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CUMBERLAND FOSSIL PLANT COAL COMBUSTION RESIDUALS MANAGEMENT OPERATIONS ENVIRONMENTAL IMPACT STATEMENT

Stewart County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
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ERRATA SHEET

TENNESSEE VALLEY AUTHORITY

CUMBERLAND FOSSIL PLANT COAL COMBUSTION RESIDUALS MANAGEMENT OPERATIONS ENVIRONMENTAL IMPACT STATEMENT

Stewart County, Tennessee

The Cumberland Fossil Plant (CUF) Coal Combustion Residuals (CCR) Management Operations Final Environmental Impact Statement (FEIS) was released to the public on April 20, 2018. The following errata sheet documents corrections and clarifications to the text of the FEIS based on a comment letter received from the U.S. Geological Survey (USGS) on May 16, 2018. These corrections reflect minor errors discovered after the release of the FEIS. There are no changes to the project or significant new circumstances or information identified in the Errata Sheet that affect the analysis and conclusions in the CUF CCR Management Operations FEIS. This document should be reviewed along with the FEIS.

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Page	Differences in Original and Amended Text
Appendix D, Page 34 & Chapter 6 Page 246	Original Text: U.S. Geological Survey. 1992. Flow Duration and Low Flows of Tennessee Streams through 1992. Water Resources Investigation Report 95-4293 by G.S. Outlaw and J.D. Weaver. Prepared in cooperation with TDEC and TVA, Nashville, Tennessee, 1996
Appendix D, Page 34 & Chapter 6 Page 242	Amendment: Outlaw, G.S., and Weaver, J.D., 1996 (USGS 1996). Flow duration and low flows of Tennessee Streams through 1992: U.S. Geological Survey Water-Resources Investigations Report 95-4293, 121 p.
Section 3.7.1.2 page 101	Original Text: of 8.72 MGD based on a USGS study in 1992 (USGS 1992) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.
Section 3.7.1.2 page 101	Amendment: of 8.72 cfs based on a USGS study in 1996 (USGS, 1996) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.
Appendix D , Section 3.2 page 5	Original Text: 8.72 million gallons per day (MGD) based on a USGS study in 1992 (USGS 1992) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.
Appendix D , Section 3.2 page 5	Amendment: 8.72 million cubic feet per second (cfs) based on a USGS study in 1996 (USGS 1996) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.
Appendix D , Section 4.2.5 page 20	Original Text: which converts to 4.69 MGD based on a USGS Study from1992 (USDS 1992).
Appendix D , Section 4.2.5 page 20	Amendment: which converts to 5.6 MGD based on a USGS Study from1996 (USGS, 1992).
Appendix D , Section 4.2.5.2 page 23	Original Data: Table 4-3 Option 1 Cumulative Impact of By-product Storage Leachate Total Mixed Concentration Estimate With Wells Creek, 1Q10 flow of Wells Creek flow of 4.69 MGD
Appendix D , Section 4.2.5.2 page 23	Amendment: Changed Table 4-3 Option 1 Cumulative Impact of By-product Storage Leachate Total Mixed Concentration Estimate With Wells Creek, 1Q10 flow of Wells Creek flow of 5.6 MGD Please Note: Change in concentrations (concentrations reduced) reflected in amended table however the impacts and end results are the same.

COVER SHEET

Cumberland Fossil Plant Coal Combustion Residuals Management Operations

Proposed action: The Tennessee Valley Authority (TVA) has prepared this Environmental Impact Statement to assess the effects and address environmental, safety, and socioeconomic concerns associated with changing the management of Coal Combustion Residuals (CCR) at the Cumberland Fossil Plant (CUF). TVA will decide which of four alternative options will be used to manage CCR produced at the plant.

Type of document: Final Environmental Impact Statement

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Abstract:

TVA needs to decide how best to conduct projects to manage CCR produced at CUF on a dry basis, which would allow for closure of the existing wet impoundments. The projects would help support the goal established by the TVA Board of Directors to eliminate wet ash storage at all its coal plants and supports the overall CCR management program at Cumberland Fossil Plant. In addition to No Action, TVA considered three alternatives that addressed several CCR management projects. These projects included the construction of a Bottom Ash Dewatering Facility, closure of the ash impoundments and options for long-term disposal of future CCR (both construction of a landfill on CUF property and offsite transport of CCR to an existing permitted landfill). All action alternatives would meet the purpose and need of the project. TVA's preferred alternative is Alternative C which would include the Construction and Operation of a Bottom Ash Dewatering Facility, Closure-In-Place of the Bottom Ash Impoundment and a combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment and Construction of an onsite landfill for future CCR produced at CUF. Impacts associated with these alternatives primarily include temporary short-term impacts during construction and minor long-term impacts to aquatic resources, loss of bat habitat, and impacts to 0.5 acre of wetland associated with construction of an onsite landfill. However, construction and operation of an onsite landfill is preferred over the use of an existing offsite landfill to avoid impacts associated with offsite transport of CCR.

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Summary

Purpose and Need for Action

This Environmental Impact Statement (EIS) addresses the management of Coal Combustion Residuals (CCR) from the Cumberland Fossil Plant (CUF). CUF is in Stewart County, Tennessee, approximately 22 miles southwest of Clarksville. The plant is on a large reservation of about 2,388 acres located at the confluence of Wells Creek and the south bank of the Cumberland River near Cumberland City. This two-unit plant was built between 1968 and 1973.

The approximately 2,470 megawatts of generating capacity provided by CUF is important in maintaining an adequate and reliable power supply to the north-central portion of TVA's service area. Accordingly, CUF is one of the coal plants that TVA plans to continue operating in the future. The plant consumes an average of 5.6 million tons of coal annually and produces approximately 1 million tons of CCR each year. TVA has historically managed storage of CCR materials generated at CUF in a combination of onsite dry stacks, wet stacks and impoundments.

With a long-standing commitment to safe and reliable operations and to environmental stewardship, TVA began to modernize its coal ash management in 2009 including converting from wet to dry ash storage. This effort was later endorsed by the TVA Board in 2011.

On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the final Disposal of Coal Combustion Residuals from Electric Utilities Rule (CCR Rule) in the Federal Register. Under the CCR Rule, impoundments are potentially subject to a closure deadline of five years, with the possibility of an extension of the closure time under certain circumstances.

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

TVA proposes to manage CCR at CUF through several projects including the construction and operation of a Bottom Ash Dewatering Facility and the closure of the existing ash impoundments. TVA is also evaluating alternatives for the long-term storage of future CCR generated at CUF.

The purpose of the proposed action is to convert the wet storage of CCR to a dry system, promote the future management of dry CCR at CUF and to meet the state and federal regulatory requirements for closing ash impoundments including EPA's CCR Rule. The project helps fulfill TVA's goal to convert wet CCR storage to dry. In addition, the dewatering facilities would also foster TVA's compliance with present and future regulatory

requirements. This includes the Tennessee Department of Environment and Conservation (TDEC) administrative order that requires TVA to evaluate and remediate, if necessary, CCR risks at all of its plants in Tennessee, except Gallatin. The TDEC Order and other environmental regulatory programs help ensure that CCR management activities at TVA's plants will continue to be protective of human health and the environment.

Alternatives Evaluated in the EIS

Based on an extensive analysis of options to manage CCR produced at CUF, TVA retained the following alternatives for detailed evaluation in the EIS:

- Alternative A – No Action
- Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF
- Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF
- Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under the No Action Alternative, TVA would not construct the proposed Bottom Ash Dewatering Facility and current operations for handling sluiced bottom ash would not change. TVA would not close the ash impoundments. Accordingly, TVA would not seek additional disposal options for dry placement of CCR generated at CUF. Rather, CCR would continue to be managed in the current impoundments and onsite stacks for as long as storage capacity is available. The No Action Alternative is not consistent with other actions that TVA could be required to take in response to regulatory programs in addition to the CCR Rule including the TDEC Order.

Consequently, this alternative would not satisfy the project purpose and need and, therefore, is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts of implementation of Alternatives B, C, and D.

Under Alternative B, TVA would complete a series of actions to manage CCR produced at CUF. These actions include:

1. Bottom Ash Dewatering Facility

   TVA would construct and operate a Bottom Ash Dewatering Facility that utilizes specialized equipment that would operate continuously while CUF is generating. The dewatering facility would be built at one of two previously disturbed locations proximate to the plant. Dewatering would involve two basic processes. In the first process, sluice water containing bottom ash would be pumped from the powerhouse to the top of two of the three submerged flight conveyers (SFCs) inside a tank. Within the SFC, the ash would settle out and would then be transported up an incline allowing for natural dewatering by gravity. Dewatered ash would be stacked and remaining water in the

material would evaporate or would drain by gravity and be collected in sumps which would drain back to the facility for treatment. The dewatered bottom ash would be transported by truck to a permitted landfill (either onsite or offsite). In the second process, water collected from the SFC would be sent to one of three clarifier tanks to allow for settling of the remaining fine bottom ash solids. Clarified water would ultimately be conveyed to a National Pollutant Discharge Elimination System (NPDES) permitted outfall.

TVA may construct a recirculation system in a subsequent phase where excess water would be routed back to the plant. Instead of discharging water from the dewatering process through the existing permitted NPDES outfall, the effluent would be rerouted back into the powerhouse for future sluicing operations. The recirculation system would be contained within the existing facility footprint.

2. Closure of the Impoundments.

TVA is considering Closure-in-Place, Closure-by-Removal as well as a combination of Closure-in-Place and Closure-by-Removal of each of the impoundments at CUF.

a. *Closure-in-Place.* Under this option, the Bottom Ash Impoundment would be dewatered, which could include decanting or drawdown which is the removal of free or ponded liquid from an impoundment, which would include the removal of pore water from the impoundment. These activities could require additional monitoring or meeting additional limits from regulators. The resulting CCR material would be stabilized in place. Following stabilization, the CCR would be regraded to promote drainage followed by installation of an approved cover system that keeps storm water from mixing with the CCR material which reduces risks of structural instability and groundwater contamination. The closure option identified for the impoundments at CUF is similar to the criteria identified in the PEIS for Closure-in-Place Category A.

b. *Combination of Closure-in-Place and Closure-by-Removal*. The Main Ash Impoundment and Stilling Impoundment would be closed using a combination of Closure-in-Place and Closure-by-Removal. CCR material plus a foot of underlying soil would be removed from the western portion of the Main Ash Impoundment and the Stilling Impoundment. These areas would be regraded within the same footprint to promote drainage and would be lined with an approved liner system and repurposed as Process Water Basin 1 and Process Water Basin 2, respectively. The remaining portion of the Main Ash Impoundment would be Closed-in-Place as described above. CCR within the portion of the Main Ash Impoundment and Stilling Impoundment to be repurposed would be removed to an existing offsite landfill.

c. *Closure-by-Removal.* Under this option, the impoundments would be dewatered and the resulting CCR material would be stabilized. For the Main Ash Impoundment, this would be followed by excavation of CCR material plus a foot of underlying soil, perimeter dike material, and support structures. The dike material would be stockpiled onsite and segregated properly if reused. A portion of the Main Ash Impoundment and the Stilling Impoundment would be repurposed as Process Water Basins 1 and 2 as described above.

Closure-by-Removal of the Bottom Ash Impoundment also entails dewatering and stabilizing residual ponded areas followed by removal of CCR material, underlying soil,

and support structures within the impoundment footprint. The resulting excavation would be approximately 40 feet in depth and would result in a loss of support for the adjacent Fly Ash Stack and Gypsum Disposal Complex. This loss of support would adversely affect slope stability of the adjacent facilities. As a result, prior to excavation to remove CCR, a retaining wall would need to be constructed along the perimeter of the impoundment to support the approximate 40-foot excavation and provide support for the adjacent facilities.

Closure-by-Removal may also include groundwater remediation, but the necessity and extent of such remediation would not be known until excavation is underway.

Once CCR and any affected soil is removed, the cleared areas would be backfilled to promote drainage and then vegetated with native, non-invasive plant species. The CCR material from the impoundments would be hauled by trucks on existing public roadways and placed in an offsite permitted landfill.

The analysis of impacts associated with transport to an existing offsite landfill are based on the closest landfill that can currently accept CCR material, the Bi-County Solid Waste Management Landfill, located in Montgomery County, Tennessee. The 37-mile haul route to the landfill would primarily use State Route (SR) 233 (also known as Cumberland City Road), SR 49 and US 79.

Although CUF has both rail and barge facilities, these facilities are not configured and designed to support loading and transport of CCR generated at CUF offsite. Further, barge and rail unloading facilities are not typical near permitted landfills and are not available at the Bi-County Solid Waste Management Landfill. As such any CCR theoretically hauled by barge or rail for landfill disposal would still entail trucking. Development of barge and rail unloading facilities would also result in additional environmental impacts (land use, wetlands, water resources, etc.) and would require additional environmental permitting. These impacts, together with the need to include trucking to the landfill site, eliminates any advantage gained. Accordingly, these forms of transport are not considered reasonable modes of transportation for offsite transport of CCR at CUF.

3. Long-Term Storage of Future CCR Produced at CUF

TVA would construct and operate a landfill for disposal of CCR generated at CUF south west of the plant site on CUF property. The selected site encompasses approximately 174 acres with a landfill footprint of about 81 acres. The landfill would be built in four stages with a total estimated capacity of 14.3 million yd^3. Based on current estimates of energy production and consumption rates, the landfill would provide for storage of CCR generated at CUF until approximately 2040, if no marketing of CCR material is assumed. The estimated capacity provides adequate CCR storage for long range planning purposes. A two-lane paved access road would be constructed onsite to transport CCR from Old Scott Road to the landfill. This road would tie into the existing access road that extends from Old Scott Road to the CUF perimeter road. TVA would pave the existing access road to support hauling of CCR to the landfill.

Under Alternative C, TVA would complete a series of projects to manage CCR produced at CUF. These actions include:

1. Bottom Ash Dewatering Facility

   TVA would construct the Bottom Ash Dewatering Facility in the same manner as described for Alternative B.

2. Closure of the Impoundments (three options)

   a. *Closure-in-Place.* Under this option, TVA would close the Bottom Ash Impoundment in-place in the same manner as described for Alternative B,

   b. *Combination of Closure-in-Place and Closure-by-Removal*. The Main Ash Impoundment and Stilling Impoundment would be closed using a combination of Closure-in-Place and Closure-by-Removal as described for Alternative B except any CCR removed from a portion of the Main Ash Pond would be transported to the existing onsite landfill (Fly Ash Stack) for long-term storage.

   b. *Closure-by-Removal*. The sequence of actions to close the ash impoundments under this option would be the same as described under Alternative B. However, CCR removed from the ash impoundments under the Closure-by-Removal option would be transported to the existing onsite landfill (Fly Ash Stack) for long-term storage.

   Therefore, impacts associated with the closure of the Main Ash Impoundment and Stilling Impoundment would be similar to Alternative B, except for the effects related to transport and storage of CCR removed from the impoundments.

3. Long-Term Storage of Future CCR Produced at CUF

   TVA would construct and operate a landfill for disposal of CCR generated at CUF southwest of the plant site on CUF property as described for Alternative B.

Under Alternative D, TVA would complete a series of projects to manage CCR produced at CUF. These actions include:

1. Bottom Ash Dewatering Facility

   TVA would construct the Bottom Ash Dewatering Facility in the same manner as described for Alternatives B and C.

2. Closure of the Impoundments (three options).

   a*. Closure-in-Place.* Under this option, TVA would close the Bottom Ash Impoundment in-place in the same manner as described for Alternative B.

   b. *Combination of Closure-in-Place and Closure-by-Removal*. Under this option, TVA would close the Main Ash Impoundment and Stilling Impoundment in-place in the same manner as described for Alternative B.

   c. *Closure-by-Removal*. The sequence of actions to close the impoundments under this option would be the same as described under Alternative B.

3. Long-Term Storage of Future CCR Produced at CUF

   In contrast to Alternatives B and C, this alternative considers the transport of future ash to a permitted offsite landfill for long-term storage. As noted under Alternative B, the analysis of impacts associated with this long-term storage option is based on the transport of future CCR to the Bi-County Solid Waste Management Landfill in Montgomery County, Tennessee.

Summary of Alternative Impacts

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

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

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Air Quality	No impact.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction activities. Best management practices (BMPs) would minimize impacts during construction. Emissions associated with the offsite transport of CCR under Closure-by-Removal of the ash impoundments would be greater than those under the combined closure of the Main Ash Impoundment and Stilling Impoundment which would include the offsite transport of a smaller amount of CCR, however all closure options would have a minor impact on regional air quality.	Similar to Alternative B, however, increased onsite emissions associated with excavation and transfer of CCR to the existing landfill due to greater number of vehicles relative to Alternative B. Offsite emissions would be notably reduced as existing ash would not be transported to an offsite landfill for disposal. Impact would be minor and localized.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction activities. BMPs would minimize impacts during construction. Long-term offsite emissions greater than Alternatives B and C due to transport of future CCR to the offsite landfill.
Climate Change and Greenhouse Gases (GHG)	No impact.	Construction and trucking operations contributes to localized GHG emissions. No impact to climate change or changes in regional GHG levels.	Similar to Alternative B. However, onsite GHG emissions associated with excavation and transfer of CCR to the existing landfill would be somewhat larger than Alternative B, but offsite emissions would be notably reduced as existing ash would	Similar to Alternative B, but magnitude of impact would be greater due to increased operation of onsite equipment and long-term effects of offsite trucking.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
			not be transported to an offsite landfill for disposal.	
Land Use	No impact.	Minor impact associated with conversion of undeveloped land to industrial use (landfill).	Same as Alternative B.	No impact.
Prime Farmland	No impact.	Minor impact from landfill construction.	Same as Alternative B.	No impact.
Geology	No impact. TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and meet appropriate safety factors.	Minor impact, mitigated by appropriate design measures.	Same as Alternative B.	Same as Alternative B for dewatering and ash impoundment closures. No impact associated with landfill construction.
Groundwater	Risk to groundwater is not reduced. However, groundwater protection processes would be implemented as needed to comply with the TDEC Order and the CCR Rule.	Minimal impacts to groundwater during construction with the use of BMPs. Closure-in-Place of the impoundments would result in long-term beneficial impacts through reduction of risk to groundwater due to reduced risk of migration of constituents to groundwater and improved water quality in comparison to the No Action Alternative. Closure-by-Removal would result in lower benefit related to reduction of risk to groundwater	Same as Alternative B. However, incrementally greater beneficial impacts of Closure-by-Removal related to reduction of risk to groundwater in both the short-term and the long-term due to shorter closure period.	Same as Alternative B.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		in the short-term, but greater beneficial impacts in the long-term. No impact as a result of landfill operation. Potential effects from leachate mitigated by effective landfill liner design coupled with use of BMPs and adherence to TDEC permitting requirements.		
Surface Water	No change from existing conditions.	Minor temporary impacts due to runoff during construction and minor long-term impacts associated with leachate and storm water discharge during operation of the landfill. Bottom ash dewatering would result in the possibility of improved water quality which would yield minor benefits, due to the capture of bottom ash solids as part of the dewatering process. Option 2 (recirculation) would result in long-term beneficial impact associated with reduction in mass loading due to operation of dewatering facilities and the recirculation of sluice water. Direct permanent impact related to filling and/or culverting	Same as Alternative B.	Same as Alternative B for dewatering and ash impoundment closures. However, minor impacts associated with landfill construction would not occur.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		3,573 feet of perennial stream and 1,211 feet of intermittent stream, which would be mitigated per permit requirements. Potential impacts to Wells Creek and/or Scott Branch from landfill leachate and storm water discharges would be mitigated to meet NPDES permit requirements.		
Floodplains	No impact.	No significant impact. Consistent with EO 11988.	No significant impact. Consistent with EO 11988.	No significant impact. Consistent with EO 11988.
Vegetation	No impact.	Minor impact resulting from the disturbance of predominantly previously disturbed areas that lack notable plant communities. Long-term minor beneficial impact associated with the change of open water area to vegetated cover. Moderate impact resulting from loss of vegetation resulting from landfill construction.	Same as Alternative B.	Same as Alternative B for dewatering and ash impoundment closures. No loss of vegetation associated with landfill construction; therefore, the magnitude of impact would be less than Alternatives B and C.
Wildlife	No impact.	Long-term beneficial impacts following closure of the ash impoundments as these areas may provide a minor expansion of upland wildlife habitat. This benefit would be incrementally	Same as Alternative B.	No impact related to loss of forested habitat. Beneficial impact would be the same as Alternative B.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		more beneficial under the Closure-by-Removal option. Impact resulting from loss of forested habitat associated with landfill development. However, impact is minor due to the abundance of high quality wildlife habitat near CUF.		
Aquatic Ecology	No impact.	Long-term beneficial impact due to the reduced discharge from dewatering. No impacts from ash impoundment closure. Minor temporary impacts during landfill construction activities that would be minimized through use of erosion control BMPs. Direct impact to aquatic biota in streams on the landfill site. Impact would be mitigated per permit requirements.	Same as Alternative B.	Similar to Alternatives B and C. However, no direct impacts to aquatic resources due to landfill construction.
Threatened and Endangered Species	No impact.	Negligible indirect impacts from dewatering facility and ash impoundment closure. Minor impact from landfill construction. Proposed landfill site is of low summer roosting quality for threatened and endangered bats, although it may be used as a foraging area.	Same as Alternative B.	Negligible indirect impacts.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Wetlands	No impact.	No impacts from dewatering facility or ash impoundment closure. Minor impact from landfill construction. Loss of 0.5 acre of wetlands determined to be jurisdictional under Section 404 of the CWA.	Same as Alternative B.	No impact.
Solid and Hazardous Waste	No impact associated with current management of CCR at CUF. Long-term impacts related to future operations due to loss of storage capacity.	Minor impact during construction and operation. Long-term impact associated with the management of solid wastes as CCR produced at CUF would be disposed in a new onsite landfill.	Similar to Alternative B. Potential impact associated with the loss of capacity of the onsite landfill (Fly Ash stack) associated with combined closure of the Main Ash Impoundment and Stilling Impoundment and the Closure-by-Removal of all the impoundments. Impact would be minor, yet greater than the Closure-in-Place option.	Similar to Alternative B. No temporary impact associated with landfill construction. Potential long-term impact related to reduction in the capacity of the existing offsite landfill related to storage of CCR.
Visual Resources	No impact.	Minor impacts from dewatering facility or ash impoundment closure due to temporary change in visual landscape during construction. The landfill would change the existing visual integrity which would result in a long-term moderate impact to the viewshed	Same as Alternative B.	Negligible long-term impact.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		of some members of the surrounding community.		
Cultural and Historic Resources	No impact.	No impacts from dewatering facility or ash impoundment closure. Direct adverse impact to archeological site associated with landfill construction. TVA would enter in to consultation with the Tennessee State Historic Preservation Officer (SHPO) for approval of the research design and the development of a Memorandum of Agreement regarding mitigation activities.	Same as Alternative B.	No effect.
Natural Areas, Parks and Recreation	No impact.	No direct impacts. Indirect impact to facilities during construction and during transport of existing CCR to the offsite landfill under the combined closure option for the Main Ash Impoundment and Stilling Impoundment due to increased vehicles on surrounding roadways. Impact would be minor, yet less than the Closure-by-Removal option.	Similar to Alternative B, however no offsite impacts related to the impoundment Closure-by-Removal option.	Same as Alternative B for dewatering and ash impoundment closures. Long-term indirect impact to facilities along the haul road associated with transport of future CCR. Impact minor but incrementally greater than Alternatives B and C.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Transportation	No impact.	No impact to traffic and levels of service on public roads for future CCR produced at CUF. Impact related to increased traffic and potential increase in crash rates during transport of existing CCR to the offsite landfill under the Closure-in-Place option. Impact would be minor, yet less than the Closure-by-Removal option, which includes the potential for onsite or offsite storage of CCR removed from the Stilling Impoundment and a portion of the Main Ash Impoundment to support the proposed Process Water Basins. Impact would be minor, yet less than the Closure-by-Removal option.	Same as Alternative B for dewatering and ash impoundment Closure-in-Place. No impact to traffic and levels of service on public roads associated with transport of CCR to an onsite landfill.	Same as Alternative B for dewatering and ash impoundment closures. Moderate impact related to increased traffic and potential increase in crash rates during transport of future CCR to the offsite landfill.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Noise	No impact.	Minor impact. Noticeable increase in noise levels during landfill operation. Operational noise would be intermittent and generally occur during normal working hours. Indirect impact along the haul route to the offsite landfill related to noise resulting from transport of CCR under the combined closure option for the Main Ash Impoundment, which includes the offsite transport of CCR. Impact would be minor, yet less than the Closure-by-Removal option.	Similar to Alternative B for dewatering and in-place ash impoundment closure. No impact to offsite receptors associated with offsite transport of CCR.	Same as Alternative B for dewatering and ash impoundment closures. Impact associated with the transport of future CCR produced at CUF to the offsite landfill would be minor, but of a greater magnitude than Alternatives B or C.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Socioeconomics and Environmental Justice	No impact.	Minor temporary beneficial impact resulting from benefits to the localized workforce. Positive economic benefits to regional economy due to capital expenditures. Minor indirect impact to ease of movement to and from community facilities along the haul route associated with the offsite transport of CCR under the combined closure option for the Main Ash Impoundment and Stilling Impoundment, which includes the offsite transport of CCR. Impact would be minor, yet less than the Closure-by-Removal option. No impact to Environmental Justice communities.	Similar to Alternative B. Increased workforce associated with ash impoundment closure, however, increase is offset by shorter duration of construction. No impact associated with offsite transport of CCR.	Same as Alternative B, but incrementally lower effect on regional economy and workforce as landfill would not be constructed. Incrementally greater effect on ease of movement to and from community facilities along the haul route associated with the long-term transport of future CCR to the offsite landfill.

	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Public Health and Safety	No impact.	Closure-by-Removal and the combined Closure-by-Removal and Closure-in-Place of the ash impoundments would have higher risk to workforce health and safety as well as increased risk related to offsite transportation of CCR (crashes, derailments, road damage and other transportation-related effects) than the Closure-in-Place option.	Risk to workforce health and safety related to excavation and transport of CCR would be similar to Alternative B. However, under the Closure-by-Removal and the combined Closure-by-Removal and Closure-in-Place option there would be no risk to public safety associated with the use of public roads.	Risk to workforce health and safety related to ash impoundment closure would be the same as Alternative B. Risk to public safety associated with the use of public roads to transport future CCR would be greater than Alternative B and C given the projected total truck traffic and duration of the project.
Cumulative Effects	No impact.	Minor localized increase in air and noise emissions. Incremental impacts to wetland and aquatic resources. No notable cumulative effect.	Same as Alternative B.	Minor localized increase in air and noise emissions. Although air emissions would be greater than Alternatives B and C, no notable cumulative effect. No cumulative impact to wetlands and aquatic resources.

Preferred Alternative

TVA has identified Alternative C as the preferred alternative. Alternative C would include the construction and operation of a Bottom Ash Dewatering Facility, Closure-in-Place of the Bottom Ash Impoundment and a combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment and Stilling Impoundment, and Construction of an Onsite Landfill for future CCR produced at CUF.

Alternative C would achieve the purpose and need of the project. Implementation of Alternative C would result in minor impacts to the natural environment primarily from the construction of the onsite landfill, but these are not significant. In addition, this alternative allows for the re-use and redevelopment of a portion of the Main Ash Impoundment, and would avoid offsite transport of existing and future CCR and the air emissions, noise emissions, safety risks and disruptions to the public that would be associated with the offsite transport of CCR along public roadways.

In addition to state and federal water and waste regulations, TVA's CCR disposal areas at Cumberland, including the impoundments, are subject to the administrative order entered by TDEC. Therefore, it is TVA's intention not to pursue Closure-in-Place activities immediately, but rather let the execution of the requirements of the TDEC order guide the closure activities to the maximum extent possible.

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Symbols, Acronyms, and Abbreviations

AADT	Annual Average Daily Traffic
ACS	American Community Survey
APE	Area of Potential Effect
ARAP	Aquatic Resources Alteration Permit
BMP	Best Management Practices
CAA	Clean Air Act
CCR	Coal Combustion Residuals
CCW	Condenser Cooling Water
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
COC	Constituents of Concern
CRM	Cumberland River Mile
CUF	Cumberland Fossil Plant
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted decibel
DSWM	Division of Solid Waste Management
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FGD	Flue Gas Desulfurization
FHWA	Federal Highway Administration
GHG	Greenhouse Gases
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
IMP	Internal Monitoring Point
IPaC	Information for Planning and Conservation
Ldn	Day-Night Sound Level
LOS	Level of Service
MGD	Million Gallons Per Day
MOA	Memorandum of Agreement
msl	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OSHA	Occupational Safety and Health Administration

PEIS	Programmatic Environmental Impact Statement
PM	Particulate Matter
RCRA	Resource Conservation and Recovery Act
RIF	Relative Impact Framework
RM	River Mile
ROD	Record of Decision
SCR	Selective Catalytic Reduction Systems
SFC	Submerged Flight Conveyers
SGLP	Synthetic Groundwater Leaching Procedure
SHPO	State Historic Preservation Officer
SWPPP	Storm Water Pollution Prevention Plan
SR	State Route
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TMSP	Tennessee Storm Water Multi-Sector General Permit for Industrial Activities
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WQC	Water Quality Criteria
WWTP	Waste Water Treatment Plant
yd^3	Cubic Yard

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

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

Built between 1968 and 1973, the two-unit plant generates enough energy to supply about 1.1 million homes. The plant consumes an average of 5.6 million tons of coal annually and produces nearly 1 million tons of coal combustion residuals (CCR) each year.

With a long-standing commitment to safe and reliable operations and to environmental stewardship, TVA began to modernize its coal ash management in 2009 including converting from wet to dry ash storage. This effort was later endorsed by the TVA Board in 2011. On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the final Disposal of Coal Combustion Residuals from Electric Utilities Rule (CCR Rule) in the Federal Register. Under the CCR Rule, impoundments are potentially subject to a closure deadline of five years, with the possibility of an extension of the closure time under certain circumstances.

In June 2016, TVA issued a Final Programmatic Environmental Impact Statement (PEIS) that analyzed methods for closing impoundments that hold CCR materials at all TVA fossil plants and identified specific screening and evaluation factors to help frame the evaluation of closures at site-specific facilities (TVA 2016b). A Record of Decision (ROD) was released in July 2016 that would allow future environmental reviews of CCR impoundment closures to draw from the analysis results in the PEIS.

TVA has prepared this Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts of implementing projects proposed to support dry handling and CCR Rule state regulatory compliance at CUF. This NEPA document is intended to tier from the 2016 Final PEIS to evaluate the closure alternatives for the ash impoundments (Bottom Ash Impoundment, Main Ash Impoundment and Stilling Impoundment). In addition, the EIS analyzes the impacts of construction and operation of a Bottom Ash Dewatering Facility and disposal of future dry CCR actions (Figure 1-1).

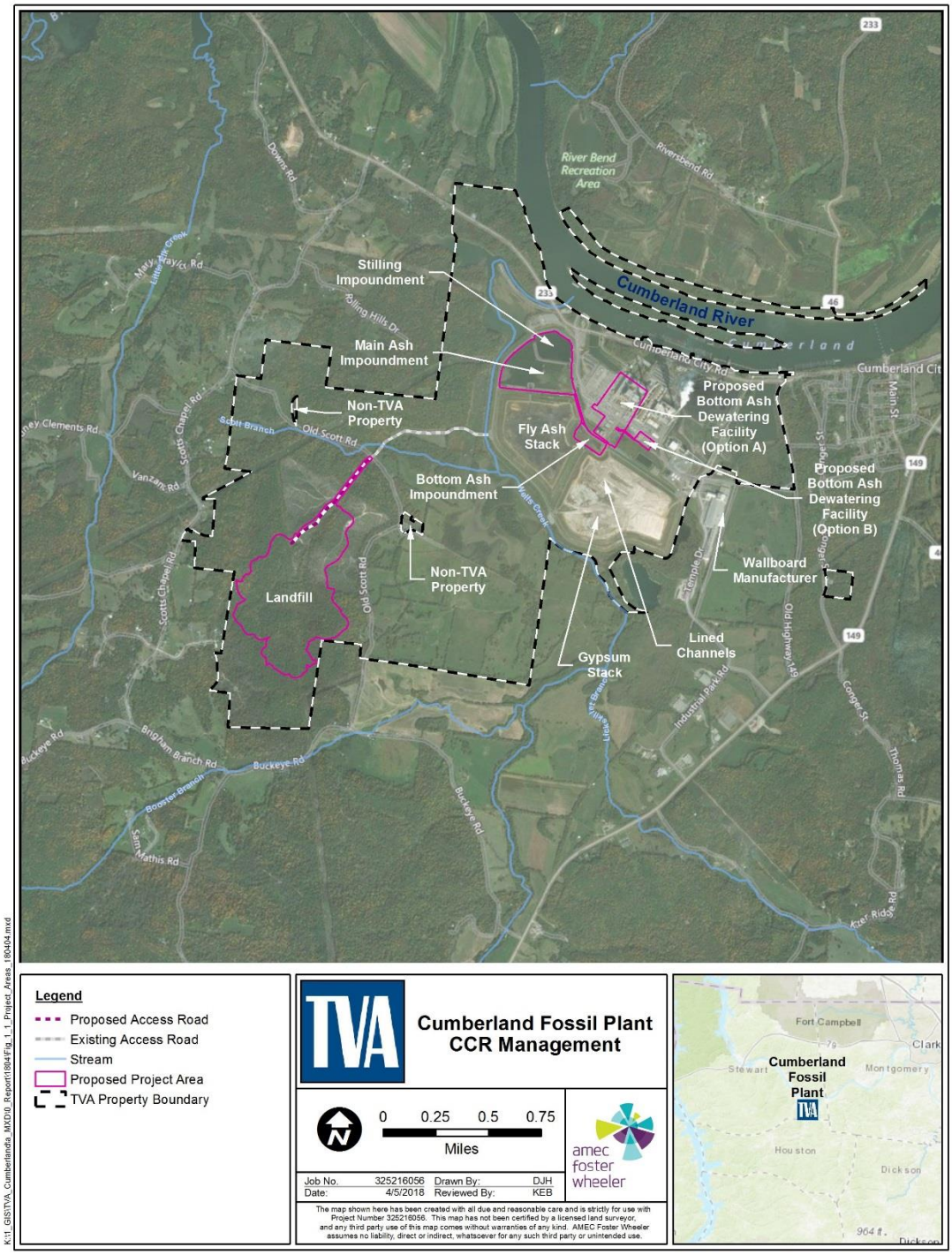

Figure 1-1. Location of Cumberland Fossil Plant and the Proposed CCR Management Projects

1.2 Current Management of CCR Material at CUF

CUF generates fly ash, bottom ash, commercial grade gypsum, and solids from the flue gas desulfurization (FGD) process. Historically, TVA has managed storage of CCR materials at CUF in a combination of dry stacks and impoundments. Bottom ash generated by the operating units is sluiced to the existing Bottom Ash Impoundment where most of the material settles out. The settled bottom ash is excavated and stacked in the Fly Ash Stack. Water from the Bottom Ash Impoundment flows to the Main Ash Impoundment and Stilling Impoundment before being discharged to the Condenser Cooling Water Channel (CCW) and ultimately is discharged into the Cumberland River through a permitted outfall. Fly ash is transported in dry form to the Fly Ash Stack. Gypsum is dewatered and conveyed to an adjacent wall-board manufacturer or disposed in the Gypsum Stack or to lined channels where it is dewatered, stockpiled for later use, or disposed in the Gypsum Stack (Figure 1-1). TVA estimates that CUF generates an annual average of approximately 282,000 tons of fly ash, 70,000 tons of bottom ash and 629,000 tons of gypsum.

What are "CCR"?

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

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

Bottom Ash: Bottom ash is comprised of the incombustible coarse particles that settle to the bottom of the combustion chamber of a boiler.

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

1.3 Purpose and Need

The approximately 2,470 megawatts of generating capacity provided by CUF is important in maintaining an adequate and reliable power supply to the north-central portion of TVA's service area. Accordingly, CUF was identified in TVA's 2015 Integrated Resource Plan (TVA 2015a), as one of the coal plants that TVA plans to continue operating in the future.

The purpose of the proposed action is to convert the wet storage of CCR to a dry system, to promote the future management of dry CCR at CUF, and to meet the state and federal regulatory requirements for closing ash impoundments including EPA's CCR Rule. The project helps fulfill TVA's goal to convert wet CCR storage to dry and applies to both existing CCR (CCR in the impoundments) and future CCR (dry CCR that would be produced at CUF under all of the alternatives). In addition, the dewatering facilities would also foster TVA's compliance with present and future regulatory requirements. This includes the Tennessee Department of Environment and Conservation (TDEC) administrative order that requires TVA to evaluate and remediate, if necessary, CCR risks at its plants in Tennessee, except Gallatin. The TDEC Order and other environmental regulatory programs help ensure that CCR management activities at TVA's plants will continue to be protective of human health and the environment.

1.4 Decision to be Made

This EIS is being prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action. Specifically, TVA needs to decide whether to or not to implement projects to manage CCR produced at CUF on a dry basis

which would allow closure of the impoundments. TVA's decision will consider factors such as environmental impacts, economic issues, availability of resources and TVA's long-term goals. This EIS is prepared to support TVA's decision-making process.

1.5 Related Environmental Reviews

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

Cumberland Fossil Plant Borrow Areas and Access Road Environmental Assessment (TVA 2017b). The EA was prepared to assess the development of two borrow sites on TVA property to be used to support partial closure of the Fly Ash and Gypsum Stacks in accordance with their solid waste permits and other plant operations. The EA also evaluated the construction of an access road to reach the borrow sites. Borrow from these areas may be needed to support future activities evaluated in this EIS.

Final Ash Impoundment Closure Environmental Impact Statement (TVA 2016b). The PEIS was prepared to address the closure of CCR impoundments at all of TVA's coal-fired power plants. The report consists of two parts: Part I – Programmatic National Environmental Policy Act Review and Part II – Site-Specific NEPA Review. In Part I, TVA programmatically considered environmental effects of closure of ash impoundments using two primary closure methods: (1) Closure-in-Place and (2) Closure-by-Removal. A Record of Decision was released in July of 2016 that would allow future environmental reviews of CCR impoundment closures to tier from the Final PEIS. This EIS is intended to tier from the Final PEIS to evaluate the closure alternatives for the existing ash impoundments at CUF.

Shawnee Fossil Plant Bottom Ash Process Dewatering Facility EA (TVA 2016d). This EA evaluated the installation of equipment to remove water from bottom ash generated at Shawnee Fossil Plant (SHF). The bottom ash dewatering equipment proposed at Shawnee is similar to the proposed dewatering equipment for bottom ash at CUF.

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

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

Environmental Assessment Development of By-Product Disposal Facilities Cumberland Fossil Plant – Flue Gas Desulfurization Gypsum and Fly Ash (TVA 1992). This EA evaluated disposal options for gypsum and fly ash at CUF. The selected alternative is the use of the current gypsum and fly ash stacks.

1.6 Scope of the EIS and Summary of the Proposed Action

This EIS evaluates the potential environmental, cultural, and socioeconomic impacts of proposed construction and operation projects to manage CCR produced at CUF. A detailed description of the proposed action and alternatives considered are provided in Chapter 2.

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

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

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplains Management), EO 11990 (Protection of Wetlands), and EO 12898 (Environmental Justice), EO 13112 as amended by EO 13751 (Invasive Species; and applicable laws including the National Historic Preservation Act of 1966, Endangered Species Act of 1973 (ESA), Clean Water Act (CWA), and Clean Air Act (CAA).

1.7 Scoping and Public Involvement

1.7.1 Scoping

During the scoping period for this EIS, TVA published a Notice of Intent (NOI); sent notifications to a range of federal, state and local agencies; established a project Web site (https://www.tva.gov/); and established means for the public to provide comments verbally, in writing and by phone message.

1.7.2 Notice of Intent

TVA's 30-day scoping period was initiated on December 5, 2016, with the publication in the Federal Register of the NOI. The NOI announced that TVA planned to prepare an EIS to address the management of CCR at CUF. In addition, TVA published notices regarding this effort in regional and local newspapers; issued a news release to media; and posted the news release on the TVA Web site to solicit public input.

TVA also developed an initial project mailing list that included local and regional stakeholders, governments and other interested parties. Letters were sent to notify those on the list of the project. Approximately 350 postcards were also mailed to all residents within 3 miles of the plant.

TVA held a public scoping meeting on December 12, 2015, in Clarksville, Tennessee. Approximately 10 people attended the scoping meeting. Attendees included members of the public, media representatives and other special interest groups.

1.7.3 Scoping Feedback

TVA received six comment submissions. Of the six submissions, four were from members of the public and two were from environmental advocacy organizations. These organizations are:

- Sierra Club (583 individuals signed a form letter, 134 of these commenters also submitted individual comments). Most of the comments expressed concern that water quality be protected.
- The Southern Environmental Law Center and nine other environmental advocacy groups submitted a 13-page letter with 12 attachments.

Comments received addressed project alternatives, adequacy of impact analysis, groundwater and surface water, aquatic ecology, tiering from the PEIS, and general topics.

In addition, TVA received a copy of four comment submissions which had been previously submitted in relation to the Ash Impoundment Closure PEIS process. Those four sets of comments were previously addressed in Appendix A of the PEIS and are not addressed further in this document. The Final Ash Impoundment Closure Environmental Impact Statement, Part I – Programmatic NEPA Review is available on the TVA Web site at: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews.

A copy of the scoping report is provided in Appendix A.

1.7.4 Public and Agency Review of the Draft EIS

The Notice of Availability of the Draft EIS was published in the Federal Register on November 17, 2017, initiating a 45-day public comment period which concluded on January 2, 2018. In addition, notification of availability of the Draft EIS was announced in regional and local newspapers, and a news release was issued to the media and posted to TVA's Web site. TVA's agency involvement included sending letters to local, state and federal agencies and federally recognized tribes to notify them of the availability of the Draft EIS. A list of agencies and tribes notified of the availability of the Draft EIS is provided in Chapter 5.

TVA hosted a public meeting on November 28, 2017, at the Cumberland City Fire Hall in Cumberland City, Tennessee. Notification of the public meeting was sent to all addresses within 3 miles of the CUF plant, and was also published in local newspapers.

TVA accepted comments submitted through mail, email, a comment form on the public website, and at the public meeting. TVA received one request from an individual for a hard copy of the EIS and one request from an individual to be added to the mailing list for future information about the project and to be notified when the Final EIS is available. TVA addressed those comments on an individual basis. TVA received a total of 69 comments from 15 commenters. Of the 15 submissions, three were from federal entities, one was from a state entity, one was from a group of environmental organizations, and 10 were from members of the public.

Comments were received in relation to the Draft EIS sufficiency, compliance with the CCR Rule and TDEC order, selection of the preferred alternative, groundwater and surface water impact, local geology, air impacts, solid waste management, and other general topics.

TVA carefully reviewed all the substantive comments that were received. Summarized comments, TVA's responses, and the original comment submissions are included in Appendix B. TVA will not make final decisions any earlier than 30 days after the Notice of Availability of the Final EIS is published in the Federal Register.

1.8 Necessary Permits or Licenses

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

- TDEC Division of Solid Waste Management (DSWM) Class II Solid Waste Permit
- General Construction Storm Water Permit and development of a Storm Water Pollution Prevention Plan (SWPPP).
- National Pollution Discharge Elimination System (NPDES) permit plan change, application and/or modification.
- Tennessee Storm Water Multi-Sector General Permit for Industrial Activities (TMSP) application and/or modification.
- Actions involving wetlands and/or stream crossings would be subject to federal CWA Section 404 permit requirements.
- A TDEC Aquatic Resources Alteration Permit (ARAP) certification may be required for any alterations to streams and wetlands on the affected area.
- Any new outfalls would require a notification or permit modification request to TDEC.
- Air permitting regulations under the CAA require TVA to secure an Air Pollution Control Permit to Construct prior to the commencement of the proposed construction. The project would likely require revisions to TVA's Title V Permit under the CAA for operations.

Other necessary permits would be evaluated based on site-specific conditions.

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CHAPTER 2 – ALTERNATIVES

2.1 Introduction

CUF produces electricity using two active coal-fired generating units (Units 1 and 2) which produce CCR including fly ash, gypsum and/or bottom ash. TVA is considering a series of actions to manage CCR produced at CUF. These actions include the construction and operation of a Bottom Ash Dewatering Facility, closure of existing impoundments, and management and storage of future dry CCR generated at CUF.

These actions are summarized below and are illustrated on Figure 2-1.

1. Bottom Ash Dewatering Facility

TVA would construct a Bottom Ash Dewatering Facility which would convert wet bottom ash generated at CUF to a dry CCR product using a continuous or "once-through" system. TVA may construct a recirculation system in a subsequent phase where excess water would be routed back to the plant and reused.

2. Close Existing Impoundments

Alternatives developed by TVA to implement impoundment closure incorporate elements of both Closure-by-Removal and Closure-in-Place as described below:

a) Closure-in-Place

b) Combination of Closure-in-Place and Closure-by-Removal – Any CCR removed from the impoundments would be transported to an existing onsite landfill (Fly Ash Stack), or to an existing offsite landfill

c) Closure-by-Removal – Any CCR removed from the impoundments would be transported to an onsite landfill (Fly Ash Stack), or

d) Closure-by-Removal – Any CCR removed from the impoundments would be transported to an existing offsite landfill.

Onsite vs Offsite

In this EIS, options for management of CCR produced at CUF include offsite and onsite storage. These options would apply to both existing CCR (CCR in the impoundments) and future CCR (dry CCR that would be produced at CUF under all of the proposed alternatives).

Onsite: Location within the boundaries of TVA owned property on CUF.

Offsite: A landfill location in the vicinity of CUF which would already be permitted to accept CCR. The analysis of impacts associated with the offsite management of CCR (both existing and future CCR) are based on the closest landfill that can currently accept CCR material, the Bi-County Solid Waste Management Landfill in Montgomery County, Tennessee.

3. Long-term Storage of Future Dry CCR Produced at CUF.

Alternatives developed by TVA to evaluate the management of future dry CCR produced at CUF include:

a) Construction and operation of an onsite landfill.

b) Transportation of CCR to an existing offsite landfill.

Each of the proposed projects as well as project alternatives eliminated from detailed consideration is described in Section 2.2. Section 2.3 identifies the alternatives evaluated in this EIS.

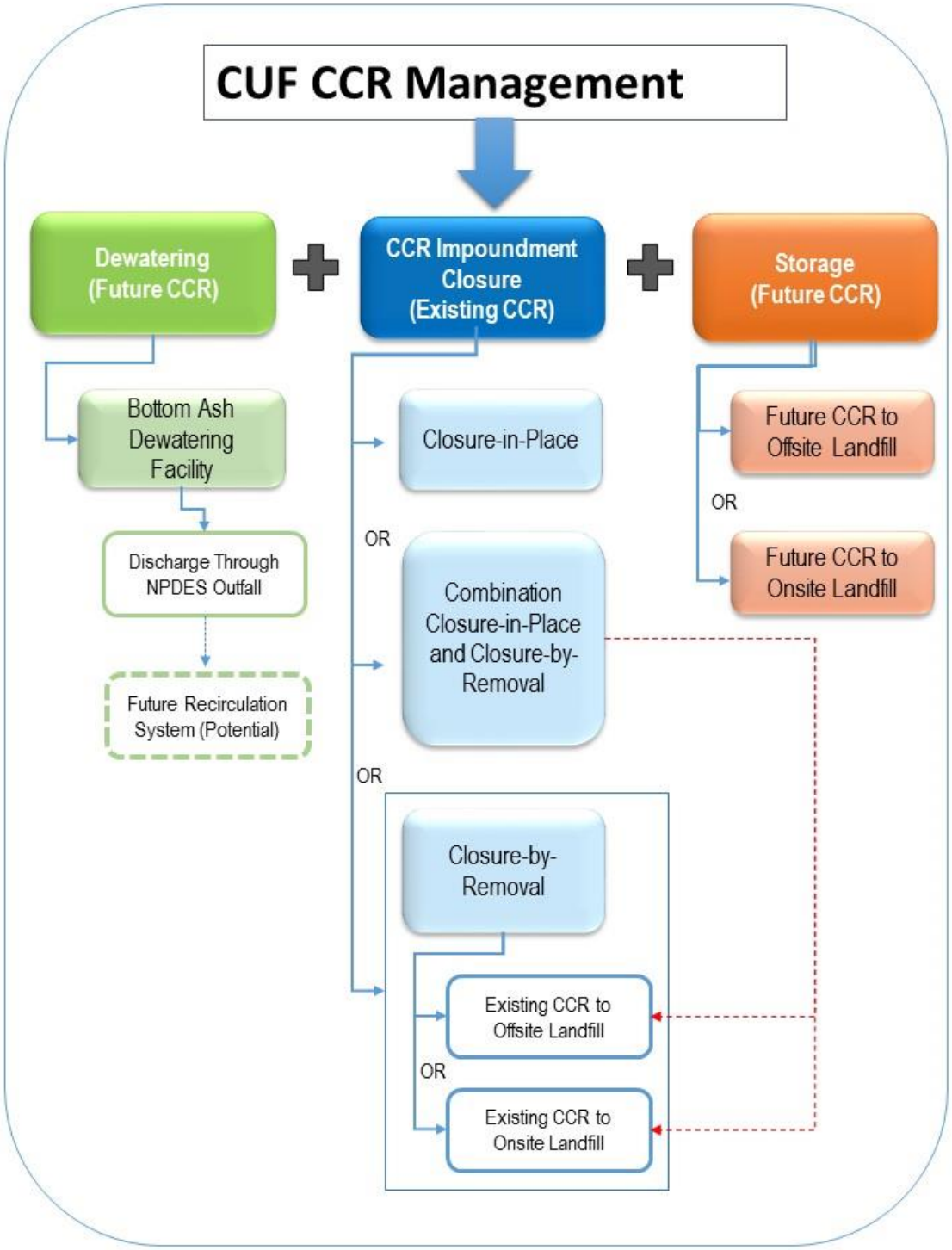

Figure 2-1. Proposed CCR Management at Cumberland Fossil Plant

2.2 Description of TVA's Proposed Projects for Management of CCR and Preliminary Alternatives

2.2.1 Bottom Ash Dewatering Facility

TVA intends to transition from a wet storage system to dry storage at CUF and close all wet impoundments containing CCR. To enable this wet-to-dry conversion, TVA proposes to construct and operate a Bottom Ash Dewatering Facility to help manage its bottom ash, economizer ash, and pyrites (hereinafter referred to as bottom ash).

Construction of the Bottom Ash Dewatering Facility is expected to take place over an 18- to 24-month period. The proposed Bottom Ash Dewatering Facility would be constructed within a 30.3-acre previously disturbed site located south of Units 1 and 2. This site is identified as Option A. However, during the period between the publication of the Draft EIS and the preparation of the Final EIS, TVA identified a second area that could support the construction of the Bottom Ash Dewatering Facility. This 2.9-acre area is located adjacent to the southeast corner of the previously identified 30.3-acre site (Option A) and is currently used for laydown and storage of equipment. This 2.9-acre site, identified as Option B, is also previously disturbed and impacts of construction and operation of a dewatering facility at this site would be the same as those described for Option A. However, construction of the Bottom Ash Dewatering Facility at this site would require less demolition and utility relocation which would minimize the impact to normal plant operations. Additionally, this site would also allow dewatering equipment to be constructed in a layout similar to other sites, whereas the original site has existing sluice piping that restricts equipment layout which would result in greater project cost and reduced operational inefficiency.

Therefore, TVA would place the proposed dewatering facility in one of two previously disturbed sites that currently support plant operations. The location of Options A and B are shown on Figure 2-2. Impacts associated with development of a dewatering facility at either of these sites would be the same and therefore they are analyzed concurrently in the EIS. As previously mentioned, both of the proposed project footprints for the dewatering facility have been thoroughly disturbed by past construction and excavation activities and therefore construction would not disrupt environmental resources including wetlands, archaeological resources and sensitive species. However, if TVA choses to construct the Bottom Ash Dewatering Facility at the site identified as Option B, no construction work would be implemented until TVA receives concurrence from the Tennessee State Historic Preservation Officer (SHPO).

TVA has identified approximately 128 acres including the fly ash stack and portions of the gypsum stack that could be used for temporary equipment laydown and mobilization during construction of the Bottom Ash Dewatering Facility and closure of the ash impoundments. These sites are also shown on Figure 2-2.

Under this alternative, TVA may construct a recirculation system in a subsequent phase where excess water would be routed back to the plant for future sluicing or other allowed reuse operations. The recirculation system would be contained within the existing facility footprint.

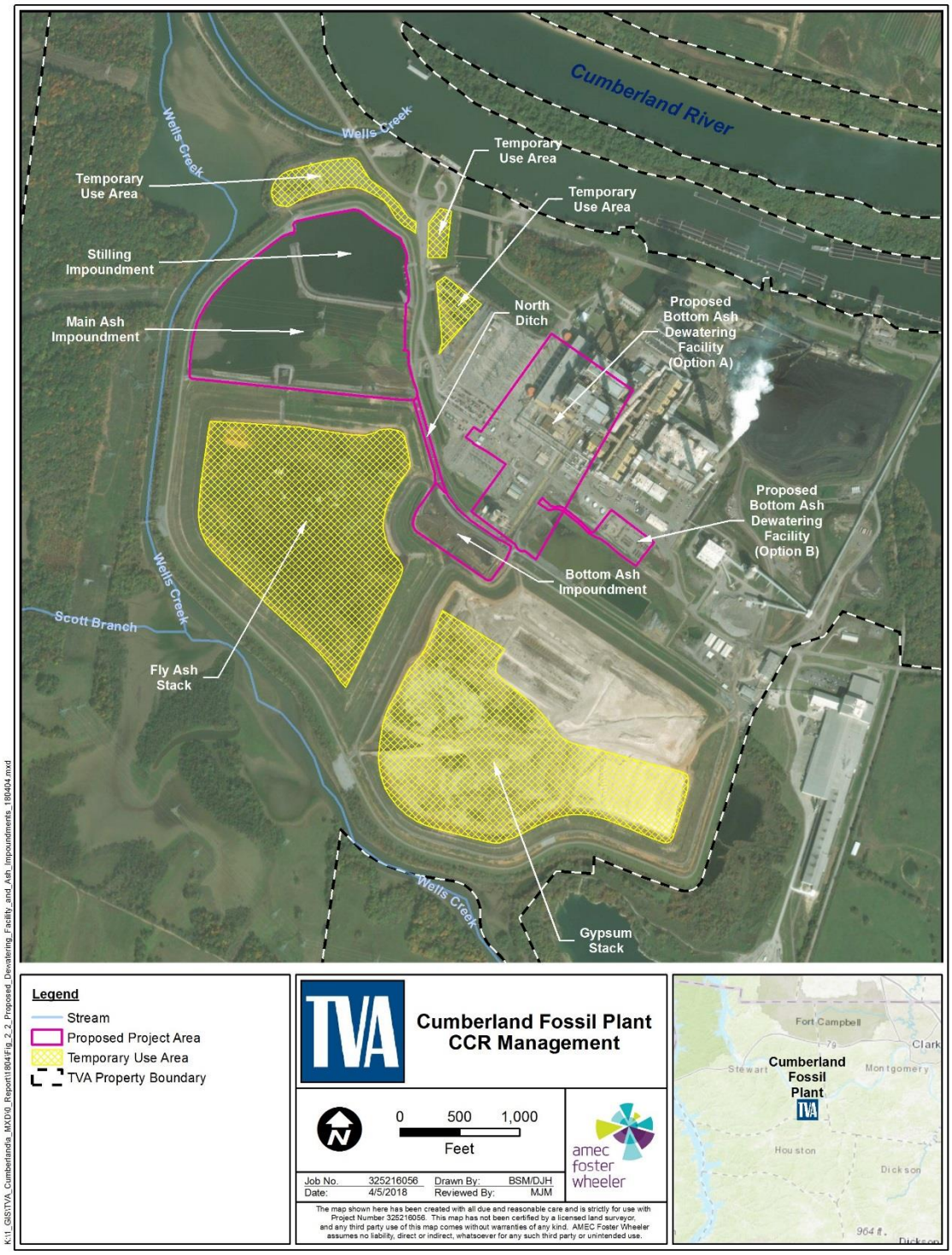

Figure 2-2. Project Areas for the Proposed Bottom Ash Dewatering Facility and Ash Impoundment Closures at Cumberland Fossil Plant

Bottom ash would be dewatered using specialized equipment that would operate continuously while CUF is generating. Dewatering would involve two basic processes. In the first process, sluice water containing bottom ash residuals would be pumped from the powerhouse to the top of two of the three submerged flight conveyers (SFC) inside a tank. Within the SFC, the ash would settle out and would then be transported up an incline allowing for natural dewatering by gravity. Dewatered ash would be stacked on concrete pads in piles within a storage bunker with a total combined storage capacity of 3 days/80 hours. The maximum height of the storage pile would be 40 to 50 feet at full capacity. Any remaining water in the material would evaporate or would drain by gravity and be collected in sumps which would drain back to the facility for treatment. The dewatered dry bottom ash would be transported by truck to a permitted landfill.

In the second process, water collected from the SFC would be sent to one of three clarifier tanks (72 feet in diameter and 16 feet high). Wastewater treatment chemicals would be used to facilitate settling of the solids in the clarifiers. The chemicals to be used would be evaluated to ensure they are safe for aquatic organisms and are not detrimental to water quality. Fine ash solids would be pumped back into the SFC for further dewatering. Clarified water would be conveyed to a process water tank which would supply water for use in the dewatering system. Excess water from the process water tank would be conveyed to the proposed Process Water Basins 1 and 2 and ultimately to an NPDES permitted outfall.

The Bottom Ash Dewatering Facility would be designed using three sets of parallel treatment systems to provide redundancy and operational flexibility allowing dewatering to continue in the event of system mechanical problems.

During the interim period between closure of the Bottom Ash Impoundment and prior to construction of the Bottom Ash Dewatering Facility, bottom ash and gypsum fines would be directed to standalone tanks and would be dipped or scooped for removal and placed in trucks to be transported to either the current onsite stack or the future onsite landfill. Once the Bottom Ash Dewatering Facility is operational, the standalone tanks would be used to support process water treatment or to support other plant needs. The tanks would be placed within the closed portion of the Main Ash Impoundment or within the closed portion of the Bottom Ash Impoundment.

2.2.1.1 Bottom Ash Dewatering Facility Alternatives Considered, but Eliminated from Detailed Consideration

Boiler Bottom Ash Removal System. Under this alternative, TVA would construct a SFC directly beneath each active boiler unit within the powerhouse. Instead of sluicing bottom ash to a dewatering facility, the quenched bottom ash would be transported up an incline allowing for natural dewatering by gravity. At the top of the incline, the ash would be discharged to concrete pads (storage bunkers) for temporary storage and additional drainage. As such, there would be no bottom ash sluice water, and there would be no need for a recirculation system. However, there is not enough physical clearance to accommodate the required ash conveyance equipment underneath the boiler bottoms, and there is not enough space to locate the supporting and auxiliary equipment close to the boiler bottoms. Therefore, this alternative would not be feasible and was eliminated from further consideration.

Mechanical Removal Using Excavators in Settling Tanks. Under this alternative, bottom ash would be sluiced from the powerhouse to a series of above-ground holding tanks, where the ash solids would settle out to the bottom of the tanks. As a tank becomes filled with

solids and settling efficiency is reduced, the bottom ash would be excavated out of the tank using mechanical excavators and allowed to dry in piles on the ground. After further dewatering and drying, the bottom ash would be transported to the selected permitted landfill. Effluent water from the tanks would be discharged through the NPDES-permitted outfall. This process is labor-intensive and would result in higher uncertainty in meeting CCR management and NPDES permit requirements. Additional measures to meet CCR management requirements could include concrete bunkers and runoff collection in sumps. Additional measures to meet NPDES requirements could include process water tanks. Once these measures are added, this alternative would have the same effectiveness as the proposed dewatering facility, but this alternative is more labor intensive and costly than the proposed dewatering facility. Although TVA proposes to use a similar system to temporarily handle bottom ash during the interim period between closure of the Bottom Ash Impoundment and prior to construction of the Bottom Ash Dewatering Facility, the permanent use of this alternative was eliminated from further consideration as this would have the same effectiveness as the proposed facility at an increased cost.

Isolation and Separate Processing of Bottom Ash and Mill Reject Streams. This alternative involves the construction of a mill reject separation system in addition to the bottom ash system. The mill rejects and bottom ash would be conveyed in separate sluice streams, and each sluice stream would have its own dewatering facilities. This would increase the marketability of the bottom ash for beneficial reuse. This alternative was eliminated for further consideration at this time as the construction of both a mill reject separator and bottom ash separator would nearly double the cost of the dewatering process, double the construction period and require a larger footprint that would increase environmental impact. In addition, given the variability of the bottom ash market, which is related to construction markets, there is a high probability that bottom ash would need to be stored during low market periods, resulting in logistical, storage, and transportation issues. Additionally, mill reject handling and storage or disposal would be required.

Dry Boiler Bottom Conversion. Conversion from wet boiler bottoms to dry bottoms and removing bottom ash in a dry state using methods that do not use water to cool the ash such as pneumatic conveying, DRYCON™, and vibrating ash conveying, were also considered. CUF is not a candidate for this process due to the space limitations and the hopper arrangements in the basement of the plant. The boilers at CUF are in basements close to the powerhouse floor. The physical clearance is insufficient to accommodate the required dry ash conveyance and supporting equipment in proximity to the boiler bottoms. Further, the cost of Dry Boiler Bottom Conversion systems was found to be at least an order of magnitude higher than the wet-to-dry conversion. For these reasons, this alternative was eliminated from further consideration.

A summary of the primary characteristics of the proposed dewatering facility is provided in Table 2-1.

Table 2-1. Primary Characteristics of the Proposed Bottom Ash Dewatering Facility

Project Feature	Characteristic	Construction/Operation of a Bottom Ash Dewatering Facility
Plant Area	Construction – temporary land use	128.3 acres. This acreage includes five temporary laydown areas located onsite (see Figure 2-2). These areas would also be used to support impoundment closure activities and landfill construction
	Operation – permanent land use	Bottom Ash Dewatering Facility would be built within the 30.3-acre project area as shown on Figure 2-2.
Height	Maximum height of dewatering facility or components	Top of the conveyor is approximately 40 feet high
Employment Workforce	Construction	150
	Operation	No change from existing

2.2.2 Ash Impoundment Closure

2.2.2.1 Programmatic Environmental Impact Statement

As described previously, TVA issued a Final PEIS in June 2016 that analyzed methods for closing impoundments that contain CCR materials at TVA fossil plants. The PEIS identified specific screening and evaluation factors to help frame the assessment of future closure actions at TVA facilities. The ROD, released in July 2016, determined that future environmental reviews of CCR impoundment closures at TVA facilities could tier from the PEIS if the impoundments fit into the framework established in the PEIS. Figure 2-3 provides the conceptual framework used to evaluate ash impoundment closures to determine if the conclusions reached from the PEIS would be applicable to the proposed impoundment closures at CUF.

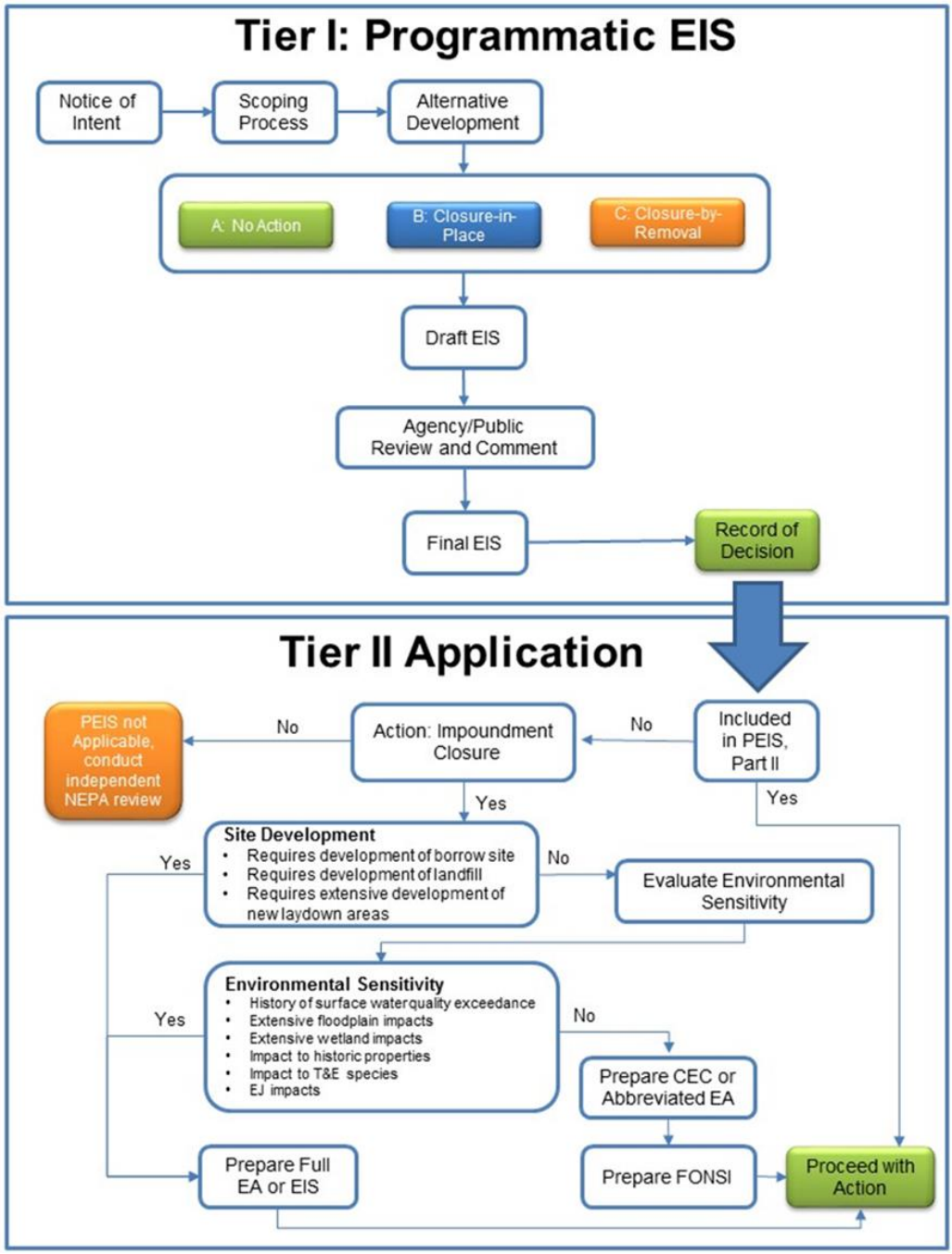

Figure 2-3. Tiered NEPA Process for TVA Ash Impoundment Closure

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

1. *Closure-in-Place*. Closure-in-Place involves stabilizing the CCR in place and installing a cover system.

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

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

For Closure-in-Place, TVA's analyses also confirmed EPA's determination that dewatering and capping impoundments would reduce groundwater contamination and structural stability risks because the water pressure would be reduced. Compared to Closure-by-Removal, this alternative would have less risk to workforce health and safety than those related to offsite transportation of CCR (crashes, derailments, road damage and other transportation-related effects).

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

Furthermore, as described in Part I, Section 2.3 of the PEIS, 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 2016). EPRI qualitatively applied its RIF to specific CCR facilities that TVA proposed to close in Part II of the PEIS. EPRI's site-specific analyses confirm TVA's programmatic conclusions about the merits of and relative differences between the two closure methods.

2.2.2.2 Tiering from Ash Impoundment Closure PEIS

This section considers the applicability and appropriateness of the ash impoundment closures at CUF for second tier NEPA analysis under the PEIS. As such, this analysis considers both the characteristics of the impoundments being considered for closure, and the nature of activities proposed under the closure action. Substantial deviations in either impoundment characteristics or the type and extent of proposed actions to conduct closure may either negate the applicability of tiering or necessitate additional specialized site-specific analyses.

Applicability of impoundment closures under consideration at CUF to the characteristics of impoundment closures considered in the PEIS is demonstrated in the Table 2-2.

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

Screening Factor	Programmatic Attribute	CUF Characteristics
Volume of CCR Materials	The size of an ash impoundment and volume of CCR affect closure activities, potential environmental impacts and cost. CCR volume within ash impoundments considered in the PEIS ranged from 10,000 to 25,000,000 yd^3.	Volumes of CCR in the ash impoundments at CUF are: Main Ash Impoundment = 1.1 million yd^3 Bottom Ash Impoundment = 334,000 yd^3 Stilling Impoundment = 180,000 yd^3
Schedule/Duration of Closure Activities	Time necessary to complete closure activities at an ash impoundment affects the reasonability of closure alternatives. The range of closure durations determined in the PEIS were as follows: Closure-in-Place: Less than 5 years Closure-by-Removal: 2.7 years to 170 years	Based upon analyses of the PEIS and the total volume of CCR in the ash impoundments at CUF they could be closed within 5 years using **Closure-in-Place**. Time to close each impoundment using **Closure-by-Removal (storage of existing CCR in onsite landfill)**: Main Ash Impoundment/ Stilling Impoundment = up to 2 years Bottom Ash Impoundment = up to 1.5 years (note: does not include time to construct the 40-foot retaining wall along the perimeter of the impoundment prior to excavation) Time to close each impoundment using **Closure-by-Removal to an offsite landfill** is as follows: Main Ash Impoundment/Stilling Impoundment = up to 8.4 years Bottom Ash Impoundment = up to 3.2 years (note: does not include time to construct the 40-foot retaining wall along the perimeter of the impoundment prior to excavation)

Screening Factor	Programmatic Attribute	CUF Characteristics
Risk to Human Health and Safety Relating to Closure Activities	Closure activities entail a range of construction activities that represent a potential risk to the health and safety of the workforce and the public. Excavations associated with the Closure-by-Removal alternative are dangerous as noted by reports of accidents leading to injury or death in the industry. As discussed in the PEIS, sites having large volumes of CCR that are considered for Closure-by-Removal would also result in extensive trucking operations that would increase transportation risks.	TVA considered worker safety in the evaluation of closure options for the impoundments at CUF. Closure-in-Place minimizes impacts associated with onsite worker safety by avoiding excavations and public safety impacts related to the transport of large volumes of CCR on public roadways. Closure-by-Removal would also require a greater number of truck movements into and out of the site which would increase the risk of injuries and fatalities associated with truck crashes. If an onsite landfill is used, the potential impacts to public safety are reduced.
Surface Water Resources	Consistent with EPA's determination in the CCR Rule and the results of the EPRI model, TVA anticipates that either closure method would have positive effects on surface water, if conducted properly. However, the results of the EPRI model indicated that for the configuration modeled, the Closure-by-Removal alternative would have a greater beneficial impact on surface water. Surface water impacts would be reduced under the Closure-in-Place alternative when the hydraulic head is removed and the facilities are capped. 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 and control and minimize impacts to surface water resources.	Initial screening analysis by TVA determined either closure method would not cause or contribute to violations of any applicable state water quality standard, violate any applicable toxic effluent standard or prohibition, or jeopardize the continued existence of endangered or threatened species or critical habitats.

Screening Factor	Programmatic Attribute	CUF Characteristics
Groundwater Resources	Both Closure-in-Place and Closure-by-Removal reduce groundwater contamination. While Closure-by-Removal would reduce groundwater contamination more than Closure-in-Place over the long-term when CCR intersects groundwater (is in the groundwater), Closure-in-Place still reduces contamination in such situations.	No records of releases or issues of concern are known that represent a risk to human health from CCR constituents associated with the existing impoundments that are proposed for closure in this EIS. TVA is working cooperatively with TDEC to assess the groundwater conditions near the ash impoundments at CUF. Information derived would be used to arrive at the certified groundwater monitoring network, which was completed in October 2017, and the upper-most aquifer determinations for all CCR facilities are due by October 17, 2018. In addition to any federal requirements that may apply to the impoundments at CUF after closure is completed, TVA would implement supplemental mitigative measures as required by the TDEC Order, as well as its approved closure plan, which could include additional monitoring, assessment or corrective action programs. However, as noted in the PEIS, TVA expects any groundwater impacts to be notably reduced following impoundment closure.
Wetlands	Analyses presented in the PEIS determined that for both Closure-in-Place and Closure-by-Removal alternatives, proposed actions would not cause or contribute to significant degradation of wetlands because laydown areas were minimized and wetlands are generally lacking from ash impoundments. Additionally, appropriate measures could be taken to avoid and minimize or compensate for impacts to wetlands and ensure no net loss of wetlands.	No jurisdictional wetlands are in the footprints of the ash impoundments at CUF or any associated laydown areas.
Risk to Other Adjacent Environmental Resources	The analyses performed as part of the PEIS determined that risk of potential release and degradation of environmental resources (cultural resources, ecological receptors, and factors related to the human environment) was generally low for both Closure-in-Place and Closure-by-Removal alternatives. However, potential air and noise emissions were expected to be markedly greater for the Closure-by-Removal alternative due to offsite transport and trucking operations.	Potential areas of disturbance associated with impoundment closure at CUF would be largely confined to previously disturbed lands. Additionally, no adjacent sensitive receptors are located proximate to ash impoundments at CUF.

Screening Factor	Programmatic Attribute	CUF Characteristics
Mode and Duration of Transport Activities – Trucking	For those sites with CCR volumes exceeding 600,000 yd^3, TVA determined that insufficient time is available within the construction schedule to effectively remove the CCR materials by truck or rail and achieve closure of impoundments within the 5-year period for closure.	Volume of CCR to be removed from the ash impoundments at CUF ranges from 334,000 yd^3 at the Bottom Ash Impoundment to 1.28 million yd^3 at the Main Ash Impoundment/Stilling Impoundment. Based upon analyses of the PEIS and the total volume of CCR, **Closure-in-Place** of both ash impoundments at CUF could be accomplished within 5 years. **Closure-by-Removal to an existing onsite landfill** could also be accomplished within 5 years for the Main Ash Impoundment/Stilling Impoundment and the Bottom Ash Impoundment. For these impoundments, CCR transport would remain onsite which results in a shortened haul distance, allows the use of larger trucks, and provides TVA the ability to work longer periods to transport CCR to the onsite landfill. However, the closure period for the Bottom Ash Impoundment would be extended due to the need to construct a 40-foot retaining wall along the perimeter of the impoundment prior to excavation. **Closure-by-Removal to an offsite permitted landfill** would require up to 8.4 years for the Main Ash Impoundment/Stilling Impoundment and up to 3.8 years for the Bottom Ash Impoundment.

Screening Factor	Programmatic Attribute	CUF Characteristics
Excessive Cost	Excessive closure costs may affect the reasonableness of an alternative. Costs for Closure-by-Removal by truck were demonstrated to be 168 to 2,390 percent greater than Closure-in-Place at the sites evaluated in the PEIS.	Estimated closure costs **for Closure-in-Place** of the impoundments at CUF: Main Ash Impoundment/Stilling Impoundment = $33,960,000 Bottom Ash Impoundment = $4,368,000 Estimated closure costs for **Closure-by-Removal** of the impoundments at CUF **(storage of existing CCR in onsite landfill)**: Main Ash Impoundment/Stilling Impoundment = $42,308,000 Bottom Ash Impoundment = $44,137,000 (Note: includes construction of a 40-foot retaining wall to provide lateral stability to the Fly Ash and Gypsum Stacks) Estimated closure costs for **Closure-by-Removal** of the impoundments at CUF **(storage of existing CCR in offsite landfill)**: Main Ash Impoundment = $282,480,000 Bottom Ash Impoundment = $114,571,200 (Note: includes construction of a 40-foot retaining wall to provide lateral stability to the Fly Ash and Gypsum stacks) Costs of **Closure-by-Removal (storage of existing CCR in onsite landfill**) are estimated to range from 18 percent to over 900 percent higher than the cost of Closure-in-Place. Costs of **Closure-by-Removal (storage in offsite landfill)** are estimated to range from 693 percent to over 2,500 percent higher than the cost of Closure-in-Place.

2.2.2.3 Deviations from the PEIS

As illustrated in Table 2-3, the volume of CCR in the Main Ash Impoundment exceeds a threshold condition established in the PEIS to determine if it would be reasonable to consider Closure-by-Removal of an ash impoundment (i.e., greater than 600,000 yd^3). However, the evaluation of impacts related to Closure-by-Removal in the PEIS were related to transport of CCR to an offsite permitted landfill. TVA determined that loading operations are highly dependent on the rate at which CCR can be safely excavated, dried and moved to truck loading facilities. TVA considered these factors and determined the rate of truck loading to be 100 truckloads per day. This would result in approximately 200 truck trips per day along the haul route over a typical nine-hour workday throughout the estimated closure period. At CUF, TVA is also evaluating Closure-by-Removal with the option to transport CCR from the impoundments to the existing onsite permitted landfill. This facility is located proximate to the impoundments and transport of CCR excavated from the impoundments would remain onsite. This results in shortened haul distance, allows the use of larger trucks, and provides TVA the ability to accommodate two 9-hour shifts per workday throughout the closure period. Therefore, the parameters established in the PEIS related to trucking and duration of closure, which assumed an offsite landfill at a greater distance from the impoundment, are not applicable to the evaluation of this closure option at CUF. Specifically, at CUF, TVA is able to use larger, 40-ton trucks as public roads would not be utilized. In addition, TVA considered the safety and stability of the onsite landfill and the shortened haul distance, and estimated that TVA could transport CCR from the impoundments to the onsite facilities at a rate of 200 trucks per day over two working shifts per day. This results in a decreased duration of closure.

Primary actions common to all impoundment closures under Closure-in-Place and Closure-by-Removal were identified in the PEIS. Table 2-3 summarizes these actions and demonstrates the consistency and applicability of the closure alternatives for the impoundments at CUF with the constraints of the analyses performed as part of the PEIS. As such, because the characteristics and proposed actions associated with the closure of ash impoundments at CUF are sufficiently bounded by the conditions and environmental effects described in the PEIS, closure of impoundments at CUF can tier off the analysis in the PEIS. The impact of the decreased duration of closure is evaluated in the analysis of resources which could potentially be impacted due to this change, specifically, air quality, transportation, noise, solid waste and socioeconomic impacts.

Table 2-3. Primary Actions Associated with Closure-in-Place and Closure-by-Removal of Ash Impoundments

Closure Activity	Programmatic Impoundment Closure Activity	Proposed CUF Impoundment Closure Activity
Ensure berm stability	For Closure-in-Place impoundments, TVA would make appropriate investigations and/or modifications 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 would be evaluated prior to construction, and any needed improvements to the berms would be made as part of the closure system construction.	TVA has evaluated the structural stability of the dikes at the surface impoundments at CUF per requirements of the CCR rule and as part of the development of conceptual closure plans. All berms have been demonstrated to meet appropriate static and seismic stability safety factors.
Consider opportunities for beneficial use of ash	Beneficial reuse is considered by TVA as part of all ash management activities. Such reuse may include incorporation of ash from CCR impoundments as part of the impermeable cover system.	Closure-in-Place of the impoundments at CUF includes grading and reconfiguring of CCR to consolidate CCR and promote site drainage prior to cover system placement to support cover system installation. As noted in the PEIS, TVA would identify opportunities for beneficial reuse of CCR removed from the impoundments under Closure-by-Removal. The main beneficial uses of CCR are in the manufacture of wallboard, roofing, cement, concrete and other products
Lower ash impoundment water level	Dewatering, which could include decanting and drawdown (which is the removal of free or ponded liquid from an impoundment), must meet current permit limits and could include the removal of pore water from the impoundment. These activities could require additional monitoring or meeting additional limits from state regulators.	Dewatering of impoundments at CUF would comply with applicable NPDES permit requirements.

Closure Activity	Programmatic Impoundment Closure Activity	Proposed CUF Impoundment Closure Activity
Identify temporary laydown areas and borrow areas	TVA anticipates temporarily using approximately 5 to 10 acres of previously undisturbed lands per site for vehicle and equipment parking, materials storage, and construction administration.	TVA has identified approximately 128 acres of previously disturbed land near the impoundments and proposed dewatering facility that could be used for temporary laydown during construction activities including impoundment closures and construction of the dewatering facility. Borrow is anticipated to be obtained from existing onsite borrow areas or other onsite disturbed areas if available. Any additional borrow that may be needed would be obtained from one or more previously developed commercial site(s) within 30 miles of CUF.
Identify facilities for CCR disposal	Identify onsite or offsite permitted management facilities for CCR disposal.	Under the Closure-by-Removal option, TVA is considering the use of several alternatives for management of existing CCR including disposal in an offsite permitted landfill as well as onsite disposal in an existing onsite landfill.
Grade to consolidate CCR, reduce footprint and promote site drainage	CCR layer is stabilized such that it is structurally suitable as a base layer. This stabilization could include pore dewatering, addition of amendments (e.g., Portland cement), and/or compaction. TVA would optimize the use of existing CCR material to achieve final grade (see options below). Fill/borrow material would be used to supplement CCR material and contoured to provide adequate storm water management	Proposed Closure-in-Place of the Bottom Ash Impoundment and a portion of the Main Ash Impoundment are consistent with the Category A (Regrade Inward) method identified in the PEIS.

Closure Activity	Programmatic Impoundment Closure Activity	Proposed CUF Impoundment Closure Activity
Install cover system	TVA would install a cover system which either meets or exceeds CCR Rule cover system performance standards ($1x10^{-5}$ permeability) or State cover system requirements. Storm water management infrastructure would maintain positive drainage. The cover system must control, minimize, or eliminate to the maximum extent practicable, post-closure infiltration of liquids into the CCR and releases of CCR, leachate, or contaminated runoff to groundwater or surface waters.	Closure-in-Place of the Main Ash Impoundment/Stilling Impoundment and the Bottom Ash Impoundment include the use of composite geosynthetic protective cover system that meets or exceeds the CCR Rule performance standard. Additional detail regarding proposed cover and liner systems is provided below in the detailed description of closure of each impoundment.
Install or expand groundwater monitoring system	A groundwater monitoring system would be installed to ensure that an adequately robust system is in place that meets or exceeds federal or state requirements. States may require groundwater monitoring, assessment, and if appropriate, corrective action.	TVA would install and operate groundwater monitoring system as required under federal and state requirements at all closed impoundments.
Closure documentation	Prepare documentation to demonstrate that appropriate closure activities were successfully implemented.	Preliminary closure plans have been prepared for the impoundments at CUF. Closure plans would be finalized upon successful completion of the NEPA review.
Post closure care	Long-term operations and maintenance activities (e.g., maintaining the cover system, monitoring, and reporting) are implemented, as necessary.	Post closure plans would be finalized upon successful completion of the NEPA review.

2.2.2.4 Proposed Ash Impoundment Closures at CUF

The Main Ash Impoundment encompasses approximately 50 acres and lies west of the powerhouse and north of the Fly Ash Stack (see Figure 2-2). The Main Ash Impoundment was originally part of the larger ash disposal area constructed in 1969. In 1979, the Bottom Ash Impoundment was separated from the larger disposal area by a divider dike. Over time, the divider dike has been lengthened and increased in height to its present configuration (elevation is 395 feet above mean sea level [msl]). The Main Ash Impoundment receives runoff from the Fly Ash Stack and the Gypsum Stack via perimeter ditches as well as effluent from the Bottom Ash Impoundment. The storm water, process water and effluent all flow northwest within the Main Ash Impoundment and then under a floating skimmer to an area where further stilling occurs (Stilling Impoundment). Finally, the decanted water discharges through four spillways into a concrete discharge channel that leads to the main plant discharge channel and then to the Cumberland River/Lake Barkley. The Main Ash

Impoundment (including the upstream Bottom Ash Impoundment) is currently operating under NPDES Permit No. TN0005789.

The Bottom Ash Impoundment is approximately 7.0 acres and is located south of the CUF power plant (see Figure 2-1). It currently receives sluiced bottom ash from the plant. The settled bottom ash is dredged, removed from the impoundment, and transported and stored in the Fly Ash Stack. The process water exits the Bottom Ash Impoundment through two 54-inch outflow pipes. The outflow pipes are located near the northern end of the impoundment and flow into the North Ditch and then to the Main Ash Impoundment. Gypsum fines are also sluiced to the Bottom Ash Impoundment where they settle and are dredged, loaded and hauled to the Gypsum Stack. When the Bottom Ash Impoundment is closed, gypsum fines would be handled in compliance with state and federal CCR regulations and would be re-routed to the existing lined channels or a separate container and would be excavated and deposited in the Gypsum Stack. Process discharge from the lined channels or separate containers would be re-routed to the new lined Process Water Basins.

The two impoundments are hydraulically connected by the North Ditch. Therefore, a joint and sequenced closure of the impoundments is required. Ideally, the Main Ash Impoundment would be closed prior to closure of the Bottom Ash Impoundment and North Ditch. However, the sequence of construction has not been determined. Closure would be sequenced properly such that CCR materials and contact water are no longer directed to the impoundments.

Construction activities associated with closure of the impoundments would entail direct disturbance of the approximately 50-acre Main Ash Impoundment (including the Stilling Impoundment), the 7-acre Bottom Ash Impoundment, and the North Ditch (approximately 0.8 acre). Approximately 128 acres of laydown area including the Fly Ash Stack and portions of the Gypsum Stack would be used as areas to temporarily provide vehicle and equipment parking, material storage, and construction administration needed to close impoundments.

Upon closure of the impoundments, process wastewater and storm water would be rerouted to the proposed new Process Water Basins. TVA considered four alternate options on CUF property for development to these facilities. A summary of attributes and issues at each alternative location are provided below.

1. Alternative 1 – An approximately 20.5-acre site located east of the plant
    - Site is not currently used for plant operations.
    - This area would require extensive pumping and pipe routing to convey process water flows to the basins.
    - Pumping would be required to convey stormwater runoff from the facilities located on the west side of the plant.
    - Less than 25 acres is available at this site.
2. Alternative 2 – An approximately 14.5-acre site located north and east of the Main Ash Impoundment
    - Site is currently utilized and planned for contractor office trailer area, staging, and parking for multiple upcoming construction projects.

- Site is proximate to the existing impoundments and would require less routing of storm water and process water flows.
- Located near the Cumberland River, eliminating extensive piping to the new outfall location.
- Requires the least amount of earthwork for construction.
- May require significant reconfiguration of the West Entrance Road.
- Requires a new NPDES outfall to the Cumberland River.
- Less than 25 acres is available at this site.

3. Alternative 3 – A greenfield site located on the west side of Wells Creek
    - Area is heavily wooded with an elevation range of 140 feet and would require extensive clearing, grubbing and grading operations.
    - Development of the site would result in environmental impacts to land cover, wildlife and other environmental resources.
    - Both process water and storm water flow would need to be conveyed across Wells Creek.
    - 25 acres is available for development of the Process Water Basins.
4. Alternative 4 –The Stilling Impoundment and a portion of the Main Ash Impoundment
    - Site is an existing asset that would no longer be needed to process wet CCR as CUF transitions to dry CCR handling.
    - Previously disturbed site.
    - Meets minimum size requirements.
    - Previous use included control of storm water and process water.

Each of these alternative locations were evaluated. Alternatives one through three were eliminated from further consideration based on factors related to minimization of environmental impact, engineering feasibility and constructability.

TVA's preferred location for Process Water Basin 1 and Process Water Basin 2 is Alternative 4. This option, which includes repurposing the Stilling Impoundment and a portion of the Main Ash Impoundment would maximize the use of previously constructed assets and minimize environmental impact as the basins would be constructed in a disturbed area that previously controlled storm water and process water.

The Main Ash Impoundment supports stilling and settling of fine suspended solids in process and storm water flows prior to discharge through the NPDES outfall in the Stilling Impoundment. Therefore, flows that are currently handled by the Main Ash Impoundment need to be temporarily diverted during construction of the permanent process water basins. TVA would construct a temporary lined basin in the southeast corner of the Main Ash Impoundment to handle process and storm water flows during the construction period. The location of the temporary basin is shown in Figure 2-4. The design of the temporary lined basin includes a cast in place (approximately 300 feet long, 60 feet wide and 7 feet deep) concrete or metal tank. Process flows exiting the tank would pass into the temporary lined basin. Once constructed, the temporary lined basin would have an operational pool surface

area of 7.5 acres and a depth of 8 feet, with the capability of holding over 20 million gallons of water. Turbidity curtains would be installed to maximize settling of any remaining fine suspended solids.

As part of this temporary measure, TVA would implement a robust treatment system to handle process and storm water flows upstream of the temporary lined basin via chemical injection to assure pH and suspended solid requirements are satisfactorily met under CUF's NPDES operating permit at the outfall. The process for minimizing suspended solids in the temporary includes:

- Rerouting gypsum fines to the lined Gypsum Dewatering Trenches
- Maintain Bottom Ash Impoundment and Coal Yard Runoff Pond to enhance settling
- Installation of Chemical injection and pH adjustment equipment tank to further enhance settling prior to discharge to the temporary lined basin
- Installation of Water Quality Instrumentation for Chemical Injection and pH adjustment, as well as monitoring of suspended solids during dewatering of the Main Ash Impoundment

Implementation of these measures would ensure that CUF would be able to operate in accordance with the NPDES permit while allowing construction of the permanent process water basins.

Specific activities associated with each closure option, including the proposed construction of Process Water Basin 1 and Process Water Basin 2, for the impoundments at CUF are described below.

2.2.2.4.1 Closure-in-Place – Category A Regrade Inward

2.2.2.4.1.1 *Bottom Ash Impoundment*

Closure-in-Place involves stabilizing the CCR in place and installing an approved cover system. The closure option identified for the Bottom Ash Impoundment is like the criteria identified in the PEIS for Closure-in-Place Category A: Regrade Inward. Under this alternative, the impoundment would be dewatered and the resulting CCR material would be stabilized in place. Following stabilization, the CCR would be regraded to promote drainage followed by installation of an approved cover system encompassing the CCR material footprints (conceptual closure plans are provided in Appendix C). The cover system would consist of geosynthetics – soil matrix including:

- 40-millimeter geomembrane
- Double-sided geocomposite drainage layer with nonwoven, needle-punched geotextile
- 18-inch protective cover soil
- 6-inch vegetative cover (topsoil or sod)

Storm water drainage from the Bottom Ash Impoundment would be directed to the North Ditch, and new pipes would be installed to convey drainage in the ditch beneath the existing access road to the north.

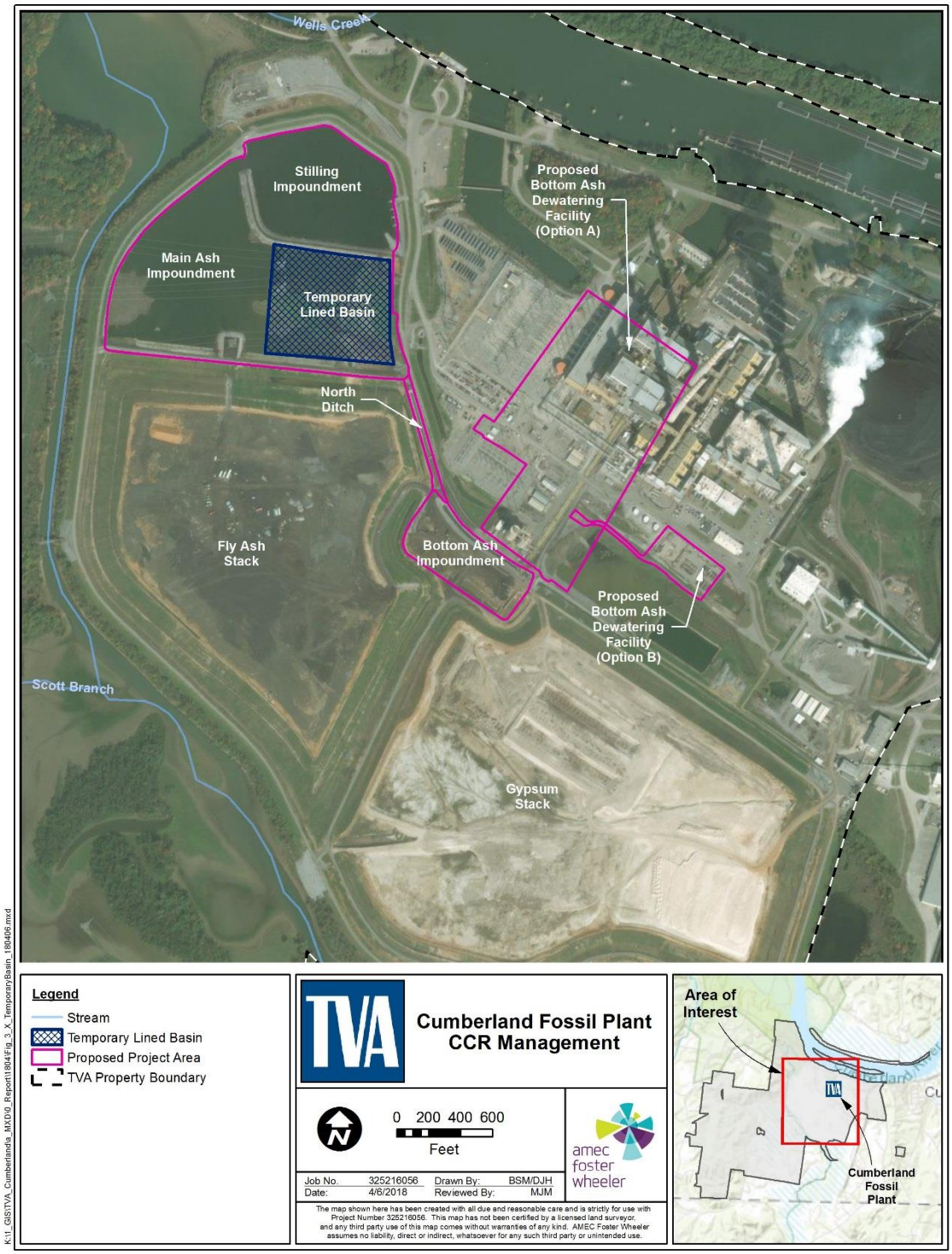

Figure 2-4. Location of Temporary Lined Basin at Cumberland Fossil Plant for Interim Process and Storm Water Flow Handling

2.2.2.4.1.2 *Main Ash Impoundment and Stilling Impoundment*

Closure of the Main Ash Impoundment and Stilling Impoundment would involve a combination of closure options. Closure-in-Place would be used for the majority of the Main Ash Impoundment by consolidation and regrading of CCR coupled with the installation of an approved cover system as described above. A portion of the Main Ash Impoundment and the Stilling Impoundment, however, would be Closed-by-Removal and would be repurposed as lined Process Water Basin 1 and Process Water Basin 2. To facilitate construction of the lined process water basins, CCR from these areas, plus a foot of underlying soil would be removed and transported to an approved onsite landfill (existing Fly Ash stack) or an offsite disposal facility. Specifically, approximately 180,000 yd^3 of CCR material would be removed from the Stilling Impoundment and approximately 245,700 yd^3 of CCR material would be removed from the Main Ash Impoundment. A geosynthetic clay liner would be installed over these areas followed by a non-woven geotextile cushion, and 18 inches of protective cover.

The CCR remaining in the Main Ash Impoundment would be regraded and compacted to support the final cover system. The final cover system described above would be installed in the portion of the Main Ash Impoundment that would be Closed-in-Place. The Western Perimeter Dike would be lowered to elevation 379 feet, and the material would be used as part of the protective cover in the final cover system. The divider dike between the Main Ash Impoundment and the Fly Ash Stack would remain and would be closed with the geomembrane cap system. New storm water outfalls would be constructed to direct storm water runoff from the closed impoundments either west to Wells Creek or east to the existing discharge channel. The North Ditch would be closed by excavating any material in the ditch and covering with the geomembrane cap system described above.

2.2.2.4.2 Closure-by-Removal – Transport to Existing Onsite Landfill

Closure-by-Removal involves excavation and relocation of the CCR from the impoundments in accordance with federal and state requirements to an approved onsite or offsite disposal facility. Under this alternative TVA would dewater and stabilize residual ponded areas followed by removal of CCR material, underlying soil, and support structures within the impoundment footprint.

The dike material would be stockpiled onsite once segregated properly. The divider dike between the Main Ash Impoundment and Fly Ash Stack would remain in place and would be closed with a geomembrane cover system. A portion of the Main Ash Impoundment and the Stilling Impoundment would be repurposed as Process Water Basins as described above.

Closure-by-Removal of the Bottom Ash Impoundment also entails dewatering and stabilizing residual ponded areas followed by removal of CCR material, underlying soil, and support structures within the impoundment footprint. However, in contrast, the resulting excavation would be approximately 40 feet in depth and would result in a loss of support for the adjacent Fly Ash Stack and Gypsum Disposal Complex. This loss of support would adversely affect slope stability of the adjacent facilities. As a result, prior to excavation of CCR, a retaining wall would need to be constructed along the perimeter of the impoundment to support the approximate 40-foot excavation and provide support for the adjacent facilities.

Closure-by-Removal may also include groundwater remediation, but the necessity and extent of such remediation would not be known until excavation is underway.

Once CCR and affected soil is removed, the cleared areas would be backfilled as necessary to promote drainage and then vegetated with native non-invasive plant species to avoid the introduction or spread of invasive species. The CCR material from the impoundments would be hauled and placed in an existing onsite landfill (the Fly Ash Stack) which is permitted to receive this material.

2.2.2.4.3 Closure-by-Removal – Transport to Offsite Permitted Landfill

Under this Closure-by-Removal alternative, activities would be the same as described above except excavated CCR would be transported and stored in an offsite permitted landfill. The offsite landfill would be previously permitted to receive CCR and would have sufficient capacity. The analysis of impacts uniquely associated with this alternative are based on the transport of CCR to the closest landfill that can currently accept CCR material, the Bi-County Solid Waste Management Landfill (see Section 2.2.3 below).

2.2.3 Long-Term Storage of Future Dry CCR Produced at CUF

CCR, including fly ash, bottom ash and gypsum, are currently stacked in separate facilities at CUF. Based on estimates of future energy production and consumption rates, and beneficial reuse of gypsum and fly ash, TVA estimates that minimum capacity of approximately 13.4 million yd^3 is needed to support long-term operations at CUF. TVA considered options for suitable sites for management of future dry CCR produced at CUF including construction of a landfill within the vicinity of CUF (offsite), construction of a landfill on CUF property (onsite landfill) and the transport of CCR at CUF to an existing offsite landfill.

2.2.3.1 Construction of a Landfill Within the Vicinity of CUF

TVA previously conducted a regional landfill siting study (TVA 2010a) that considered options for development of new landfills for disposal of CCR from 11 TVA facilities, including CUF. The study considered potential landfill sites in a broad area that included Kentucky, Tennessee, Alabama, and Mississippi. Subsequent facility planning considerations led to the examination of potential landfill options that would consist of a smaller landfill that would serve the site-specific needs of CUF. Options more distant from CUF were not acceptable due to considerations related to property access, unwilling landowners, higher transportation costs, and potential impacts associated with long-distance CCR transport (e.g., air, noise).

A subsequent draft landfill siting study report (TVA 2010b) was prepared for CUF which narrowed the focus of a potential new landfill site from a regional approach to locations in the vicinity of CUF. Five sites were evaluated, and TVA selected two to be carried forward for further analysis. These two sites were immediately southwest of CUF with one being immediately adjacent to CUF in Stewart County, and the other being a bit further south in Houston County. The other three sites were eliminated primarily because of their greater distance from CUF, which posed problems for getting access to the properties. Additionally, some land owners were not willing to sell these properties.

In July 2011, TVA conducted an additional landfill siting study (TVA 2011a), which more narrowly focused on the two sites recommended in the 2010 study. As mentioned above, one site was immediately adjacent to and southwest of CUF (identified as Site 8) and the other was a little further southwest (identified as Site 9). The closer of the sites, Site 8, was determined to be the best suited site for a new landfill facility because: (1) it is closer to CUF than Site 9; (2) it is easier to design than Site 9, which requires relocation of a public road; (3) it affects less property owners than Site 9; and (4) it has a lower total cost.

TVA has accepted the results in the previous siting studies and has eliminated the construction of new landfill within the region and the proposed Site 9 from further consideration.

2.2.3.2 New Onsite Landfill

In June 2015, TVA conducted a landfill siting study (TVA 2015) that narrowed the focus of the July 2011 study to more specific locations within Site 8. The 2015 landfill siting study identified five onsite alternatives and selected a landfill site in a topographic valley between the ridges located on the western portion of the CUF property just south and west of Old Scott Road. This site was selected because: (1) it has less than the average amount of stream impacts; (2) it is generally isolated from the public eye, which is desired by local residents; (3) it avoids floodplain impacts; (4) it can be accessed without leaving TVA property (access from CUF requires only one crossing of a public road – Old Scott Road); and (5) it facilitates mitigation of the Brunsoni Furnace site, which is an archaeological site listed on the National Register of Historic Places (NRHP).

In development of the proposed landfill project site, TVA optimized its location by considering the following:

- *Impacts to Wetlands* – The proposed layout and design of the landfill avoids all wetlands associated with the floodplains of Wells Creek and Scott Branch. Potential options for onsite development that consist of a “lateral fill” type design east of the proposed location would result in additional impacts to wetlands.
- *Visual and Emissions-Related Effects to Residential Communities* – Selection of an onsite location for landfill development avoids potential impacts associated with high frequency offsite truck traffic and its associated emissions. Development of the landfill using a valley-fill design minimizes visual effects.
- *Regulatory Floodplains* – Floodplains mapped by the Federal Emergency Management Agency (FEMA) are located east of the proposed landfill area and as such, landfill development would result in no significant impacts to floodplains.
- *Sensitive Species* – Biological surveys conducted within TVA properties have identified potential use of the proposed landfill area by sensitive bat species. However, in development of the landfill site, TVA would commit to seasonal restrictions regarding removal of trees that may be suitable for summer roosting bat habitat such that impacts to sensitive species would not be anticipated.
- *Cultural Resources* – Several cultural resource sites are known to exist on the CUF property. A house that is listed on the NRHP is located along Old Scott Road east of the proposed landfill site; if the landfill is developed, it would avoid this site. One site characterized as being the site of a former Brunsoni Furnace is located with the “limits of disturbance” of the proposed landfill. To address this issue, TVA initiated consultation with the Tennessee SHPO for approval of the research design and the development of a (MOA) regarding mitigation activities (Appendix E). The MOA was executed on October 10, 2017.
- *Impacts to County Road* – Potential options for onsite development that consist of a “lateral fill” type design east of the proposed location would interfere with borrow site operation and potentially result in closure and relocation of Old Scott Road to the east of its present location. Relocation of this road would result in further potential impacts to floodplains, wetlands and intermittent streams. Therefore, the

development of the “lateral fill” type design east of the proposed location was not considered further.

- *Cost* – Selection and development of an onsite disposal facility is a low-cost option that contributes to TVA’s commitment to provide cost-effective power to users in its service area.

In consideration of the above factors, TVA proposes to construct and operate a landfill for disposal of future dry CCR generated at the plant within the boundaries of TVA owned property on CUF (onsite). This site is located approximately 1.2 miles southwest of the plant site on CUF property. The selected site encompasses approximately 174 acres with a landfill footprint of approximately 80 acres. The landfill would be built in four major stages with a total estimated capacity of 14.3 million yd^3. At current generation levels, the closure date is approximately 2040. In the event beneficial reuse via marketing continues at its current rate, the landfill closure is approximately 2100. The estimated capacity provides adequate CCR storage for long-range planning purposes.

The proposed landfill project area includes a leachate impoundment located to the north of the proposed limit of waste and three storm water basins located to the north, the west and the south of the limit of waste. Conceptual design drawings of the landfill are included in Appendix C. Features of the proposed landfill are shown on Figure 2-5.

Excess soil material excavated during construction of the landfill would be stockpiled in a designated borrow/stockpile area located within the landfill project area. Stockpiled soil would be used as needed for interim cover and the final cover system. In addition, any excess soil may be used, if needed, to support other routine maintenance and/or construction operations at CUF. Soil material transported to CUF would utilize the existing onsite access route.

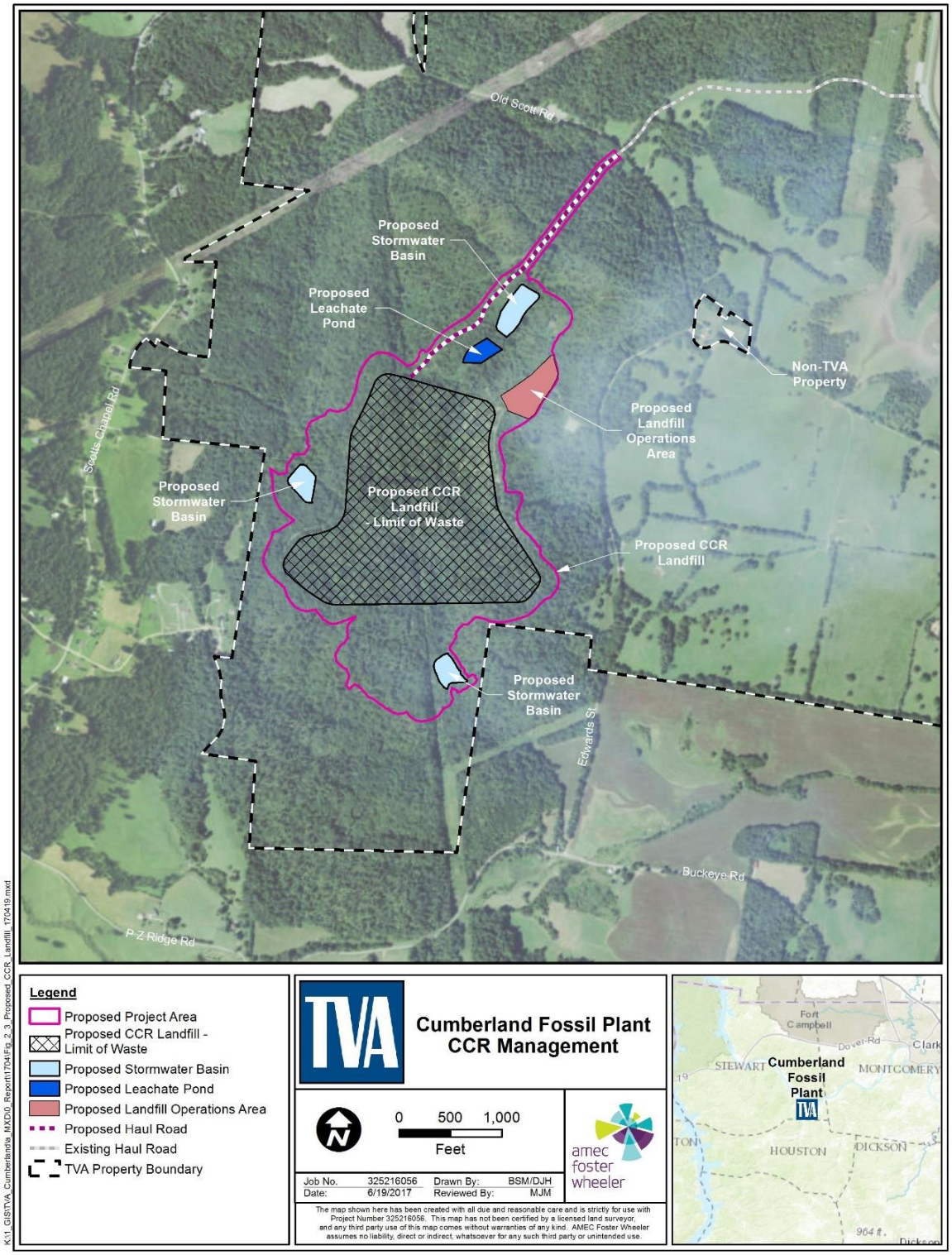

Figure 2-5. Proposed Onsite Dry CCR Landfill at Cumberland Fossil Plant

The proposed landfill would be developed to meet the TDEC Solid Waste Management Rules and the federal CCR Rule requirements for new landfills. This would include the following components:

1. Composite Liner System. The proposed composite liner system would include at a minimum, the following components (or equivalent):
   - A geologic buffer consisting of a minimum of 5 to 10 feet of soil with a maximum hydraulic conductivity per regulatory requirements. The geologic buffer is measured from the bottom of the liner to the seasonal high water table of the uppermost unconfined aquifer or the top of the formation of the confined aquifer.
   - Either a soil liner, a geosynthetic clay liner or a combination of both; a 60-millimeter high density polyethylene flexible membrane liner; and a cushioning geotextile.
   - A 12-inch drainage layer and minimum 12 inches of protective cover between the drainage layer and CCR.
2. Leachate Collection and Treatment System.
   - A leachate collection system designed to facilitate the free drainage of leachate would be a component of the liner. Leachate collected would be handled separately from surface runoff. The leachate would be discharged to a leachate pond and then would either be gravity fed via a pipe to Wells Creek (Option 1) or would be pumped to the proposed Process Water Basin to be constructed at the Main Ash Impoundment closure site or directly discharged to the CCW channel (Option 2).
   - The leachate collection system is designed to remove leachate from the landfill during its active life and the post-closure period.
3. Storm Water Management.
   - New perimeter drainage ditches would be constructed to convey storm water runoff from the new landfill area to one of three proposed storm water basins.
   - Storm water basins are designed with sufficient volume to detain runoff from the 24-hour, 25-year storm event and would discharge via new Tennessee multi-sector permitted storm water outfalls to Scott Branch, a tributary of Wells Creek and Wells Creek to the north, west and south of the proposed CCR landfill site. Drainage structures including ditches, benches, and culverts would be designed using standards outlined in the TDEC Solid Waste Management Rules and the Final CCR Rule.
4. Final Cover System. The proposed final cover design would be developed in accordance with TDEC Solid Waste Management Rules and the Final CCR Rule, and is anticipated to consist of the following components:
   - Twelve inches of intermediate cover soil (maximum hydraulic conductivity of 1x10-5 cm/sec) over compacted CCR subgrade layer.
   - Forty-millimeter linear low density polyethylene flexible membrane liner.
   - Geocomposite drainage layer.
   - Twelve inches of cap cover soil (protective soil layer).
   - Vegetative cover (with a 12-inch layer of topsoil).

5. Set-backs. The Tennessee Division of Solid Waste Management requires that landfills be located, designed, constructed, operated, and maintained such that the fill areas meet the following minimum set-backs:
   - Two hundred (200) feet from normal boundaries of springs, streams and lakes (except that this standard shall not apply to any wet weather conveyance nor to bodies of water constructed and designed to be part of the facility.
   - Five hundred (500) feet from wells downgradient and used as a source of drinking water by humans or livestock.
   - One hundred (100) feet from all property lines.
   - Five hundred (500) feet of a residence unless the owner of the residential property agrees in writing to a shorter distance.
   - A total site buffer with no construction appurtenances within 50 feet of the property.

The proposed landfill meets each of the above minimum setbacks. Borrow and cover material would be obtained within the landfill limit of disturbance. However, if offsite borrow material is needed, it would be hauled from one or more established commercial permitted sites within 30 miles of CUF.

2.2.3.2.1 Access Road

A two-lane paved access road (40 feet wide) with paved shoulders would be constructed onsite to transport CCR from the plant to the landfill. The approximately 0.6-mile haul road would extend from Old Scott Road to the landfill. This road would tie into the existing access road that extends from Old Scott Road to the CUF perimeter road (see Figure 2-4) resulting in a total distance of roughly 1.2 miles. TVA would pave the existing access road to support hauling of CCR to the landfill. Based on the current volume of CCR production and the use of articulated dump trucks (capacity of 20 yd^3), it is estimated that 141 truckloads per day (282 truck trips per day) would be needed to transport CCR to the onsite landfill.

A summary of the primary characteristics of the proposed landfill during both construction and operation is provided in Table 2-4.

2.2.3.3 Offsite Disposal of Future CCR in an Existing Permitted Landfill (Bi-County Solid Waste Management Landfill)

Under this alternative, CCR from CUF would be transported to an existing offsite landfill. For the purposes of this EIS, the offsite landfill would have sufficient capacity and be permitted to receive CCR or special waste. The analysis of impacts associated with this alternative are based on the closest landfill with available capacity that can currently accept CCR material, the Bi-County Solid Waste Management Landfill. This landfill is located approximately 12 miles northeast of CUF in Montgomery County, Tennessee. The landfill is owned and operated by the county and serves central Tennessee and could receive CCR if TVA obtains a special waste approval from TDEC. Capacity at this landfill can be expanded to accommodate TVA's requirement for long-term storage of CCR generated at CUF. Under this alternative, dry CCR generated at CUF would be transported to the landfill by over the road dump trucks on existing roadways.

Table 2-4. Primary Characteristics Related to Construction and Operation of a Landfill on CUF Property

Project Feature	Characteristic	Specifications
Construction	Limits of disturbance (includes leachate ponds, storm water ponds, and conveyances, and access roads).	173.7 acres.
Capacity	Total capacity	14.3 million yd^3.
Limit of Waste	Landfill footprint.	81.4 acres.
Leachate Management	Option 1 – Discharged via a NPDES permitted outfall to Wells Creek. Option 2 – Pumped to the proposed Process Water Basins to be built at the Main Ash Impoundment or directly discharged to the CCW.	0.90 million gallons per day (MGD) with a maximum peak of 1.12 MGD.
Storm Water Management	Three storm water basins.	Discharge via new Tennessee multi-sector permitted storm water outfalls to Scott Branch, a tributary of Wells Creek and Wells Creek.
Height	Maximum height of landfill relative to access roads.	263 feet.
Employment Workforce	Construction. Operation.	40 workers. 5 workers.
Articulated Dump Truck Traffic Volume	Number of fully loaded truckloads needed to haul future CCR from CUF to the proposed landfill via a private onsite access road.	141 truckloads per day. Equates to a traffic count of 282 truck trips per work day or approximately 32 trucks per hour.
Transport Distance	Length of onsite access road.	New construction = 0.6 mile. Existing road = 0.6 mile. Total distance of roughly 1.2 mile.

Based on the estimated volume of CCR production and the use of over the road dump trucks (capacity of 15 yd^3), approximately 187 truckloads per day (274 truck trips) would be needed to transport CCR to the offsite landfill to accommodate long-term storage of CCR produced at CUF (estimated to be the life of the onsite landfill or approximately 18.8 years for analysis purposes). The haul route to the Bi-County Solid Waste Management Landfill would be approximately 37 miles long and primarily would utilize the following public roads: State Route (SR) 233, SR 49, and US 79 (Figure 2-5).

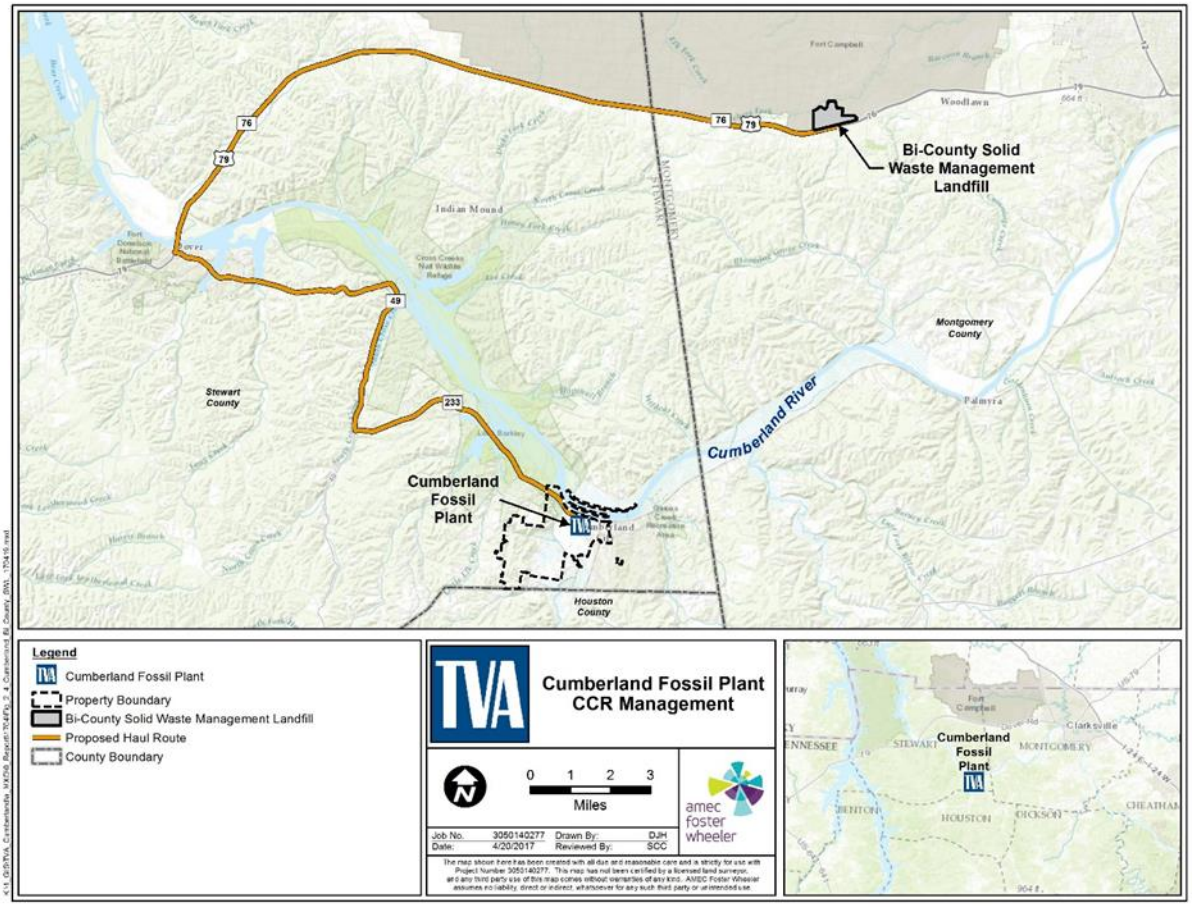

Figure 2-6. Haul Route to the Bi-County Solid Waste Management Landfill

The Bi-County Solid Waste Management Landfill is an existing landfill permitted to accept CCR. As such, impacts to the natural environment from disposal of CCR at this landfill are not anticipated. Therefore, the analysis provided in this EIS is limited to the evaluation of characteristics related to transportation of CCR from CUF to the Bi-County Solid Waste Management Landfill. These characteristics are summarized in Table 2-5.

Table 2-5. Primary Characteristics Transport of CCR from CUF to the Bi-County Solid Waste Management Landfill

Project Feature	Characteristic	Value
Landfill Size/Capacity	Size of current landfill.	Montgomery County owns approximately 550 acres. Fifty-five (55) acres are currently permitted. Estimated landfill capacity for 70 years.
Location	Distance from CUF.	37 miles.
Daily Limits	Volume of waste allowed per day.	1,200 to 1,500 tons per day.
Over the Road Dump Truck Traffic Volume (future dry CCR)	Number of truckloads needed to haul future CCR from CUF to Bi-County Solid Waste Management.	Based on the estimated volume of CCR production and the use of over the road dump trucks 187 truckloads per day would be needed to transport CCR generated at CUF offsite. Equates to a traffic count of 374 truck trips per work day or approximately 42 trucks per hour for approximately 18.8 years.
Over the Road Dump Truck Traffic Volume (existing wet CCR)	Number of truckloads needed to haul existing CCR from the impoundments under the Closure-by-Removal option to Bi-County Solid Waste Management.	Per the PEIS, TVA determined the rate wet CCR can be safely excavated, and transported offsite to be 100 truckloads per day. Equates to a traffic count of 200 truck trips per work day or approximately 23 trucks per hour during the closure period (total of approximately 12 years).

2.2.4 Modes of Material Transport Considered but Eliminated from Further Consideration

Potential modes of transport of CCR (both current CCR and future CCR) can include truck, rail and barge. An analysis of barge and rail transport is presented in the PEIS and conclusions from that analysis apply to conditions at CUF. Site-specific considerations for transportation alternatives are presented here.

Although CUF has both rail and barge facilities, these facilities are not configured and designed to support loading and transport of CCR offsite. Furthermore, rail and barge facilities would have to be expanded and improved to support CCR loading operations. This expansion could result in additional environmental impacts (land use, wetlands, water resources, etc.) and would require additional environmental permitting. Rail and barge unloading facilities are not typical near permitted landfills and are not available at the Bi-County Solid Waste Management Landfill. As such, any CCR theoretically hauled by barge or rail for landfill disposal would still entail trucking. For rail transportation, a rail carrier would be needed and rail cars dedicated for use as CCR transport would also have to be acquired to support CCR removal operations. Environmental risks from discharges or releases may occur under both of these transport options.

After the spill at the Kingston Fossil Plant in 2008, it was determined that the effort involved in transporting by rail was labor intensive, required dedicated rail cars and was slower than anticipated. For these reasons, along with schedule impacts and the volume of CCR,

transporting CCR from the impoundments using barge or rail was not considered reasonable, especially for impoundments having a lower volume of CCR. CCR volumes of the main ash impoundment at CUF are considered relatively low to moderate (MAP = 1.1 million yds^3) and as such, the use of rail facilities would be relatively more impactful and not offer notable advantages relative to trucking.

These impacts, together with the need to include trucking to the landfill site, eliminates any advantage gained. Accordingly, these forms of transport are not considered reasonable modes of transportation for offsite transport of CCR at CUF.

2.3 Alternatives Retained for Detailed Analysis

Based on the extensive analysis of options to manage CCR produced at CUF, TVA retained the following alternatives for detailed evaluation in this EIS:

- Alternative A – No Action
- Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF
- Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF
- Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

2.3.1 Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed Bottom Ash Dewatering Facility, and the bottom ash sluice would continue to be handled as described in current operations. TVA would not close the ash impoundments. Accordingly, TVA would not seek additional disposal options for dry placement of CCR generated at CUF. Rather, CCR would continue to be managed in the current impoundments and onsite stacks for as long as storage capacity is available. The No Action Alternative is not consistent with other actions that TVA could be required to take in response to regulatory programs in addition to the CCR Rule including the TDEC Order. As such, the No Action Alternative would not support TVA's goal of eliminating wet CCR storage at CUF or TVA's compliance with present and future regulatory requirements related to CCR production and management. Nor would it support TVA's plan to continue to operate CUF in the future in accordance with the 2015 TVA Integrated Resource Plan. Consequently, this alternative would not satisfy the project purpose and need and, therefore, is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts of implementation of Alternatives B, C, and D.

2.3.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, TVA would construct and operate a series of actions to manage CCR produced at CUF.

CCR Management Project	Alternative A	B	C	D
Bottom Ash Dewatering Facility	No Action	◆	◆	◆
Impoundment Closure				
Closure-in-Place		◆	◆	◆
Closure-by-Removal --Existing CCR to Offsite Permitted Landfill		◆		◆
Closure-by-Removal -Existing CCR to Onsite Landfill			◆	
Long-Term Storage of Future CCR Produced at CUF				
Construction and Operation of a New Landfill Located on CUF (onsite)		◆	◆	
Transport of Future CCR to an Existing Permitted Landfill (offsite)				◆

1. Construction and operation of a Bottom Ash Dewatering Facility

2. Ash impoundment closure as follows:

   a. Consolidation and Closure-in-Place of the Bottom Ash Impoundment and North Ditch.

   b. Combination of Closure-in-Place and Closure-by-Removal. A portion of the Main Ash Impoundment and the Stilling Impoundment would be repurposed for use as Process Water Basins (identified as Process Water Basin 1 and Process Water Basin 2, respectively). This would require removal of CCR and underlying soil within the Stilling Impoundment and a portion of the Main Ash Impoundment. CCR from these areas would be transported to an existing permitted offsite disposal facility (Bi-County Solid Waste Management Landfill. The remaining portion of the Main Ash Impoundment would be Closed-in-Place as described above, *or*

   c. Closure-by-Removal of the Bottom Ash Impoundment, Main Ash Impoundment and Stilling Impoundment and the North Ditch. CCR material and underlying soil removed from the impoundments would be transported and managed in an existing offsite permitted landfill (Bi-County Solid Waste Management Landfill). Following removal of CCR, a portion of the Main Ash Impoundment and the Stilling Impoundment would be repurposed for use as Process Water Basin 1 and Process Water Basin 2.

3. Long-term management of future dry CCR at CUF – Construct and operate an onsite landfill for future CCR generated at CUF

2.3.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, TVA would construct and operate a series of related actions to manage CCR produced at CUF. These actions include:

CCR Management Project	Alternative A	B	C	D
Bottom Ash Dewatering Facility	No Action	◆	◆	◆
Impoundment Closure				
Closure-in-Place		◆	◆	◆
Closure-by-Removal --Existing CCR to Offsite Permitted Landfill		◆		◆
Closure-by-Removal -Existing CCR to Onsite Landfill			◆	
Long-Term Storage of Future CCR Produced at CUF				
Construction and Operation of a New Landfill Located on CUF (onsite)		◆	◆	
Transport of Future CCR to an Existing Permitted Landfill (offsite)				◆

1. Construction and operation of a Bottom Ash Dewatering Facility

2. Ash impoundment closure as follows:

   a. Consolidation and Closure-in-Place of the Bottom Ash Impoundment and North Ditch.

   b. Combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment and Stilling Impoundment as described for Alternative B, except CCR from the impoundments would be transported to an existing onsite landfill (Fly Ash Stack) for long-term storage,

   c. Closure-by-Removal. The sequence of actions to close the ash impoundments under this option would be the same as described under Alternative B. However, CCR removed from the ash impoundments under the Closure-by-Removal option would be transported to the existing onsite landfill (Fly Ash Stack) for long-term storage.

   Impacts associated with the closure of the Main Ash Impoundment and Stilling Impoundment would be similar to Alternative B, except for the effects related to transport and storage of existing CCR removed from the impoundments.

3. Long-term management of future dry CCR at CUF – Construct and operate an onsite landfill for future CCR generated at CUF

2.3.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, TVA would construct and operate a series of actions to manage CCR produced at CUF. These actions include:

CCR Management Project	Alternative A	B	C	D
Bottom Ash Dewatering Facility	No Action	◆	◆	◆
Impoundment Closure				
Closure-in-Place		◆	◆	◆
Closure-by-Removal --Existing CCR to Offsite Permitted Landfill		◆		◆
Closure-by-Removal -Existing CCR to Onsite Landfill			◆	
Long-Term Storage of Future CCR Produced at CUF				
Construction and Operation of a New Landfill Located on CUF (onsite)		◆	◆	
Transport of Future CCR to an Existing Permitted Landfill (offsite)				◆

1. Construction and operation of a Bottom Ash Dewatering Facility

2. Ash impoundment closure as follows:

    a. Closure-in-Place. Under this option, TVA would close the Bottom Ash Impoundment in-place in the same manner as described for Alternative B.

    b. Combination of Closure-in-Place and Closure-by-Removal. Under this option, TVA would close the Main Ash Impoundment and Stilling Impoundment in-place in the same manner as described for Alternative B.

    c. Closure-by-Removal. The sequence of actions to close the impoundments under this option would be the same as described under Alternative B.

3. Long-term management of CCR at CUF – Transport future dry CCR generated at CUF to an offsite landfill (Bi-County Solid Waste Management Landfill).

2.3.5 Comparison of Alternatives

The environmental impacts of each of the alternatives under consideration are summarized in Table 2-6. 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 2-6. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Air Quality	No impact.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction activities. BMPs would minimize impacts during construction. Emissions associated with the offsite transport of CCR from the impoundments under Closure-by-Removal would be greater than those under the combined closure of the Main Ash Impoundment and Stilling Impoundment which would include the offsite transport of a smaller amount of CCR, however all closure options would have a minor impact on regional air quality.	Increased localized onsite emissions associated with excavation and transfer of CCR from the impoundments to the existing landfill due to greater number of vehicles relative to Alternative B. Offsite emissions would be notably reduced as existing ash would not be transported to an offsite landfill for disposal. Impact would be minor and localized.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction activities. BMPs would minimize impacts during construction. Long-term offsite emissions greater than Alternatives B and C due to transport of future CCR to the offsite landfill
Climate Change and Greenhouse Gases (GHG)	No impact.	Construction and trucking operations contributes to localized GHG emissions. No impact to climate change or changes in regional GHG levels.	Similar to Alternative B. However, onsite GHG emissions associated with excavation and transfer of CCR to the existing landfill would be somewhat larger than Alternative B, but offsite emissions would be notably reduced as existing ash would	Similar to Alternative B, but magnitude of impact would be greater due to increased operation of onsite equipment and long-term effects of offsite trucking.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
			not be transported to an offsite landfill for disposal.	
Land Use	No impact.	Minor impact associated with conversion of undeveloped land to industrial use (landfill).	Same as Alternative B.	No impact.
Prime Farmland	No impact.	Minor impact from landfill construction.	Same as Alternative B.	No impact.
Geology	No impact. TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and meet appropriate safety factors.	Minor impact, mitigated by appropriate design measures.	Same as Alternative B.	Same as Alternatives B and C for dewatering and ash impoundment closures. No impact associated with landfill construction.
Groundwater	Risk to groundwater is not reduced. However, groundwater protection processes would be implemented as needed to comply with the TDEC Order and the CCR Rule.	Minimal impacts to groundwater during construction with the use of BMPs. Closure-in-Place of the impoundments would result in long-term beneficial impacts through reduction of risk to groundwater due to reduced risk of migration of constituents to groundwater and improved water quality in comparison to the No Action Alternative.	Same as Alternative B. However, incrementally greater beneficial impacts of Closure-by-Removal related to reduction of risk to groundwater in both the short-term and the long-term due the shorter closure period.	Same as Alternative B.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		Closure-by-Removal would result in lower benefit related to reduction of risk to groundwater in the short-term, but greater beneficial impacts in the long-term. No impact as a result of landfill operation. Potential effects from leachate mitigated by effective landfill liner design coupled with use of BMPs and adherence to TDEC permitting requirements.		
Surface Water	No change from existing conditions.	Minor temporary impacts due to runoff during construction and minor long-term impacts associated with leachate and storm water discharge during operation of the landfill. Bottom ash dewatering would result in the possibility of improved water quality which would yield minor benefits, due to the capture of bottom ash solids. Option 2 (recirculation) would result in long-term beneficial impact associated with reduction in mass loading due to operation of dewatering facilities	Same as Alternative B.	Same as Alternative B for dewatering and ash impoundment closure. However, minor impacts associated with landfill construction would not occur.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		and the recirculation of sluice water. Direct permanent impact related to filling and/or culverting 3,573 feet of perennial stream and 1,211 feet of intermittent stream, which would be mitigated per permit requirements. Potential impacts to Wells Creek and/or Scott Branch from landfill leachate and storm water discharges would be mitigated to meet NPDES permit requirements.		
Floodplains	No impact.	No significant impact. Consistent with EO 11988.	No significant impact. Consistent with EO 11988.	No significant impact. Consistent with EO 11988.
Vegetation	No impact.	Minor impact resulting from the disturbance of predominantly previously disturbed areas that lack notable plant communities. Long-term minor beneficial impact associated with the change of open water area to vegetated cover. Moderate impact resulting from loss of vegetation resulting from landfill construction.	Same as Alternative B.	Similar to Alternatives B and C for dewatering and ash impoundment closures. No loss of vegetation associated with landfill construction; therefore, the magnitude of impact would be less than Alternatives B and C.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Wildlife	No impact.	Long-term beneficial impacts following closure of the ash impoundments as these areas may provide a minor expansion of upland wildlife habitat. This benefit would be incrementally more beneficial under the Closure-by-Removal option. Impact resulting from loss of forested habitat associated with landfill development. However, impact is minor due to the abundance of high quality wildlife habitat near CUF.	Same as Alternative B.	No impact related to loss of forested habitat. Beneficial impact would be the same as Alternative B.
Aquatic Ecology	No impact.	Long-term beneficial impact due to the reduced discharge from dewatering. No impacts from ash impoundment closure. Minor temporary impacts during landfill construction activities that would be minimized through use of erosion control BMPs. Direct impact to aquatic biota in streams on the landfill site. Impact would be mitigated per permit requirements.	Same as Alternative B.	Similar to Alternatives B and C. However, no direct impacts to aquatic resources due to landfill construction.
Threatened and Endangered Species	No impact.	Negligible indirect impacts from dewatering facility and ash impoundment closure.	Same as Alternative B.	Negligible indirect impact.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		Minor impact from landfill construction. Proposed landfill site is of low summer roosting quality for threatened and endangered bats, and may be used as a foraging area.		
Wetlands	No impact.	No impacts from dewatering facility or ash impoundment closure. Minor impact from landfill construction. Loss of 0.5 acre of wetlands determined to be jurisdictional under Section 404 of the CWA.	Same as Alternative B.	No impact.
Solid and Hazardous Waste	No impact associated with current management of CCR at CUF. Long-term impacts related to future operations due to loss of storage capacity.	Minor impact during construction and operation. Long-term impact associated with the manage-ment of solid wastes as CCR produced at CUF would be disposed in a new onsite landfill.	Similar to Alternative B. Potential impact associated with the loss of capacity of the onsite landfill (Fly Ash stack) associated with combined closure of the Main Ash Impoundment and Stilling Impoundment and the Closure-by-Removal of all the impoundments. Impact would be minor, yet greater than the Closure-in-Place option.	Similar to Alternative B. No temporary impact associated with landfill construction. Potential long-term impact related to reduction in the capacity of the existing offsite landfill related to storage of CCR.
Visual Resources	No impact.	Minor impacts from dewatering facility or ash impoundment closure due to temporary	Same as Alternative B.	Negligible long-term impact.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
		change in visual landscape during construction. The landfill would change the existing visual integrity which would result in a long-term moderate impact to the viewshed of some members of the surrounding community.		
Cultural and Historic Resources	No impact.	No impacts from dewatering facility or ash impoundment closure. Direct adverse impact to archeological site associated with landfill construction. TVA would enter in to consultation with the Tennessee SHPO for approval of the research design and the development of a Memorandum of Agreement regarding mitigation activities.	Same as Alternative B.	No effect.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Natural Areas, Parks and Recreation	No impact.	No direct impacts. Indirect impact to facilities during construction and during transport of existing CCR to the offsite landfill under the combined closure option for the Main Ash Impoundment and Stilling Impoundment due to increased vehicles on surrounding roadways. Impact would be minor, yet less than the Closure-by-Removal option.	Similar to Alternative B, however no offsite impacts related to offsite transport of CCR.	Same as Alternative B for dewatering and ash impoundment closures. Long-term indirect impact to facilities along the haul road associated with transport of future CCR. Impact minor but incrementally greater than Alternatives B and C.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Transportation	No impact.	No impact to traffic and levels of service on public roads for future CCR produced at CUF. Impact related to increased traffic and potential increase in crash rates during transport of existing CCR under the combined closure option for the Main Ash Impoundment and Stilling Impoundment. Impact would be minor, yet less than the Closure-by-Removal option as fewer trucks would be required to transport existing CCR. No impact related to Closure-in-Place of the Bottom Ash Impoundment.	Same as Alternative B for dewatering and ash impoundment Closure-in-Place. No impact to traffic and levels of service on public roads associated with offsite transport of CCR.	Same as Alternative B for dewatering and ash impoundment closures. Moderate impact related to increased traffic and potential increase in crash rates during transport of future CCR to the offsite landfill.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Noise	No impact.	Minor impact. Noticeable increase in noise levels during landfill operation. Operational noise would be intermittent and generally occur during normal working hours. Indirect impact along the haul route to the offsite landfill related to noise resulting from transport of CCR under the combined closure option for the Main Ash Impoundment and Stilling Impoundment, which includes offsite transport of CCR. Impact would be minor, yet less than the Closure-by-Removal option.	Similar to Alternative B for dewatering and in-place ash impoundment closure. No impact to offsite receptors associated with the offsite transport of CCR.	Same as Alternative B for dewatering and ash impoundment closures. Impact associated with the transport of future CCR produced at CUF to the offsite landfill would be minor, but of a greater magnitude than Alternatives B or C.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Socioeconomics and Environmental Justice	No impact.	Minor temporary beneficial impact resulting from benefits to in the localized workforce. Positive economic benefits to regional economy due to capital expenditures. Minor indirect impact to ease of movement to and from community facilities along the haul route associated with the offsite transport of CCR under the combined closure option for the Main Ash Impoundment and Stilling Impoundment. Impact would be minor, yet less than the Closure-by-Removal option. No impact to Environmental Justice communities.	Similar to Alternative B. Increased workforce associated with ash impoundment closure, however, increase is offset by shorter duration of construction. No impact associated with the offsite transport of CCR.	Same as Alternative B but incrementally lower effect on regional economy and workforce as landfill would not be constructed. Incrementally greater effect on ease of movement to and from community facilities along the haul route associated with the long-term transport of future CCR to the offsite landfill.

Resource	Alternative A: No Action	Alternative B: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative C: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF	Alternative D: Bottom Ash Dewatering Facility Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF
Public Health and Safety	No impact.	Closure-by-Removal and the combined Closure-by-Removal and Closure-in-Place of the impoundments would have higher risk to workforce health and safety as well as increased risk related to offsite transportation of CCR (crashes, derailments, road damage and other transportation-related effects) than the Closure-in-Place option.	Risk to workforce health and safety related to excavation and transport of CCR would be similar to Alternative B. However, under the Closure-by-Removal and the combined Closure-by-Removal and Closure-in-Place options there would be no risk to public safety associated with the use of public roads.	Risk to workforce health and safety related to ash impoundment closure would be the same as Alternative B. Risk to public safety associated with the use of public roads to transport future CCR would be greater than Alternative B and C given the projected total truck traffic and duration of the project.
Cumulative Effects	No impact.	Minor localized increase in air and noise emissions. Incremental impacts to wetland and aquatic resources. No notable cumulative effect.	Same as Alternative B.	Minor localized increase in air and noise emissions. Although air emissions would be greater than Alternatives B and C, no notable cumulative effect. No cumulative impact to wetlands and aquatic resources.

2.4 TVA's Preferred Alternative

TVA's preferred alternative is Alternative C which would include the Construction and Operation of a Bottom Ash Dewatering Facility, Closure-In-Place of the Bottom Ash Impoundment, and a combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment, which allows for the re-use and redevelopment of a portion of the Main Ash Impoundment. The portion of the Main Ash Impoundment and the Stilling Impoundment that is closed by removal would be repurposed as Process Water Basin 1 and Process Water Basin 2, respectively with CCR removed from the impoundment transported to an existing onsite landfill. In addition, under Alternative C TVA would construct an onsite landfill to manage future CCR produced at CUF.

Impacts associated with this alternative primarily include temporary short-term impacts during construction and minor long-term impacts to aquatic resources, loss of bat habitat, and impacts to 0.5 acre of wetland associated with construction of an onsite landfill. However, construction and operation of an onsite landfill is preferred over the use of an existing offsite landfill to avoid air emissions, noise emissions, safety risks and disruptions to the public that would be associated with the offsite transport of CCR along public roadways.

In addition to state and federal water and waste regulations, TVA's CCR disposal areas at CUF, including the impoundments, are subject to the administrative order entered by TDEC. Therefore, it is TVA's intention not to pursue Closure-in-Place activities immediately, but rather let the execution of the requirements of the TDEC order guide the closure activities to the maximum extent possible.

2.5 Summary of Mitigation Measures and Best Management Practices

TVA's analysis of the proposed alternatives includes mitigation, as required, to reduce or avoid adverse effects. Mitigation measures designed to avoid, minimize, or compensate for adverse impacts associated with the management of CCR at CUF include:

- A TDEC ARAP and U.S. Army Corps of Engineers (USACE) 404 permit would be required for disturbance to wetlands and stream features, and the terms and conditions of these permits would likely require mitigation for these proposed activities.
- TVA would implement supplemental groundwater mitigation measures that could include monitoring, assessment, or corrective action programs as mandated by state and federal requirements. The CCR Rule and state requirements provide an additional layer of groundwater protection to minimize risk.
- TVA would coordinate with the Tennessee Department of Transportation and Stewart County transportation officials as needed to develop appropriate mitigation measures to reduce localized temporary transportation effects.
- Potential impacts to Wells Creek and/or Scott Branch from landfill leachate and storm water discharges would be mitigated as required to meet permit requirements.
- Forested land within the proposed landfill project area is of low summer roosting quality for threatened and endangered bats, although it may be used as a foraging area. Section 7 Consultation with U.S. Fish and Wildlife Service (USFWS) is

underway. Impacts would be mitigated as required in accordance with the ESA during Section 7 Consultation with USFWS.

- SHPO concurrence would be required before TVA would construct the proposed Bottom Ash Dewatering Facility at the location identified as Option B.
- TVA will adhere to the mitigation measures stipulated in the MOA with the Tennessee SHPO to minimize adverse effects to the Brunsoni Furnace.
- If construction of the Bottom Ash Dewatering Facility were to require the demolition of structures that could potentially be considered suitable unconventional bat roosts, a survey will be conducted of the structures prior to demolition.
- No tree removal would occur between June 1 and July 31 to avoid any potential direct impact to juvenile bats at a time when they are unable to fly.

In addition, TVA has identified the following best management practices (BMP) that would be employed to minimize impacts. Any additional project-specific BMPs would be applied as appropriate on a site-specific basis to enable efficient maintenance of construction projects and further reduce potential impact on environmental resources including, air, surface water, threatened and endangered species and groundwater.

- Fugitive dust emissions from site preparation and construction would be controlled by wet suppression and BMPs (CAA Title V operating permit incorporates fugitive dust management conditions).
- Erosion and sedimentation control BMPs (e.g., silt fences) would ensure that surface waters are protected from construction impacts.
- Consistent with EO 13112 as amended by EO 13751, disturbed areas would be revegetated with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.
- BMPs as described in the project-specific SWPPP and TVA's guide for environmental and best management practices (TVA 2017a) would be used during construction activities to minimize impacts and restore areas disturbed during construction.
- Any temporary or permanent outdoor lighting will be angled downward and away from suitable bat habitat to minimize light pollution impacts to listed bats.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Air Quality

3.1.1 Affected Environment

Regulatory Framework for Air Quality

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

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

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air (EPA 2017b).

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

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

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

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under this alternative, existing CCR management operations at CUF would continue. Consequently, there would be no additional emissions related to project construction activities or the transport of CCR materials to receiving landfills. Therefore, no impacts to air quality are anticipated.

3.1.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.1.2.2.1 Bottom Ash Dewatering Facility

3.1.2.2.1.1 *Construction Impacts*

Under this alternative, transient air pollutant emissions would occur during construction of the Bottom Ash Dewatering Facility. Construction-related air quality impacts would be primarily related to operation of internal combustion engines and site preparation activities.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter, NO_x, CO, volatile organic compounds, and SO_2 during the site preparation and construction period. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Additionally, it is expected that all vehicles would be properly maintained which would also reduce emissions. Therefore, emissions from internal combustion engines would result in minor short-term local effects on air quality due to the relatively low number of vehicles, adherence to equipment maintenance requirements, and continued improvement of emission control measures and fuel blends.

Site preparation and vehicular traffic over paved and unpaved roads at the construction sites would result in the emission of fugitive dust during active construction periods. Based on analyses presented for similar dewatering facilities proposed at Kingston (TVA 2016c) and Bull Run (TVA 2012), it is expected that the largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. All TVA power plants have fugitive dust control plans as required under existing Title V permits, and TVA requires all contractors to maintain construction equipment properly and to use BMPs (such as covered loads and wet suppression) to minimize dust, if necessary. Air quality impacts from construction activities would depend on both man-made factors (intensity of activity, control measures, etc.) and natural factors such as wind speed and direction, soil moisture and other factors. However, even under unusually adverse conditions, these emissions would have, at most, a minor transient impact on offsite air quality and would be well below the applicable ambient air quality standard.

3.1.2.2.1.2 *Operation Impacts*

Operation of the dewatering facility is subject to specific state air quality regulations and fugitive dust regulations. The proposed dewatering facility would be operated in compliance with state regulations.

Fugitive dust emission standards state that fugitive dust may not be emitted in quantities that produce visible emissions beyond the property. Bottom ash would be conveyed from the dewatering facility and stacked in a pile on a concrete pad and moistened with water as

necessary to control fugitive emissions (i.e., dust blown off the top of the pile). The ash would be reclaimed from the storage pile and transported either to the onsite or offsite landfill or offsite for storage and/or beneficial reuse.

Under current operations, fly ash is transported in dry form to the fly ash stack. Gypsum is conveyed to an adjacent wall-board manufacturer or to lined channels (see Figure 1-1) where it is dewatered, stockpiled for later use, or disposed in the Gypsum Stack. Fugitive dust control BMPs would reduce potential impacts to air quality; the dewatering facility is expected to comply with fugitive dust emission standards. Therefore, air quality impacts associated with operation of the Bottom Ash Dewatering Facility would be minor and would not exceed NAAQS.

3.1.2.2.2 Ash Impoundment Closure

Impoundment closure activities involve several activities that potentially would result in air emissions. These activities include dewatering, grading and earth-moving operations, excavation and/or compaction of CCR, and emissions from trucking. CCR within the Stilling Impoundment (180,000 yd^3) and a portion of the Main Ash Impoundment (approximately 245,400 yd^3) would be removed to an approved existing offsite landfill. Borrow material would be obtained onsite which minimizes emissions from the transport of this material. However, if offsite borrow material is needed, it would be hauled from one or more previously permitted sites within 30 miles of CUF.

Potential air quality impacts associated with activities under the Closure-in-Place option include dust and emissions from equipment, earth-moving activities (dozing, grading, and fill placement) and equipment movement on access roads on the site. Under the combined Closure-in-Place and Closure-by-Removal option, the CCR removed from the Stilling Impoundment and a portion of the CCR from the Main Ash Impoundment would be transported to an offsite landfill may result in additional onsite and offsite fugitive dust emissions or emissions from equipment or vehicles as well as emissions associated with offsite trucking operations. Any supplemental borrow material that is needed beyond the capacity of the existing onsite borrow area would be provided by a contractor from an existing offsite, previously permitted borrow site. Minor, localized emissions may also be expected in conjunction with the procurement of supplemental borrow material from offsite locations, if necessary.

As noted in the PEIS (TVA 2016b), the Closure-in-Place alternative would result in temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction and transport of borrow material. Relative to Closure-in-Place, excavation and removal of CCR from the impoundments and transport to an offsite landfill would result in notably greater emissions from fugitive dust and emissions from equipment and vehicles during construction and transport of borrow and CCR material. In either case, air quality impacts are expected to be localized and short-term, and would not result in exceedances of NAAQS at CUF.

Regional impact on air quality would be negligible.

3.1.2.2.3 Landfill

3.1.2.2.3.1 *Construction Impacts*

Construction of the proposed landfill and its associated access road would require the use of earthmoving, compacting and paving equipment as well as trucks for hauling materials. All construction activities would be carried out onsite, and no offsite activities are

anticipated. These activities would generate fugitive dust during active construction periods for the Bottom Ash Dewatering Facility and impoundment closure.

Equipment potentially required for this alternative includes excavators, bulldozers, water trucks, loaders, pickup trucks, and semi-trailers. All equipment would be used onsite, and any air quality impacts would be limited to the immediate site area. Emissions associated with the combustion of gas and diesel fuels would generate local emissions during the construction period. Given the relatively low number of vehicles and equipment that would be used for the initial construction activities, adherence to equipment maintenance requirements, continued improvement of emission control measures and fuel blends, and the intermittent nature of construction, emissions from construction equipment would be minor and temporary in nature.

Excavated soil from the landfill area would be handled and processed onsite to separate the more clayey soils capable of meeting the lower permeability requirements requested by TDEC. These are relatively scarce materials so selective excavation will be performed. The valuable soils will be segregated and stockpiled for current and future landfill cell construction as part of the landfill liner system. The remaining soil materials less suited for the soil liner portion of the system will be used as general fill for landfill and associated earth fills, other projects on TVA property, and plant operation if needed. Fugitive dust generated during this process would be controlled using wet suppression and other BMPs, as outlined in the fugitive dust control plan as required by CUF's Title V Operating Air Permit.

TDEC requested the change to more clayey soils in the liner system. This will create an overall less permeable liner system that has a lower leakage rate over what is stipulated in the current regulations. Expending additional resources to utilize onsite materials instead of importing soils from the surrounding countryside is based on TVA's focused stewardship of natural resources in the region.

3.1.2.2.3.2 *Operation Impacts*

Operation of the proposed landfill would comply with Tennessee regulations for fugitive emissions and CUF's air operating permit conditions. CCR handling, transport and placement activities would utilize methods similar to other TVA landfill operations. Moisture conditioned CCR would be transported to the working face of the landfill using heavy-duty dump trucks over paved access roads contained within the boundaries of the plant. Based solely on the estimate of CCR produced daily and the safe capacity of an articulated dump truck, TVA estimates that approximately 141 truckloads of conditioned CCR would be transported to the proposed onsite landfill per day (282 trips). It is anticipated that all trucks used to transport CCR would be maintained in good working condition with current emission control technologies to minimize local air quality impacts.

Once placed within the landfill, the CCR material would be spread and compacted. The compacted surface further limits fugitive dust. As each cell of the landfill reaches its capacity, it would be covered with an approved cover system. Equipment used for placement and compaction of CCR would be similar to what is currently in use at the existing Gypsum Stack and Fly Ash Stack so there would be no substantive change in emissions as compared to base conditions. Therefore, landfill operation air quality impacts are anticipated to be minor, localized and long-term and would not exceed NAAQS.

3.1.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, air quality impacts associated with implementation of the dewatering facility and in-place closure of the bottom ash impoundment would be the same as identified under Alternative B. Additionally, air quality impacts associated with the construction and operation of the onsite CCR landfill would also be like those described for Alternative B.

For Alternative C however, CCR removed from a portion of the Main Ash Impoundment and Stilling Impoundment under the proposed combination of Closure-in-Place and Closure-by-Removal option as well as all of the CCR removed from the impoundments under the Closure-by-Removal option would be transported to the existing onsite landfill (Fly Ash Stack) for long-term storage. TVA estimates that it could safely transport and deposit CCR on the existing landfill at a rate of 200 truckloads of CCR per day, over two working shifts which equates to 400 truckloads of CCR per day (800 truck trips). The increased number of trucks that can be used is a result of the shortened distance of transport to the existing landfill as well as the ability to work two shifts as public roadways would not be used. Onsite air emissions associated with excavation and transfer of CCR to the existing onsite landfill would be increased during the closure period relative to Alternative B given additional trucks, but offsite emissions would be notably reduced as existing ash would not be transported to an offsite landfill for disposal. In either case, air quality impacts from emissions and fugitive dust are expected to be localized and short-term for bottom ash dewatering and ash impoundment closures; minor, localized, and long-term for landfill operations, but would not result in exceedances of NAAQS at CUF.

3.1.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Air quality impacts under Alternative D are expected to the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and the same as Alternative B for the ash impoundment closure activities.

However, in contrast to Alternatives B and C, this alternative considers the transport of future ash to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage.

Under this alternative, no construction-related activities would be required to develop a landfill. Consequently, impacts from this alternative due to construction would be less than those described for Alternatives B and C. In contrast, however, this alternative would require the transport of future CCR daily to the Bi-County Solid Waste Management Landfill and would result in long-term emissions and fugitive dust associated with trucking operations. Based solely on the estimate of CCR produced daily and the safe capacity of over the road dump trucks, TVA estimates that approximately 187 truckloads of CCR per day would be needed to transport CCR to the proposed offsite landfill. That would result in a traffic count of 374 trips per day between the dewatering site and the proposed offsite landfill. In addition, the 200 vehicles per day that would occur daily for approximately 12 years under the ash impoundment Closure-by-Removal option would also utilize the same haul route to the offsite landfill. It is anticipated that all trucks used to transport CCR

would be maintained in good working condition with current emission control technologies to minimize local air quality impacts.

Overall, air quality impacts associated with Alternative D would not result in an exceedance of NAAQS. However, emissions from the additional trucks needed to transport CCR from CUF to the Bi-County Solid Waste Management Landfill are expected to result in long-term local effects that would be minor, but greater than those evident under Alternatives B and C.

3.1.3 Summary of Impacts to Air Quality

As summarized in Table 3-1, TVA has determined that all air quality impacts related to the CCR management projects are minor and would not have an impact on NAAQS.

Table 3-1. Summary of Impacts to Air Quality Resources

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary impacts associated with localized onsite emissions from vehicles and equipment as well as generation of fugitive dust during construction activities. Operations – Fugitive dust control BMPs would reduce potential impacts to air quality.	Minor. No exceedance of NAAQS expected.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Temporary construction impacts associated with emissions from vehicles and equipment as well as generation of fugitive dust.	Minor. No exceedance of NAAQS expected.
Landfill		
Onsite Landfill	Construction and operational localized emissions related to clearing, and site preparation, trucks transporting CCR to the onsite landfill as well as equipment used to manage the CCR at the landfill.	Minor. No exceedances of NAAQS expected.
Offsite Landfill	Operational localized emissions related to trucks transporting CCR to an offsite landfill.	Minor. Long-term offsite emissions greater than Alternatives B and C. No exceedances of NAAQS expected.

3.2 Climate Change and Greenhouse Gases

3.2.1 Affected Environment

<u>Regulatory Framework for Climate Change and Greenhouse Gases</u>

“Climate change” refers to any substantive change in measures of climate, such as temperature, precipitation, or wind lasting for an extended period (decades or longer) (EPA 2016a). The 2014 National Climate Assessment concluded that global climate is projected

to continue to change over this century and beyond. The amount of warming projected beyond the next few decades, by these studies, is directly linked to the cumulative global emissions of greenhouse gases (GHGs) (e.g., carbon dioxide [CO_2], methane). By the end of this century, the 2014 National Climate Assessment concluded a 3 degrees Fahrenheit (°F) to 5°F rise can be projected under the lower emissions scenario and a 5°F to 10°F rise is projected for a higher emissions scenario (Melillo et al. 2014).

Climate change is primarily a function of too much CO_2 in the atmosphere. CO_2 is the primary GHG emitted through human activities. In 2014, U.S. greenhouse gas emissions totaled 6.870 million metric tons (15.1 trillion pounds) of carbon dioxide equivalents. This 2014 total represents a 7percent increase since 1990 but a 7 percent decrease since 2005 (EPA 2016a). This carbon overload is caused mainly by activities that burn fossil fuels such as coal, oil, and gas or by cutting down forests which releases stored carbon. As more of these gases are added to the atmosphere, more heat is trapped. This extra heat leads to higher air temperatures near the Earth's surface, alters weather patterns, and raises the temperature of the oceans (EPA 2016a).

TVA has adopted a climate adaptation plan that establishes adaptation planning goals and describes the challenges and opportunities climate change may present to its mission and operations. The goals of TVA's adaptation planning process are to ensure that TVA continues to achieve its mission and program goals and to operate in a secure, effective and efficient manner in a changing climate.

TVA manages the effects of climate change on its mission, programs and operations within its environmental management processes. TVA's Environmental Policy includes the specific objective of stopping the growth in volume of emissions and reducing the rate of carbon emissions by 2020 by supporting a full slate of reliable, affordable, lower CO_2 energy supply opportunities and energy efficiency.

Activities associated with the CCR management projects at CUF that produce CO_2 are primarily related to emissions from fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.) used during construction, transport and long-term management of CCR.

Forested areas that absorb and store CO_2 from the atmosphere via a process known as carbon sequestration help to reduce levels of CO_2 in the atmosphere. Approximately 173.2 acres of forested land are present within the proposed landfill limits of disturbance. There is no forested land within the footprint of either the Bottom Ash Dewatering Facility or the impoundment areas.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under this alternative, there would be no change to CCR management operations at CUF. Therefore, there would be no impact to GHGs and climate change.

3.2.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.2.2.2.1 Bottom Ash Dewatering Facility

3.2.2.2.1.1 *Construction Impacts*

GHG emissions, primarily CO_2, would occur during construction of the dewatering facilities. As discussed above, CO_2 construction-related emissions would occur from internal combustion engines during site preparation and facility construction. Due to the small number of vehicles and construction equipment involved, only a minor temporary increase in CO_2 emissions would be anticipated because of the construction of the dewatering facilities. Such emission levels are *de minimis* in comparison to the regional and world-wide volumes of CO_2. Therefore, local and regional GHG levels would not be adversely impacted by CO_2 emissions from construction activities.

3.2.2.2.1.2 *Operation Impacts*

Operations at the dewatering facility would require the use of electricity already being produced by CUF. The energy required to operate the dewatering facility would not perceptibly increase the amount of fossil fuel burned or CO_2 emitted at CUF and, therefore, is not anticipated to have local and regional GHG level impacts or impacts on climate change.

3.2.2.2.2 Impoundment Closure

Construction-related CO_2 emitting activities associated with the impoundment closures would be similar to those described for the Bottom Ash Dewatering Facility. The impoundment closures, however, may generate slightly greater CO_2 emissions due to the large amounts of grading, transportation of borrow material, and installation of approved closure liner systems. New emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions which would minimize the impact associated with increased levels of construction equipment use. No carbon sequestration would be lost as the impoundment areas have no forested areas that would be affected by closure activities.

Although the Closure-by-Removal options would use more equipment for extended periods of time because of excavation and transport of CCR material to a permitted offsite landfill, associated impacts would be small and temporary. Therefore, no changes to climate or significant increases in greenhouse gases are anticipated.

It is expected that CO_2 emissions would have potential minor short-term local effects on GHG levels but overall, regional impact on GHG levels and climate change would not be impacted.

3.2.2.2.3 Landfill

3.2.2.2.3.1 *Construction Impacts*

Construction of the proposed landfill would require the use of earthmoving and compacting equipment as well as trucks for hauling materials. All construction activities would be carried out onsite, and no offsite activities are anticipated. Equipment expected to be required for this alternative includes excavators (two), bulldozers (three), a water truck, a loader, pickup trucks (five) and semi-trailers. These activities would generate CO_2 emissions during active construction periods. As with the dewatering and impoundment closure projects, due to the relatively low number of vehicles and construction equipment

involved, only minor CO_2 emissions would be anticipated in comparison to the regional and world-wide volumes of CO_2 generated. Therefore, local and regional GHG levels would not be adversely impacted by the project.

EPA's quantification tool was used to estimate the carbon sequestration that may be lost from the conversion of forested land (EPA 2017a). Assuming 173.2 acres of forested areas (the land cover with the greatest potential carbon sink) are completely cleared from the proposed landfill area limits of disturbance, and forest composition and age is typical for the east Tennessee region, TVA estimates that the conversion of these forested lands would result in the loss of approximately 148 metric tons of carbon sequestered in one year. The loss of carbon sequestered or stored is very small relative to the carbon sequestered in local and regional forested areas. Overall, carbon sequestration within forests in the region has increased due to net increases in forest areas (e.g., conversion of farmland to forested areas), improved forest management, as well as higher vegetation growth productivity rates and longer growing seasons. Within the 5-mile radius of CUF, it is estimated that existing forested lands sequester approximately 67,856 metric tons of carbon per year. By comparison, therefore, the loss of 148 metric tons of carbon sequestration due to construction phase clearing of forests at CUF is *de minimis* relative to the regional carbon sequestration and would not adversely affect climate change.

3.2.2.2.3.2 *Operation Impacts*

CCR would be transported to the proposed landfill using dump trucks over access roads within the boundaries of the plant. Based solely on the estimate of CCR produced daily and the capacity of an articulated dump truck, approximately 141 truckloads of CCR would be transported to the onsite landfill per day (282 trips). Due to the relatively low number of trucks and minimal transport distance, the trucks would produce a minor, long-term increase in CO_2 emissions but are not anticipated to increase regional GHG levels or impact climate change.

Equipment that produces CO_2 emissions (e.g., bulldozers) would be used to spread and compact the CCR. The equipment used for landfill operations would be similar to what is currently in use at the existing gypsum stack and, therefore, there would be no substantive change in CO_2 emissions as compared to base conditions.

3.2.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, climate change and GHG impacts associated with implementation of the Bottom Ash Dewatering Facility and in-place closure of the Bottom Ash Impoundment would be the same as identified under Alternative B. Additionally, impacts associated with the construction and operation of the onsite CCR landfill would also be the same as to those described for Alternative B.

For Alternative C, however, CCR removed from a portion of the Main Ash Impoundment and Stilling Impoundment under the proposed combination of Closure-in-Place and Closure-by-Removal and CCR removed from all impoundments under the Closure-by-Removal option would be transported to the onsite existing landfill for long-term storage. Onsite GHG emissions associated with excavation and transfer of CCR to the landfill would be somewhat larger than Alternative B due the greater number of vehicles used, but offsite emissions would be notably reduced as existing ash would not be transported to an offsite landfill for disposal.

In either case, GHG impacts from emissions are expected to be localized and short-term for the bottom ash dewatering and ash impoundment closures, localized and long-term for landfill operations, but would not result in regional impacts on climate.

3.2.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Climate change impacts under Alternative D are expected to be the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and the same as Alternative B for the ash impoundment closure activities.

However, in contrast to Alternatives B and C, this alternative considers the transport of future ash to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage.

Under Alternative D, no construction related activities would be required to develop a landfill. Consequently, there would be no impact to the amount of localized forest carbon sequestration. Consequently, impacts from this alternative due to construction would be less than those described for Alternatives B and C. This alternative would require the daily transport of future CCR to the Bi-County Solid Waste Management Landfill and would result in long-term emissions of GHG associated with trucking operations. Based solely on the estimate of CCR produced daily and the safe capacity of over-the-road dump trucks, TVA estimates that approximately 187 truckloads per day would be needed to transport conditioned CCR to the proposed offsite landfill. That would result in a traffic count of 374 trips per day between the dewatering and dry ash handling sites and the proposed offsite landfill. It is anticipated that all trucks used to transport CCR would be maintained in good working condition with current emission control technologies to minimize local air quality impacts.

Overall, GHG emissions associated with Alternative D would be relatively minor and long-term, but not result in climate change or changes in regional GHG levels. These local effects would be minor, but greater than those evident under Alternatives B and C.

3.2.3 Summary of Environmental Consequences on Climate Change and Greenhouse Gases

Impacts to climate change associated with the implementation of each alternative are summarized in Table 3-2. In summary, no impact to climate change is anticipated based on the limited CO_2 emissions generated from these CCR management projects in comparison to the regional and world-wide volumes of CO_2 generated.

Table 3-2. Summary of Impacts to Climate Change

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary increase in construction-related emissions would occur using internal combustion engines during site preparation and facility construction.	Minor. No impact to regional GHG levels or climate change.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Temporary increase in construction-related emissions would occur using internal combustion engines during site preparation and closure activities. Increase in in CO_2 emissions from transport of CCR.	Minor. No impact to regional GHG levels or climate change.
Landfill		
Onsite Landfill	Temporary construction and long-term operational GHG emissions are related to clearing and site preparation, trucks transporting CCR to the onsite landfill as well as equipment used to manage the CCR at the landfill. Minor loss in local forest carbon sequestration.	Minor. No impact to regional GHG levels or climate change.
Offsite Landfill	Operational GHG emissions are related to trucks transporting CCR to and from the offsite landfill	Minor. Long-term effect greater than Alternatives B and C. No impact to regional GHG levels or climate change.

3.3 Land Use

3.3.1 Affected Enviroment

The CUF facility is located near Cumberland City, Stewart County, Tennessee, along the southern bank of the Cumberland River. The plant property occupies approximately 2,400 acres of land that supports industrial development for the facility itself and supporting infrastructure. Land use within the facility is dominated by various developed uses and barren land (Figure 3-1). The areas associated with the dewatering facility and impoundment closures are previously disturbed due to existing CUF plant development. The proposed onsite landfill area is located within previously undeveloped land on CUF property and is primarily deciduous forest (173.2 acres) with a very small amount of wetlands (0.5 acre) (Table 3-3). More information about wetlands can be found in Section 3.12.

Table 3-3. Land Cover of the Proposed Project Areas and Within the Vicinity of CUF

Land Cover Type	Dewatering Facility (Option A)[1] (ac)	Dewatering Facility (Option B)[1] (ac)	Ash Impoundment Closure[2] (ac)	Temporary Use Areas[3] (ac)	Landfill[4] (ac)	5-Mi Radius (ac)
Barren Land	0	0	0	0	0	34.7
Cultivated Crops	0	0	0	0	0	3,534.9
Deciduous Forest	0	0	0	0	173.2	61,203.2
Developed, High Intensity	0	0	0	0	0	108.5
Developed, Low Intensity	27.7	2.3	1.0	9.4	0	335.9
Developed, Medium Intensity	0	0	0	0	0	284.0
Developed, Open Space	0	0	12.0	118.6	0	2,803.1
Emergent Herbaceous Wetlands	0	0	3.5	0	0	173.6
Evergreen Forest	0	0	0	0	0	776.2
Hay/Pasture	0	0	0	0	0	6,612.2
Herbaceous	2.1	0.6	0	0.2	0	5,484.1
Mixed Forest	0	0	0	0	0	2.7
Open Water	0.5	0	41.5	0	0	2,398.4
Shrub/Scrub	0	0	0	0	0	551.2
Woody Wetlands	0	0	0.1	0	0.5	2,033.3
Total	**30.3**	**2.9**	**58.1**	**128.2**	**173.7**	**86,336.2**

Source: Homer et al. 2015

[1] Includes the project area for the dewatering facility.

[2] Includes Main Ash Impoundment/Stilling Impoundment, North Ditch and Bottom Ash Impoundment limits of disturbance.

[3] Includes temporary use areas which may be used as part of ash impoundment closure activities; this may include portions of the existing landfill areas (Fly Ash Stack and Gypsum Stack).

[4] Includes the proposed landfill and access road project areas.

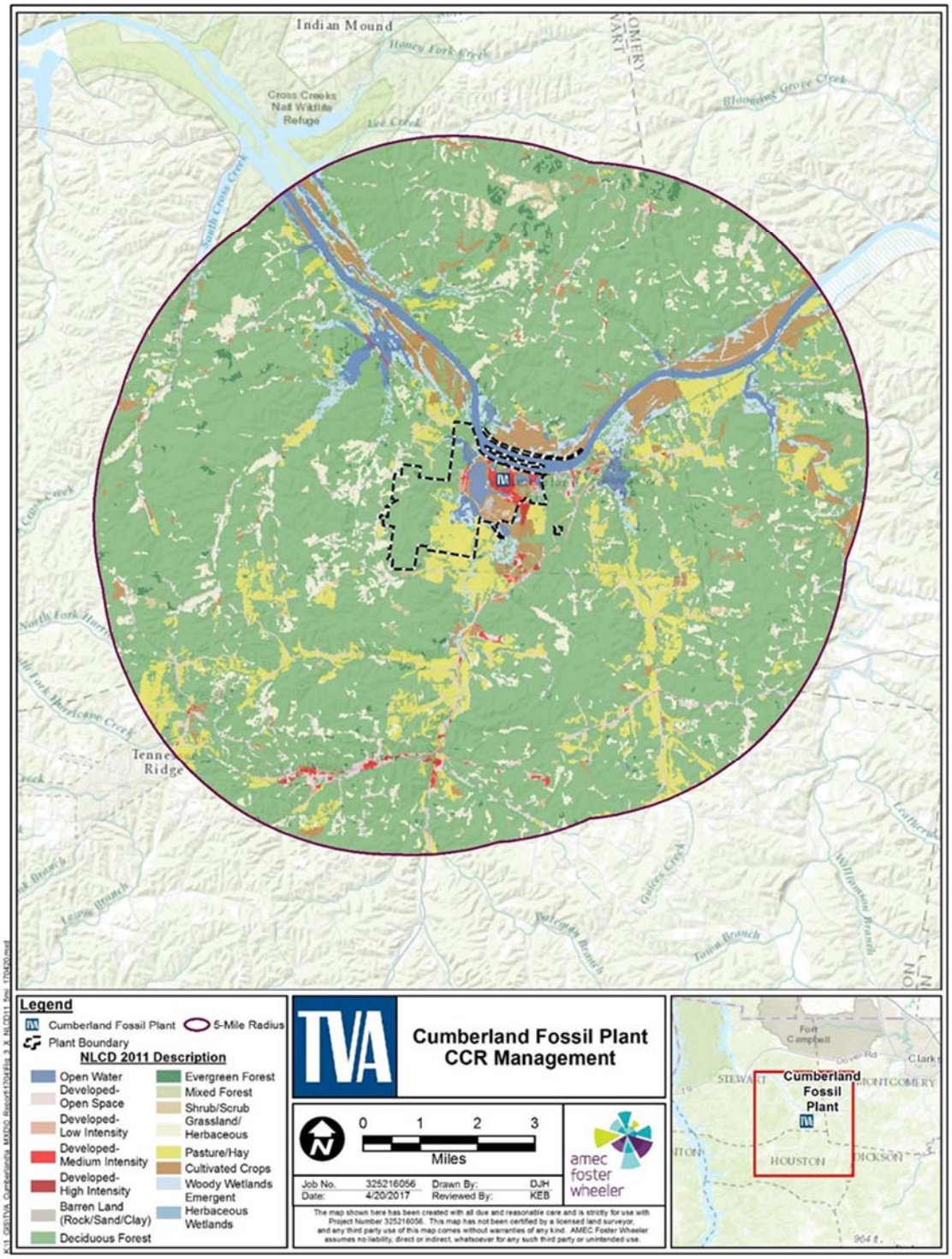

Figure 3-1. Land Use/Land Cover Within the Vicinity of Cumberland Fossil Plant

As summarized in Table 3-3, land use within the 5-mile radius surrounding CUF is dominated by undeveloped lands with various vegetative cover types, primarily deciduous forest (61,203.2 acres), hay/pasture (6,612.2 acres), herbaceous/grassland (5,484.1 acres) and cultivated crops (3,534.9 acres). Developed lands in the vicinity include both industrial (CUF plant site) and non-industrial uses. Non-industrial developed lands consist of developed lands associated with the rural Cumberland City to the east. The nearest residence is located approximately 0.3 mile east of the CUF property in Cumberland City. The facility is bordered to the north by Cumberland River, to the east by Cumberland City, and to the west and south by undeveloped lands.

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change in the management of CCR produced at CUF, and no work would be conducted that could result in a change in land use. Therefore, no project-related environmental impacts with respect to land use would occur under this alternative.

3.3.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed Bottom Ash Dewatering Facility would be constructed on sites that are already used for heavy industrial use. Accordingly, no changes in land use would occur with this project.

Closure-in-Place of the impoundments would include the installation of a cover system which would convert the existing industrial facilities largely devoid of vegetation to areas with herbaceous terrestrial land cover. A portion of the Main Ash Impoundment/Stilling Impoundment would be converted to Process Water Basins. However, these areas would still be located within the TVA plant site and be used for industrial purposes; therefore, closure would not result in the conversion of any land uses in the foreseeable future. Over a longer period, it is possible that closed impoundments could be put to other uses. If such uses are proposed, additional environmental reviews would be conducted.

Closure of the impoundments would incorporate some fill material that would be obtained from a previously permitted onsite borrow area or offsite commercial borrow area. During closure activities, TVA would use portions of existing developed areas for construction-related activities (i.e., vehicle and equipment parking, storage, and construction administration). These activities would occur on land located within the plant boundary which is dedicated to industrial use. Therefore, no changes in land use would occur with this closure option.

Existing CCR removed from the impoundments under the applicable closure options would be transported to an existing offsite permitted landfill. Therefore, there would be no changes from the existing environment within the landfill boundaries under this alternative. The haul route to the offsite landfill would utilize previously constructed roads which are already subjected to vehicular traffic and no new roads would need to be constructed. Therefore, there would be no impact to land use under this closure option

The proposed onsite landfill would be constructed on a site that is currently in an undeveloped state and covered with various vegetation cover types. Construction of the proposed facility would result in the permanent conversion of approximately 174 acres of land that is currently undeveloped to industrial facilities. Permanent industrial facilities include the construction of the landfill, leachate ponds, storm water ponds and conveyances, and access roads.

The conversion of undeveloped lands to industrial facilities is minor when compared to the abundance of undeveloped land within a 5-mile radius of the site (see Table 3-3). Therefore, impacts to land use from the construction and operation of the proposed onsite landfill would be minor.

3.3.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with construction and operation of the Bottom Ash Dewatering Facility, in-place CCR impoundment closure, and onsite landfill construction and operation would be the same as identified under Alternative B. However, under Alternative C, CCR removed from the impoundments would be transported to the existing onsite landfill for long-term storage rather than being transported to an offsite landfill. These areas are currently developed for industrial use, therefore there would be no change in impacts to land use under this alternative.

3.3.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts to land use associated with construction and operation of the Bottom Ash Dewatering Facility would be the same as Alternatives B and C, and would be the same as Alternative B for CCR impoundment closure (both Closure-in-Place and Closure-by-Removal options). However, under Alternative D, future CCR generated at CUF would be transported to the Bi-County Solid Waste Management Landfill for long-term disposal and there would be no direct impact to land use associated with landfill construction and operation. Therefore, there would be no changes to land use under this alternative

3.3.3 Summary of Impacts to Land Use

Impacts to land use associated with each of the proposed projects is summarized in Table 3-4.

Table 3-4. Summary of Impacts to Land Use

Project	Impact	Severity
Bottom Ash Dewatering Facility	Construction and operation would occur on land currently supporting industrial land use. There would be no change in land use.	No impact.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Construction and operation would occur on land currently supporting industrial land use. There would be no change in land use.	No impact.
Landfill		
Onsite Landfill	Construction and operation would result in the permanent conversion of approximately 174 acres of undeveloped, forested land to industrial facilities	Minor impact due to the abundance of undeveloped land within the region.
Offsite Landfill	The location is an existing permitted landfill and would use existing haul roads.	No impact.

3.4 Prime Farmland

3.4.1 Affected Environment

The Farmland Protection Policy Act of 1981, 7 United States Code (USC) 4201, requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. Prime farmland includes land that possesses the above characteristics and may include land currently used as cropland, pastureland, rangeland, or forestland.

Prime farmland soils within the project areas are shown on Table 3-5. Project areas associated with the proposed dewatering facility and ash impoundment closure projects are previously developed and no longer contain native soils. Therefore, there are no prime farmland soils on these sites. Approximately 8 percent of the land within the proposed landfill project site is prime farmland and consist of Humphreys gravelly silt loam and the Lobelville silt loam.

Table 3-5. Acres of Prime Farmland Soils

Project Type	Prime Farmland Soils (acres)	Non-Prime Farmland Soils (acres)
Bottom Ash Dewatering Facility	0	0
Ash Impoundment Closure	0	0
Temporary Use Areas[1]	0	0
Potential Onsite Landfill	14.2	159.5
Grand Total	**14.2**	**159.5**

Source: USDA NRCS 2017

[1]Includes temporary use areas utilized as part of ash impoundment closure activities; this may include portions of the Fly Ash Stack and Gypsum Stack.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change in the management of CCR produced at CUF. As a result, no ground disturbance activities would be conducted that could potentially alter project-related environmental conditions within the project area. Therefore, there would be no impacts to prime farmland resources with this alternative.

3.4.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, implementation of the proposed projects (including all options for ash impoundment closure) would impact approximately 14 acres of prime farmland soils on the proposed landfill site. TVA has initiated coordination with the U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) through submittal of the AD 1006 Farmland Conversion Impact Rating Form. The NRCS uses a land evaluation and site assessment (LESA) system to establish a farmland conversion impact rating score. This score is used as an indicator to determine if adverse impacts to farmland exceed the recommended allowable level. The higher the numerical score assigned, the more protection the farmland would receive. Project sites receiving a total score of less than 160 need not be given further consideration for protection and no additional sites need to be evaluated. The proposed landfill site received a score of 64.6. The completed AD 1006 Form is provided in Appendix E.

Approximately 18,599 acres (21.3 percent) of the area within 5 miles have soils classified as prime farmland. The minor loss of onsite prime farmland soils due to the proposed actions is not significant when compared to the amount of land designated as prime farmland within the surrounding region. Therefore, impacts to prime farmland soils would be minor under this alternative.

3.4.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts to prime farmland associated with construction and operation of the proposed onsite landfill would be the same as identified under Alternative B. Since there are no additional impacts associated with management of CCR in the existing onsite landfill, there would be no change to the impact identified in Alternative B.

3.4.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, any future CCR generated at CUF would be transported to the Bi-County Solid Waste Management Landfill. Therefore, there would be no impacts to the 14.2 acres of prime farmland soils from the construction and operation of the onsite landfill. Consequently, implementation of Alternative D would not impact prime farmland soils.

3.4.3 Summary of Impacts to Prime Farmland

Impacts to prime farmland associated with the proposed projects are summarized in Table 3-6.

Table 3-6. Summary of Impacts to Prime Farmland

Project	Impact	Severity
Bottom Ash Dewatering Facility	No impact. Prime farmland soils not present.	No impact.
Ash Impoundment Closure	No impact. Prime farmland soils not present.	No impact.
Temporary Use Areas	No impact. Prime farmland soils not present.	No impact.
Landfill		
Onsite Landfill	Loss of 14.2 acres of prime farmland due to construction and operations.	Minor compared to the amount of land designated as prime farmland within the surrounding region.
Offsite Landfill	No impact. The location is an existing permitted landfill and would use existing haul roads.	No impact.

3.5 Geology

3.5.1 Affected Environment

3.5.1.1 Site Geology

CUF is in the Highland Rim Physiographic Province (Figure 3-2) which is underlain by a sequence of sedimentary bedrock that extends from Mississippi and Northern Alabama through Tennessee, northward into Kentucky, Indiana, and Illinois. The formations that underlie this province consist of dolostone, limestone, shale, and sandstone. The bedrock strata have been subjected to an extended period of erosion which has produced a series of moderate to steeply sloping hills and broad valleys. The province is relatively flat or rolling upland into which a complex drainage pattern has been incised. In general, the elevation of this upland surface ranges from 700 feet to 800 feet msl in the south, and lowers northward to 600 to 700 feet msl. The Cumberland River enters the Wells Creek area on the east and at an elevation of about 360 feet and leaves its western edge at an elevation of about 340 feet. The Cumberland River has subsequently deposited a blanket of alluvium at lower elevations over the bedrock (State of Tennessee 1968).

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

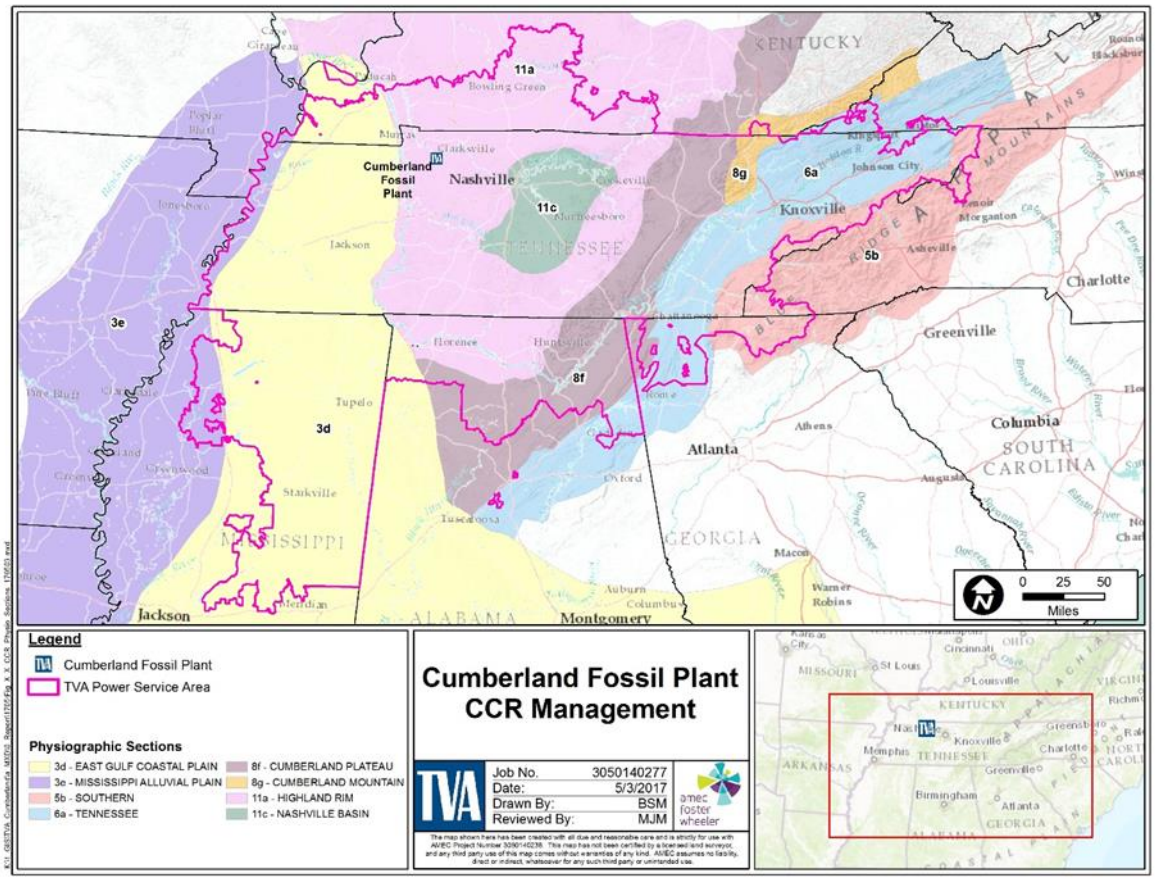

Figure 3-2. Physiographic Sections of the TVA Region (Adapted from Fenneman 1938)

The apparent meteor impact caused some of the older rock formations to be uplifted close to ground surface. Most of the rock formations in this area are of the Mississippian System which includes the Fort Payne, Warsaw, and St. Louis formations. These formations consist mostly of carbonate rock. Older formations such as the Nashville Group which consists of the Hermitage Formation and the Knox Group are also found in the middle of the structure. The bedrock in this area has been folded and faulted, reflecting the Wells Creek Basin Structure. The subject site appears to be underlain by the Fort Payne Formation which consists of calcareous and dolomite silica stone with interbedded limestone and shale. Parts of the site also appear to be underline by the Hermitage Formation which consists of gray interbedded sandy and argillaceous limestone.

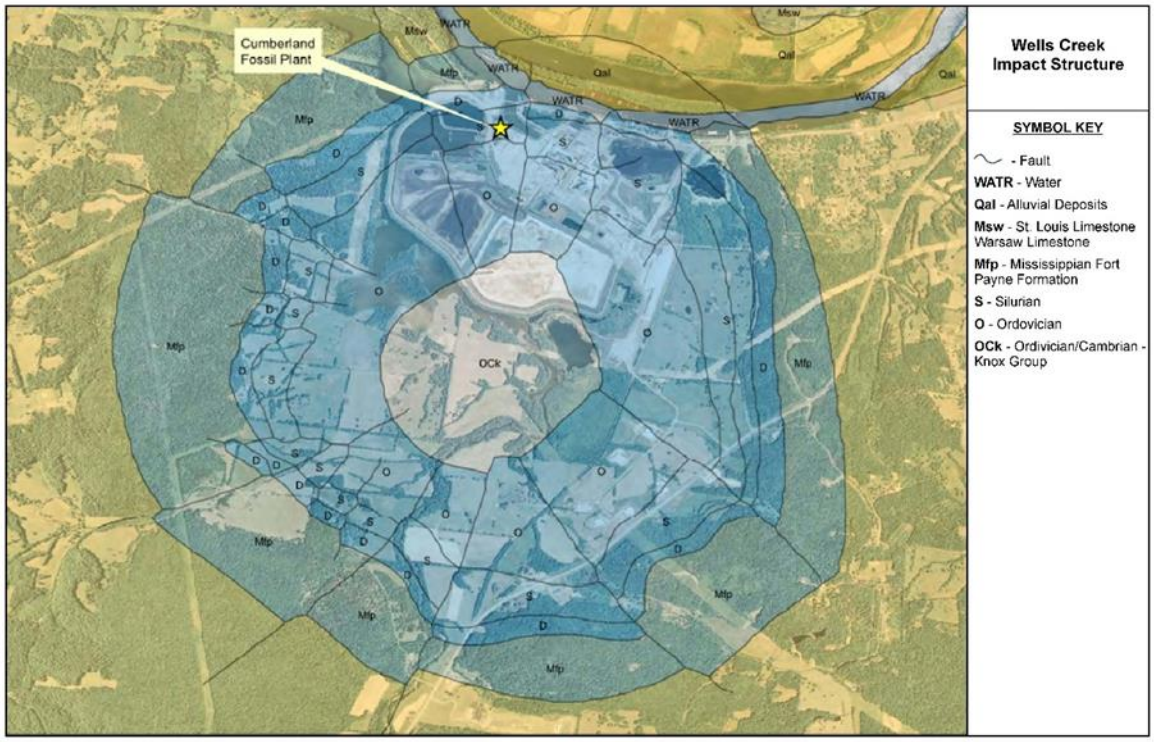

Figure 3-3. Wells Creek Impact Structure (Source: Law Engineering 1992)

3.5.1.2 Geologic Hazards

3.5.1.2.1 Seismic Events

A graphical representation of the 2014 National Seismic Hazard Map for the TVA region is shown on Figure 3-4. CUF is in an area where the expected Peak Ground Acceleration is 0.2 g and is identified as being within the influence of the New Madrid Seismic Zone. CUF is on the edge of this zone but still can be impacted by the New Madrid Fault Zone potential (U.S. Geological Service [USGS] 2009). Per the USGS, hazard map CUF would suffer minimal damage but appropriate design criteria would be implemented to minimize potential seismic impacts.

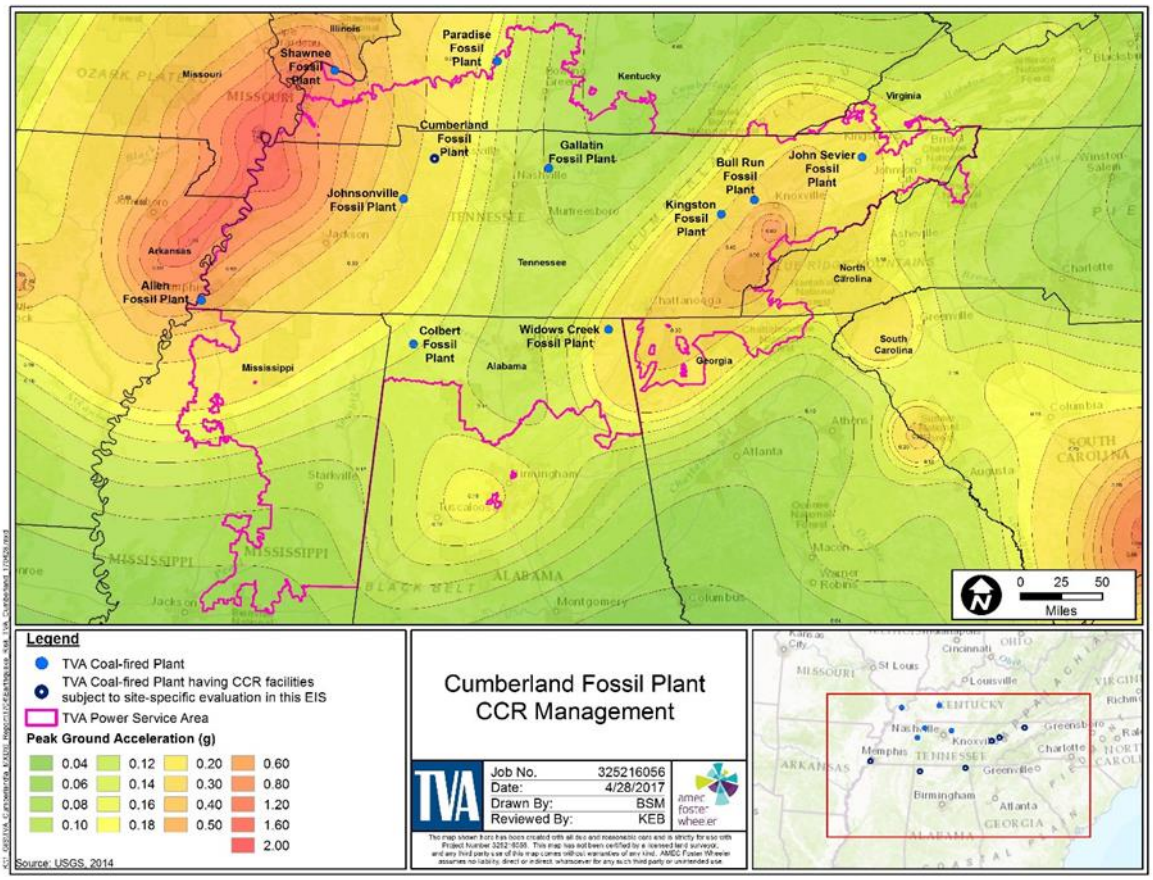

Figure 3-4. Seismic Peak Ground Acceleration Factors Near the TVA Coal-Fired Plants

3.5.1.2.2 Faults

Four main concentric faults are associated with the Wells Creek Structure. The outer most concentric fault marks the beginning of the essentially undisturbed region, and the Cumberland Facility is in the middle of the Wells Creek Structure in the disturbed area. Numerous faults are present beneath and nearby the facility. The Carlisle Fault is located outside of the structure but it is not believed to be associated with the Wells Creek Structure (State of Tennessee 1968). The areas in between each concentric fault are represented by a hill and valley terrain that extends from the center of the structure to its periphery. However, faults near CUF are located deep beneath the surface and have been re-cemented over geologic time such that they do not represent a significant seismic concern (Law Engineering 1992).

Ancient joints, fractures, faults, and contacts between rock types influence the bedrock groundwater flow system at CUF. At many locations, dissolution of the limestone has produced effective openings for groundwater movement in the bedrock. In certain areas and along particular horizons, many of these openings might be closed, or infilled with residual material and/or sediment. In 1992, Law Engineering conducted tests to evaluate permeability of selected bedrock formations at CUF. Results from these tests indicated that the formation was impermeable but higher permeability values were noted in areas with numerous rock fractures and cavities (TVA 1998). Average conductivity values from 1998 tests of selected bedrock formations were similar to the 1992 test results. The highest

average conductivity value occurred at a well which was purposely located along the Indian Hill fault. Therefore, the data suggests there might be some correlation between the locations of fault zones and preferential movement of groundwater at the site along these features (TVA 1998).

3.5.1.2.3 Karst Topography

"Karst" refers to a type of topography that is formed when rocks with a high carbonate content, such as limestone and dolomite, are dissolved by groundwater to form sink holes, caves, springs and underground drainage systems. Karst topography forms in areas where limestone and dolomite are near the surface. Due to the carbonate rocks in the region and the shattered bedrock around CUF, the potential exists for karstification to take place. Karst features are typical in carbonate rock and are known to exist in the low areas south of the existing plant. However, clay-filled solution channels and low-permeability confining soil overburden reduce the potential for sinkhole development. The proposed landfill area is in an upland area, and no karst features are known to exist within the proposed landfill footprint (State of Tennessee 1968).

3.5.1.2.4 Soils

According to the USDA NRCS web soil survey (USDA NRCS 2017), most of the natural soils on CUF are mapped as silty loams. Quaternary alluvial clay and silt deposits averaging as much as 90 feet in thickness cover the Cumberland River and the Wells Creek Basin in the structure (State of Tennessee 1968). The Quaternary Formations are the result of in-place weathering of bedrock which has in-filled the faults, and closed over geologic time. Most of the natural soils are variations of loams that are made of alluvial and residuum material. Most of the soils near the plant have been stripped away and have been replaced by anthropogenic fill to support development of plant facilities. As such, project areas associated with the proposed dewatering facility and ash impoundment closure projects are previously developed and no longer contain native soils. However, geotechnical investigations conducted near the onsite impoundments provide evidence of a low-permeability barrier under impoundment areas (Law Engineering 1992 and Stantec 2010b).

Soil characteristics of the proposed onsite landfill area consist of steeply sloping and often eroded lands that include the following:

- Hb – Maury silty clay loam, 5 to 12 percent slopes, eroded
- Pf – Byler silt loam, 5 to 12 percent slopes, eroded
- Bp – Bodine gravelly silt loam, 20 to 60 percent slopes
- Bk – Bodine gravelly silt loam, 5 to 12 percent slopes, eroded
- Bh – Bodine gravelly silt loam, 12 to 20 percent slopes, eroded

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under Alternative A, no excavations would occur in conjunction with the construction of dewatering facilities or landfill construction, and impoundments would remain operational. Accordingly, TVA would not seek additional disposal options for dry placement of CCR generated at CUF and would neither modify lands to construct an onsite landfill or haul CCR offsite to an existing landfill. Additionally, TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and meet appropriate safety factors. Thus, continued operations at CUF under the No Action Alternative would not be expected to result in reduced safety under either static or seismic conditions.

3.5.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.5.2.2.1 Bottom Ash Dewatering Facility

3.5.2.2.1.1 *Construction Impacts*

The proposed dewatering facility would be constructed on a site that is heavily disturbed and comprised of fill material. Site excavation and foundation construction is expected to be limited to this horizon and not expected to disrupt bedrock geology. Therefore, there would be no impacts to the geological or native soil resources from activities related to this project.

3.5.2.2.1.2 *Operation Impacts*

Geology-related operation impacts are associated with the potential effect of earthquakes on the proposed dewatering operations. TVA would consider earthquake loads (and the secondary effects of strong ground shaking) as part of the design of new facilities at the project site. These design considerations are expected to mitigate the potential seismic risk of impact to the proposed facilities and associated structures. Therefore, no notable seismic impacts are expected to occur on the proposed dewatering facility that would impair operation.

3.5.2.2.2 Ash Impoundment Closure

As identified in the PEIS, impoundments proposed to be Closed-in-Place would be dewatered to allow stabilization of CCR materials and the installation of a low permeability cover system. Structural integrity criteria for existing CCR surface impoundments under the CCR Rule establish guidelines for conducting initial and periodic static, seismic, and liquefaction safety factor assessments. Impoundment dikes would be assessed to ensure they meet guidelines requiring stability under static and seismic conditions. At CUF, dikes associated with the ash impoundment were assessed and determined to have acceptable slope stability (Stantec 2010a). Similarly, dikes associated with other impoundments have been similarly found to be stable or have had remedial measures implemented to ensure stability (Stantec 2010a).

Closure-in-Place of the impoundments would require a large amount of fill material. Proposed closure plans entail re-utilization of CCR from the impoundment as fill material to construct design grades prior to the installation of the final cover system. The reuse of CCR for fill material reduces the demand for soils for use in impoundment closure. Additional borrow material would be obtained from the existing onsite borrow site located at CUF to install a properly designed cover system.

Specific conditions of the ash impoundments at CUF would not be expected to change the impact analysis presented in the PEIS. Additionally, geotechnical investigations conducted near the onsite impoundments provide evidence of a low-permeability barrier under impoundment areas. Impacts from ash impoundment closure at CUF are, therefore, expected to be positive as both the static and seismic factors of safety would be increased by dewatering the impoundments under this alternative.

Under the Closure-by-Removal option, the impoundments would be dewatered and all CCR materials would be excavated and transported to an existing offsite landfill. If borrow is needed to help grade and cover the site it would be obtained from the existing onsite borrow area or from one or more permitted borrow sites within 30 miles of CUF.

3.5.2.2.3 Onsite Landfill

3.5.2.2.3.1 *Construction Impacts*

Construction of the proposed landfill would involve ground disturbing activities that would include grubbing, grading, and excavation. Excavation activities are anticipated across most of the landfill footprint to reduce the higher elevation areas across the site. Excavations are anticipated to extend less than 1 foot to more than 35 feet deep. As described above, geology of the proposed site is composed of carbonate rocks of the Mississippian System surrounding the impact structure and older foundation strata such as the Nashville Group exposed at the center of the impact structure. Removal of vegetation, grading and construction activities have the potential to disturb soil stability and increase erosion. Despite this, impacts to soil resources associated with surface disturbances related to the proposed construction, excavation, clearing and grubbing activities are expected to be minor, as BMPs outlined in a SWPPP designed to minimize erosion during land clearing and site preparation would be implemented.

Onsite and local geologic and geomorphic features within and around the proposed landfill's footprint were evaluated during the screening level geotechnical investigation of the proposed landfill locations (Stantec 2010a). The geotechnical exploration did not encounter any onsite features that would prohibit development of a landfill for CCR storage. Where some faulting has taken place due to the meteor impact, faults are considered dormant structures that typically do not join existing active faults in the subsurface. Additionally, karst features are not known to exist within the proposed landfill footprint. The design of the landfill sufficiently addresses soils and materials that may be susceptible to liquefaction, soil strength and slope stability, differential settlement potential, and fill material selection and compaction requirements. Therefore, based on these design considerations, impacts associated with geological features and soils are expected to be minor.

3.5.2.2.3.2 *Operation Impacts*

There are two general categories of earthquake hazards that may impact operation of the landfill: primary and secondary. Primary hazards include fault ground rupture and strong ground shaking. If an earthquake is larger than magnitude 5.5, ground rupture may occur on the fault. The amount of displacement generally increases with the magnitude of the earthquake. Structures located on a fault, can be displaced or damaged by fault ground rupture. The best mitigation for potential fault ground rupture to structures is to accurately locate the fault and set back structures a safe distance from the fault. Where structures and other facilities cannot be located to avoid faults, geotechnical and structural design measures would be implemented to mitigate the potential for fault ground rupture. The

faults in the footprint of the subject site are caused by the meteorite impact. However, as described above, these faults have shown to be healed by in filling of minerals. No movement of the fault since the impact has been recorded (Stantec 2010b).

Secondary hazards include liquefaction/lateral spreading, landsliding, and ground settlement. Liquefaction is essentially loss of strength in generally granular, saturated materials including alluvial and fluvial deposits subjected to ground shaking. Liquefaction can result in ground settlement, and where there is a free face such as river bank, can result in ground spreading toward the free face. Liquefaction can damage foundations, pavement, and pipelines and underground utilities. Such effects, however, can be mitigated by geotechnical and structural design measures that include ground improvements and foundation design. Earthquake-induced landsliding can occur where landslides are present or where colluvial deposits or unstable materials are present on slopes. Potential landslides can be mitigated, if present, with adequate siting and with various geotechnical and structural design measures. Ground settlement can occur in soft, weak materials, including non-engineered fill, due to ground shaking, and can be mitigated, by various geotechnical and structural design measures, including ground improvements and adequate foundation design.

3.5.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility and ash impoundment Closure-in-Place would be the same as identified under Alternative B. However, under the Closure-by-Removal option, CCR from the impoundments would be dewatered and all CCR materials would be excavated and transported to the existing onsite landfill. Because this is an existing permitted CCR disposal facility, there would be no additional direct impacts to the local geology that have not already been considered in the issuance of the existing permit. Therefore, no additional impacts to geology and soils are expected to occur with this alternative.

3.5.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility would be the same as Alternatives B and C. Impacts associated with closure of the ash (both Closure-in-Place and Closure-by-Removal) would be the same as identified under Alternative B. However, under this alternative, future CCR generated at CUF would be transported to an existing offsite permitted landfill, the Bi-County Solid Waste Management Landfill. Because this is an existing permitted landfill, there would be no changes from the existing environment within the landfill boundaries under this alternative. There would be no impacts to the geology and soils associated with landfill construction.

3.5.3 Summary of Impacts to Geological Resources

Impacts associated with geological resources with the implementation the project alternatives are summarized in Table 3-7. Impacts associated with geological resources would be minor and mitigated by appropriate design measures.

Table 3-7. Summary of Impacts to Geological Resources

Project	Impact	Severity
Dewatering Facility	Construction impacts associated with ground disturbance and foundation construction.	Minor, minimized through implementation of BMPs outlined in the SWPP.
	Operation impacts related to potential seismic hazard.	Minor. Mitigated by appropriate design.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Static and seismic factor of safety would be met for all dewatered impoundments under this alternative.	Minimal impact or risk of failure.
Landfill		
Onsite Landfill	Impacts associated with construction would be related ground disturbing activities.	Minor. Mitigated with proper design.
	Operation impacts are related to primary and secondary earthquake hazards.	
Offsite Existing Landfill	Existing, permitted landfill.	No Impact.

3.6 Groundwater

3.6.1 Regulatory Framework for Groundwater

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

3.6.2 Affected Environment

3.6.2.1 Regional Aquifers

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

As described in Section 3.5 (Geology) CUF is located just to the north of the center of the Wells Creek Impact Structure. The center of the impact structure to the south of the plant is mostly overlain by the Wells Creek Embayment. This embayment is low lying and drains into the Cumberland River to the North. Wells Creek drains from the south to the north and borders the southern and western portion of CUF. The potentiometric groundwater surface at the facility appears to be oriented to the south and west towards Wells Creek (TVA 2016e). Most of the soils are fill material around the plant or alluvial soils from the Wells Creek and the Cumberland River. The alluvial soils range from 5 to 43 feet in thickness (Law Engineering 1992). Based on the 1992 report, groundwater is present within the alluvial material.

The alluvial aquifer consists of water-bearing sand and gravel deposits associated with streams and floodplains.

Bedrock of carbonate formations of the Highland Rim is generally slightly alkaline and high in dissolved solids and hardness. The quality of groundwater from shallow bedrock aquifers is generally soft to moderately hard, but may contain elevated concentrations of iron. Most groundwater from the alluvium along the Cumberland River is generally harder and contains more iron than groundwater derived from the bedrock aquifers. TVA, as part of adhering to the Tennessee Division of Solid Waste Management Regulations, has monitored existing onsite wells around their ponds. Since 2012, concentrations have not exceeded groundwater protection standards.

3.6.2.2 Groundwater Use

Based on the map provided by TVA of domestic water wells within 1 mile of the subject site, it appears the wells are either up-gradient or in another hydrologic zone. Therefore, there are no known local users of groundwater.

3.6.3 Environmental Consequences

3.6.3.1 Alternative A – No Action Alternative

Under Alternative A, TVA would continue current plant operations and not construct or operate the Bottom Ash Dewatering Facility or undertake impoundment closure activities. Additionally, TVA would not seek additional disposal options for dry placement of CCR generated at CUF. Rather, CCR would continue to be managed in the current impoundments and dry stacks for as long as storage capacity is available.

If the No Action Alternative is implemented, TVA would continue to adhere generally to the existing Tennessee Division of Solid Waste Regulations. Groundwater monitoring at CUF would continue on existing monitoring wells at regularly prescribed practices and intervals. Groundwater monitoring of the impoundments would be undertaken with the development of the CCR Rule required certified groundwater monitoring network which was completed in October 2017. In conjunction with this plan, TVA would continue to work with the state under the TDEC Order to obtain and evaluate groundwater quality associated with the CCR management facilities at CUF. As described in the PEIS (TVA 2016b), regulations have outlined a mitigation measure process summarized below that be implemented as appropriate, in coordination with state regulatory agencies to help ensure environmental protection for closure of inactive impoundments:

1. Design and implement a groundwater monitoring system.
2. Identify statistical procedures for evaluation of groundwater monitoring data.
3. Further assess groundwater conditions in proximity to closed ash impoundment.
4. If needed, identify corrective measures to prevent further releases or remediate identified releases.

For active ash impoundments (under the No Action Alternative), a similar process for groundwater assessment and protection would be implemented to ensure compliance with CCR Rule requirements while in coordination with the TDEC Order and minimizing environmental impacts.

3.6.3.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.6.3.2.1 Bottom Ash Dewatering Facility

3.6.3.2.1.1 *Construction Impacts*

The proposed Bottom Ash Dewatering Facility would be constructed on a site that is heavily disturbed and comprised of fill material. Construction activities would not directly impact groundwater. BMPs as described in the project-specific SWPPP and A guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities, Revision 3 (TVA 2017a) would be used to avoid impacts to groundwater in the project area and would be used to control sediment infiltration from storm water runoff during construction phases of the project. With the use of BMPs, impacts to groundwater would be minor and temporary.

3.6.3.2.1.2 *Operation Impacts*

Potential sources of groundwater impacts resulting from operations of the proposed dewatering and handling facility include releases from the transfer pipe systems and runoff from the dry storage piles. Much like the construction-related effects, these potential impacts can be sufficiently mitigated with the use of appropriate BMPs. These BMPs would cover sealed holding concrete basins in which equipment would be installed, and piping which would be used in the dewatering process including but not limited to containment walls, site grading and sumps equipped with transfer pumps.

With the implementation of the dewatering facilities, CCR would be conveyed to the onsite CCR landfill or offsite existing landfill. Accordingly, the volume of water used for sluicing would be reduced relative to the No Action Alternative. This reduction in water use would result in a corresponding reduction in the potential for movement of constituents from surface water systems (sluice trenches and impoundments) to groundwater. Therefore, impacts of this alternative on groundwater are considered beneficial and minor.

TVA may construct a recirculation system in a subsequent phase where excess water would be routed back to the plant. Instead of discharging water from the dewatering process through the existing permitted NPDES outfall, the effluent would be rerouted back into the powerhouse for future sluicing operations. This would further reduce the potential for movement of constituents from surface water systems to groundwater.

3.6.3.2.2 Ash Impoundment Closure

Specific conditions of the ash impoundments at CUF would not be expected to change the impact analysis presented in the PEIS. In the preamble to the CCR Rule, EPA determined that either Closure-in-Place or Closure-by-Removal can be equally protective of human health and the environment if done properly (80 FR 21412). Impacts from ash impoundment closure at CUF are therefore expected to be positive under the Closure-in-Place option as the decanting of surface water and subsequent grading and stabilization of the CCR materials in the impoundment provides an immediate reduction in the potential influx of leachate water moving from the impoundment through the subsurface saturated zone. A cover system with an approved closure system over the compacted CCR not only prevents additional infiltration from precipitation, but also would facilitate management of storm water runoff. Elimination of the hydraulic inputs to the impoundment reduces the potential for migration of leachate to groundwater beneath the impoundment and receiving surface waters.

As noted in the PEIS (TVA 2016b), Closure-in-Place activities would reduce risk to groundwater and improve water quality in comparison to the No Action Alternative. Even in cases where the elevation of the upper most aquifer is unknown, Alternative B provides the following benefits:

1. Elimination of process water reduces the hydraulic head, therefore reducing the pressure of water forcing ash contaminants into groundwater.
2. Capping improves groundwater quality by virtually eliminating rainfall infiltration through the impoundment, and reducing downward migration of contaminants into groundwater.
3. NPDES outfall water quality improves as contact with ash would cease following capping; and the receiving river water quality would also improve.
4. Natural groundwater quality would eventually be reestablished.

TVA's on-going monitoring of similar ash management facilities also points to the effectiveness of those benefits mentioned above. In the case of CUF, when sluicing of CCR changed from an open impoundment to sluicing in geomembrane-lined channels, groundwater constituents demonstrated stable or decreasing concentrations. This has been true for approximately 3 years. Closure-in-Place with a geomembrane is considered one of the best options for improving groundwater quality beneath or downgradient of an ash impoundment or landfill.

Under the Closure-by-Removal option, CCR from the impoundments would be dewatered, and all CCR materials would be excavated and transported to an existing, permitted offsite landfill. As a result, a potential future source of CCR constituents would be removed. As EPA identified in the CCR Rule, removal of the CCR materials would reduce groundwater risk in the impoundment area. The CCR being removed from an impoundment would be dried to an acceptable level prior to being loaded for offsite transport. The permitted landfills that receive CCR would be lined and have groundwater monitoring systems as required by their respective permits to minimize potential impacts to groundwater.

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

As summarized in the PEIS, EPRI evaluated the potential effects of a closure scenario similar to this option for a hypothetical CCR impoundment in Tennessee. EPRI found that this option has an incrementally more positive impact compared to baseline relative to the Closure-in-Place option (i.e., concentrations of all COCs are less than 100 percent of baseline), ranging from a 1.4- to 21.7-fold increase in positive impact for excavate and redispose (i.e., reduction in concentration) (EPRI 2016). However, for facilities having larger volumes of CCR, the extended duration of removal (can be up to 70 years) would effectively diminish any benefits to groundwater quality improvement relative to the Closure-in-Place option.

No federal post-closure care measures are required if the impoundment is closed under the Closure-by-Removal option. State requirements for post-closure certification would be implemented as needed.

Depending on the volume of CCR to be removed, the impacts of this alternative on groundwater are beneficial and could be considerable, as it eliminates subsurface discharges and eliminates COCs from the former CCR impoundments when the removal project is completed. However, until the closure of the impoundments is completed, which could take up to approximately 12 years at CUF, the benefit to groundwater quality is expected to be less than the Closure-in-Place alternative because water infiltration through the CCR would essentially be stopped much earlier.

The CCR removed from the impoundments would be dried to an acceptable level prior to being loaded for offsite transport. The permitted landfill that receives CCR would be lined and have groundwater monitoring systems as required by their respective permits to minimize potential impacts to groundwater.

3.6.3.2.3 Onsite Landfill

The proposed onsite landfill is located within a valley that is substantially elevated relative to the alluvium and as such would not directly impact local groundwater aquifers. In accordance with TDEC requirements, the proposed landfill design would incorporate a composite liner system that meets Federal Subtitle D Resource Conservation and Recovery Act (RCRA) regulations and performance standards. The landfill design would incorporate requirements designed to reduce groundwater impacts including a storm water management system, leachate migration control standards, a geosynthetic cap system and a groundwater monitoring program. BMPs would be used to control sediment infiltration from storm water runoff during all construction phases of the project.

It is anticipated that construction and operation of the proposed landfill site would not have a notable impact to groundwater as the new landfill would be required to maintain a liner system as well as an engineered cap/cover system to mitigate groundwater flow through the materials. Therefore, with the use of BMPs and adherence to TDEC permitting requirements, minimal impacts to groundwater from the proposed action are expected.

3.6.3.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility, closure of the ash impoundments, and construction and operation of the onsite landfill would be the same as identified under Alternative B. However, CCR removed from the impoundments would be dewatered, and all CCR materials would be excavated and transported to the existing onsite landfill. As with Alternative B, this would have a beneficial impact as it eliminates subsurface discharges and eliminates COCs from the former CCR impoundments when the removal project is completed. However, as the closure period is shorter under this alternative, beneficial impacts would be greater than realized under Alternative B. The onsite landfill is a permitted CCR disposal facility, and there would be no additional direct impacts or indirect impacts.

3.6.3.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility would be the same as identified under Alternatives B and C, and impacts associated with impoundment closure (both Closure-in-Place and

Closure-by-Removal) would be the same as identified under Alternative B. However, all future CCR materials would be transported to an existing offsite permitted landfill, the Bi-County Solid Waste Management Landfill. Because this is an existing permitted landfill, there would be no changes from the existing environment within the landfill boundaries under this alternative. As such, there would be no impacts to groundwater associated with landfill construction.

3.6.4 Summary of Impacts to Groundwater

Based on the analysis summarized above, impacts to groundwater associated with the proposed projects would be short-term and minor with the potential for long-term beneficial impacts. Impacts to groundwater are summarized in Table 3-8.

Table 3-8. Summary of Impacts to Groundwater

Project	Impact	Severity
Dewatering Facilities	No direct impacts on groundwater. Potential for beneficial impact due to reduction in water use, reducing the potential for movement of constituents from surface water systems (sluice trenches and impoundments) to groundwater. Implementation of future recirculation system would enhance this benefit.	Minor and temporary, potential risk to groundwater minimized with BMPs.
Ash Impoundment Closure		
Closure-in-Place	Dewatering coupled with reduction of hydraulic input and construction of low permeability cover system reduces risk of migration of constituents to groundwater.	Considerable beneficial impact. TVA also committed to supplemental mitigative measures such as groundwater monitoring and corrective measures, as appropriate.
Closure-by-Removal	Reduces risk to groundwater by removing CCR from the impoundment.	Greater beneficial impacts as it eliminates subsurface discharges and eliminates COCs from the former CCR impoundment when the removal project is completed. Less short-term benefit during prolonged closure activities. Long-term monitoring is not required.
Landfill		
Onsite Landfill	No direct impact on local groundwater aquifers. Potential effects from leachate mitigated by effective landfill liner design coupled with use of BMPs and adherence to TDEC permitting requirements.	Negligible impact.
Offsite Permitted Landfill	Existing, permitted landfill. No impacts from offsite trucking.	No Impact.

3.7 Surface Water

3.7.1 Affected Environment

3.7.1.1 Surface Water – Lower Cumberland River, Barkley Reservoir

CUF is in northern middle Tennessee, southwest of Clarksville on the south shore of Barkley Reservoir (Cumberland River) approximately 72 miles upstream of Barkley Dam. CUF is drained by permitted storm water outfalls, wet weather conveyances, the CCW discharge (Outfall 002), and process and storm water discharges from the Main Ash Impoundment (Internal Monitoring Point [IMP] 001). The CCW, Outfall 002, discharges to the Cumberland River at Cumberland River Mile (CRM) 102.8. The plant intake is located approximately at CRM 103.2 and withdraws water for cooling and process purposes (TDEC 2008a).

The Lake Barkley Watershed (USGS HUC 05130205) is approximately 2,343 square miles with approximately 982 square miles in Tennessee and includes parts of six counties in Tennessee. A part of the Cumberland River drainage basin, the watershed has 1,258 stream miles and includes 27,000 acres in Tennessee.

The Lower Cumberland River from the Kentucky-Tennessee line (CRM 74.6) to Cummings Creek (CRM 118.3) is classified for use for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Wells Creek from mile 0.0 to its origin is classified for use for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2013). No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are located near the CUF site. Scott Branch adjacent to CUF has not been assessed, but would assume designations for aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2013).

The Cumberland River (Barkley Reservoir) downstream of CUF is subject to the influence of the thermal discharges from the plant. Under normal conditions, the Cumberland River flow near CUF is primarily dependent upon releases from the USACE Cheatham Dam located approximately 46 miles upstream, and to a lesser extent by downstream releases from Barkley Dam and tributary inflows upstream of the plant. However, in 2007 leakage was discovered in the USACE's Wolf Creek Dam located upstream of CUF at CRM 460.9 which impounds the 65,530-acre Lake Cumberland in Russell County, Kentucky. To accommodate repairs, the reservoir pool was lowered substantially which resulted in reduced flows in the Cumberland River system downstream for approximately 5 years.

During this time of reduced river flows, and even though the plant reduced power production (derated) to comply with thermal discharge limits, a large proportion of the flow in the river was withdrawn by the plant for condenser cooling which magnified the potential for adverse effects to the aquatic community downstream.

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

3.7.1.2 Onsite Surface Water Features

The ash impoundments and the proposed Bottom Ash Dewatering Facility site are in previously disturbed areas and remain an active part of the CUF facility. These areas are bordered to the south and west by Wells Creek and to the north by the Cumberland River. Wells Creek has an 1Q10 (lowest one day flow with an average recurrence frequency of once in 10 years) of 8.72 MGD based on a USGS study in 1992 (USGS 1992) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.

The proposed landfill site is located to the south and southwest of the main plant area and is primarily wooded. Drainage on the property flows generally north and west to Wells Creek and Scott Branch.

Jurisdictional streams and wetlands were delineated within the proposed project areas in November and December 2016 (Amec Foster Wheeler 2017). As ash impoundments and manmade drainage features within the existing plant boundary are not considered jurisdictional, the proposed Bottom Ash Dewatering site, impoundment closure projects, and laydown areas would not impact any streams or wetlands. One perennial stream, one intermittent stream, four wet weather conveyance/ephemeral streams, and one wetland were documented in the project area defined for the proposed landfill and access road (Figure 3-5). The total linear footage of the portion of the perennial stream and the intermittent stream within the proposed landfill site is 3,573 feet and 1,211 feet respectively. The total linear footage of the four wet weather conveyances is 4,111 feet. Wetlands are addressed in Section 3.13.

3.7.1.3 Existing CUF Wastewater Streams

CUF operates a surface water intake structure that withdraws an average of 2,096 MGD from the Cumberland River for use as CCW and plant process water (e.g., sluice water, fire protection, boiler feed water, safety eye wash and showers, and miscellaneous wash water). Approximately 98 percent of the water withdrawal is used for cooling, while approximately 2 percent is used for other uses including process water. The withdrawn water is returned to the river after appropriate treatment and complies with CUF's NPDES permit.

The IMP 001 discharge to the CCW channel has an average flow of 21.73 MGD. TVA is required under NPDES Permit No. TN0005789 to meet pH, total suspended solids, and oil and grease at IMP 001. (TDEC 2008a and 2008b). The NPDES permit also requires that IMP 001 be monitored for a series of total metals and ammonia as nitrogen. These monitored metals include cadmium, chromium, copper, lead, mercury, iron, manganese selenium, and silver. Total dissolved solids, chloride, sulfate, and fluoride must also be sampled, analyzed, and reported for IMP 001 (TDEC 2008a and 2008b). Although there are currently no regulatory limitations for these metals, discharged waters must meet TDEC water quality criteria.

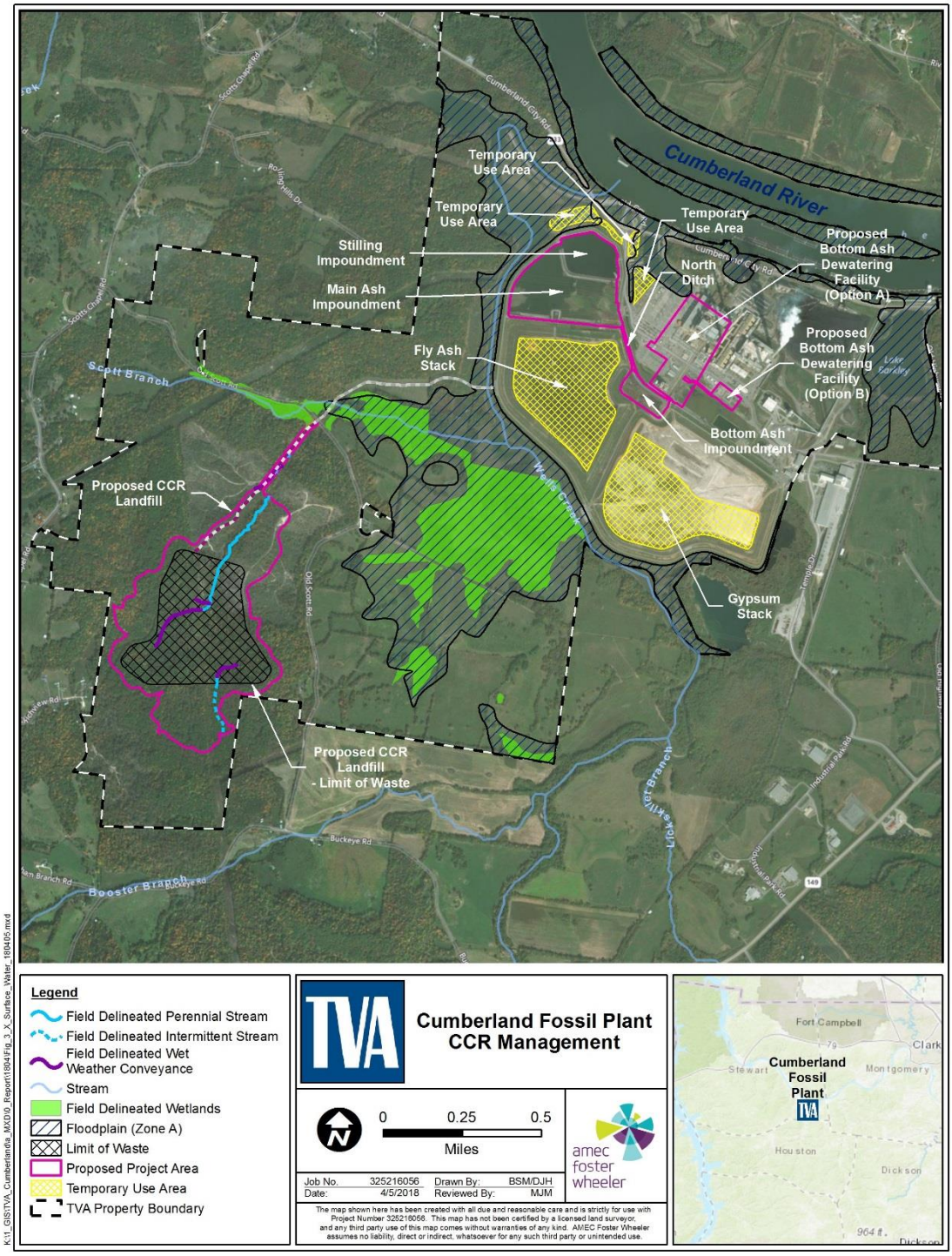

Figure 3-5. Surface Water Features of the Cumberland Fossil Plant Area

As identified in Chapter 1, bottom ash is sluiced to the Bottom Ash Impoundment where suspended solids are settled. The bottom ash is excavated and stacked in the Dry Ash Stack, and the process water is conveyed through a series of ditches to the Main Ash Impoundment. The Main Ash Impoundment receives runoff from the Fly Ash Stack and Gypsum Stack via perimeter ditches in addition to the effluent from the Bottom Ash Impoundment. The Main Ash Impoundment discharges under a floating skimmer to the stilling impoundment. The stilling pool discharges through four spillways into the CCW main plant discharge channel which flows into Barkley Reservoir.

3.7.1.3.1 FGD Scrubber Gypsum Byproduct Handling

When the gypsum concentration reaches about 15 percent solids in the absorber, solution blow-down is initiated to maintain equilibrium. This blow-down stream is conveyed either:

- To one of the two flexible membrane lined slurry settling channels in the northern portion of the Gypsum Stack Area, or
- To the gypsum dewatering facility (currently operated by SynMat) which dewaters and markets the by-product for wallboard production, and the dewatered (filtrate) waste water stream is then discharged to the ash impoundment.

The dewatered gypsum is then either placed in the gypsum disposal area or beneficially reused as commercial grade gypsum. The Gypsum Stack drains to the Main Ash Impoundment.

The Selective Catalytic Reduction (SCR) process is used to reduce nitrogen oxides for air pollution control. Ammonia is added to the flue gases as part of the SCR process. Some ammonia may slip through the SCRs. Most of the ammonia slip would be removed from the stack gases in the FGD scrubber for that unit and become part of the FGD scrubber gypsum disposal area wastewater. CUF performs monthly monitoring of IMP 001 for total ammonia nitrogen per Permit TN0005789.

3.7.1.3.2 Discharge Characterization

To characterize the current conditions and projected changes in the IMP 001 discharge, an evaluation of in-stream conditions after mixing of chemical characteristics was conducted. This can be useful in predicting potential impacts to water quality that may arise from the changes to the bottom ash handling systems. For details of this evaluation, see the Surface Water Technical Memorandum in Appendix D.

This evaluation was based on a worst-case scenario just for evaluation purposes based on a CCW flow that is full plant capacity and minimum river flow (1Q10 = 678.8 MGD). In reality, if the flow in the Cumberland River were that low, CUF would derate or even shut down to avoid thermal impacts to the river.

Even with that worst-case assumption, the evaluation of the in-stream mixing concentrations show that all the constituents except thallium would meet the TDEC lowest criteria (i.e., the limit equal to minimum of the water quality criteria). The thallium exception is the result from testing methods that can only detect these constituents in concentrations over the TDEC criterion of 0.00024 milligram per liter. So, these results are due to limitations in testing methods and do not represent true impacts to water quality due to thallium concentrations. The mass balance analysis indicates that the overall impact of current operations does not cause impacts to surface water quality.

3.7.1.3.3 Other Surface Runoff

The existing plant site runoff is regulated under the NPDES Permit TN0005789 and Tennessee Storm Water Multi-Sector General Permit for Industrial Activities TNR0510000, Tracking Number TNR051933.

Existing facilities and BMPs are used to ensure compliance with the permit conditions. Some plant runoff is directed through the Main Ash Impoundment system IMP 001 or through the CCW discharge Outfall 002 discussed above.

3.7.2 Environmental Consequence

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed new facilities, and no construction impacts would occur. TVA would continue to operate the existing systems for bottom ash, fly ash, and gypsum. The existing wastewater streams would continue to be authorized under NPDES Permit TN0005789. Discharges would continue to comply with all applicable permit limits and therefore, surface water quality adjacent to CUF should remain approximately the same.

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

3.7.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.7.2.2.1 Construction Impacts

Wastewaters generated during construction may include construction-related storm water runoff, drainage of work areas, non-detergent equipment washings and dust control, hydrostatic test discharges, and domestic sewage. Construction activities have the potential to temporarily affect surface water via storm water runoff.

The proposed Bottom Ash Dewatering Facility and ash impoundments are in an area within an industrial site partially covered with impervious structures or ground cover. Both potential locations for the proposed Bottom Ash Dewatering Facility would render similar storm water impacts, since both are previously disturbed and do not currently have any noted surface water resources to disturb. However, since Site A has a larger footprint and would have more construction needs by requiring rerouting of infrastructure, this site has a larger potential for construction related impacts.

Additionally, impervious buildings and infrastructure prevent rain from percolating through the soil and may result in additional runoff of water and pollutants into storm drains, ditches, and streams. Any existing structures and infrastructure would be removed from the project site; however, they would be replaced with the covered Bottom Ash Dewatering Facility and would alter the current storm water flows. Therefore, construction on the existing developed area would only increase impervious surface area to a small extent.

Appropriate BMPs would be followed, and proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized. A General Permit for Storm Water Discharges

Associated with Construction Activities (TDEC 2016b) would be required for this project, and this permit would require development of a project-specific SWPPP. BMPs would be based on TVA's guide for environmental and best management practices (TVA 2017a). Therefore, only minor temporary impacts to surface water would be expected due to surface water runoff from the construction site.

Equipment washing and water for dust control activities would be handled in accordance with BMPs described in the BMP Plan required by the site's NPDES Permit TN0005789 and the General Permit for Storm Water Discharges Associated with Construction Activities (TDEC 2016b) to minimize construction impacts to surface waters.

Onsite hydrostatic testing would have the option to use potable or surface waters and any releases would be covered under the current NPDES Permit TN0005789.

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

With the implementation of appropriate BMPs, only temporary and minor impacts to surrounding surface waters would be expected from construction activities associated with the Bottom Ash Dewatering Facility and impoundment closure.

Landfill construction activities could include, but are not limited to, the clearing and grading of the project site and grading of new separate storm water and leachate basins; the installation of the landfill facility (including liner and leachate collection fields) and the installation of a forced main to pump leachate to its discharge outfall. Direct impacts to 3,573 feet of perennial stream and 1,211 feet of intermittent stream would occur as a result of landfill construction activities (filling and/or culverting). Indirect effects include potential sedimentation of downstream areas associated with runoff from the construction site. However, such indirect effects are expected to be minimized by the installation of detention basis and other BMPs within the construction site.

A characterization of aquatic features was conducted on the proposed project areas. One perennial stream, one intermittent stream, and four wet weather conveyance/ephemeral streams were documented on the proposed landfill project area. The USACE performed a Jurisdictional Determination to determine wetlands and stream features and concurred with identified resources. The requirement of a state 401 water quality certification (either an individual or general ARAP permit) and federal 404 permits to be obtained for any stream/wetland impact and the terms and conditions of these permits would likely require mitigation, such as contributing to a stream mitigation bank, for these proposed activities.

3.7.2.2.2 Operation Impacts

3.7.2.2.2.1 *Bottom Ash Dewatering Facility Operation Impacts*

<u>Option 1 – Construction/Operation of a Process Dewatering Facility Utilizing a Continuous or "Once-Through" System</u>

The bottom ash that would be dewatered is currently sluiced from the boiler bottoms to a series of impoundments, where it settles and then is mechanically dewatered utilizing heavy machinery. During the interim period between closure of the Bottom Ash Impoundment and

prior to construction of the Bottom Ash Dewatering Facility, bottom ash and gypsum fines would be directed to standalone tanks. Once the Bottom Ash Dewatering Facility is operational, the standalone tanks would be used to support process water treatment or to support other plant needs. The location of these tanks is described in Chapter 2.

Currently, the bottom ash sluice stream also sluices economizer ash. CUF currently uses a 100 percent Illinois Basin coal blend, which does generate a mill reject waste steam; however, the production of mill rejects has the potential to change based on the coal blend utilized by the facility. For the purposes of this project, all three of these waste streams would remain commingled and would go to the dewatering facility to be dewatered, and dry solid waste would be sent to an approved existing onsite landfill. Depending on the timing of various phases of construction, there may be a possibility that the impoundment system could still be operational for a time after the implementation of the dewatering system. Therefore, sluice water would be released to either the current impoundment system or, after closure of the impoundment system, to the proposed process water basins. Either impoundment/basin would ultimately discharge through IMP 001 to the CCW and Outfall 002 to the Cumberland River. Clarified water from the Bottom Ash Dewatering Facility would meet current NPDES permit limits.

To support the bottom ash dewatering effort, an internal study was performed in 2011 to determine the potential wastewater management issues of the bottom ash and mill reject waste streams during the dewatering process. This study specifically focused on the solubility of the mill reject/coal mixture, both separately and combined, in the sluice water prior to and after the dewatering process (TVA 2011b). This study's results indicate that the waste stream that would be generated by this process would likely meet the current TDEC pH and metals in-stream Water Quality Criteria (WQC). For details of this study, see the Surface Water Technical Memorandum (Appendix D).

No direct negative impacts to the surface waters would be anticipated from the operation of this facility because any discharges would be required to meet existing NPDES and Tennessee WQC limits that are developed to be protective of designated uses.

Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If routine monitoring showed impacts, then mitigation measures, including altered settling times and chemical treatments at the bottom ash dewatering equipment, would be undertaken to meet requirements ensuring discharges meet NPDES and chronic toxicity limits and not cause an exceedance of in-stream TDEC WQC.

Any discharges into surface waters would comply with all NPDES permit limits. Thus, implementation of bottom ash dewatering at CUF under Option 1 conditions would not be expected to cause any additional direct or indirect effects to local surface water resources.

<u>Option 2 – Construction/Operation of a Bottom Ash Dewatering Facility with a Recirculated Bottom Ash Sluice Stream</u>

This option would have similar construction impacts noted above for Option 1. However, the operational withdrawals, and discharge details and impacts would be slightly different, as discussed below.

In this alternative, most bottom ash sluice transport water would be recirculated. Only 0.9 to 2 MGD would be discharged from IMP 001 to Outfall 002, and this would be a reduction of 11 to12 MGD from existing discharges from these outfalls.

The dewatering process for Option 2 as described in Section 2.1.1 would be similar to the process for Option 1, with the addition of recirculating the majority of the bottom ash sluice transport water to be used again for sluicing or other allowed uses. This sluice water recirculation process would include a make-up water stream, a low volume continuous blowdown stream, and an outage waste stream. The make-up water stream would be water that would replace or supplement the water lost from evaporation or leakage in the system. This raw make-up water withdrawal rate would range from 300 to 600 gallons per minute, which is equated to a maximum 0.864 MGD of make-up water. Not only would make-up water ensure that water lost in the system was replaced, it would help to balance the pH and other chemical constituents in the recirculating system to maintain the integrity of the system's infrastructure and materials.

Wastewater would flow from the dewatering conveyor to the clarifier and process flow tanks, and lastly into a wastewater containment facility (or recirculation tank) prior to being recirculated. The blowdown stream from the containment facility would help to regulate the hydraulic flow levels from both generation units and would reduce the existing bottom ash discharge from approximately 12.844 MGD to an approximate maximum of 2 MGD of process water. During outages, the waste stream flow from the system could range between 0.2 to 0.5 MGD to purge the system. All process waste streams would be managed to comply with the site-specific NPDES permit.

Discharge Reduction Characterization

The potential reductions in loadings from recirculating ash sluice water to the Bottom Ash Dewatering Facility were evaluated. It should be noted that this range of reduction does not reflect the loadings being discharged from IMP 001/Outfall 002 or to the receiving stream (Cumberland River), but rather the reduction in the loadings being discharged into the ash impoundment prior to co-treatment. The ash impoundment effectively treats and decreases these concentrations. After the ash impoundments are closed, the proposed Process Water Basins and/or waste water treatment plant (WWTP) would ensure provision of equivalent or greater levels of treatment such that any discharge would continue to meet NPDES permit limits and TDEC WQC. For details of this evaluation, see the Surface Water Technical Memorandum in Appendix D.

Some metals concentrations would be expected to decrease with the removal of the majority of the bottom ash waste stream. The analysis indicates that the overall impact of future bottom ash dewatering operations with recirculation would have beneficial impacts to surface water quality. Thus, continued operations at CUF under Option 2 would not be expected to cause any additional direct and/or indirect impacts to local surface water resources.

As with Option 1, TVA would conduct routine monitoring of the altered and new waste streams at IMP 001 to confirm this study's results that no significant impacts to the Cumberland River would occur from this action. Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If the routine monitoring shows impacts, then mitigation measures, including altered settling times and chemical treatments, would be undertaken to meet requirements for ensuring that discharges meet NPDES and chronic toxicity limits.

3.7.2.2.2.2 *Ash Impoundment Closure*

Existing flows to the Main Ash Impoundment would be rerouted prior to closure. The proposed plan to close the existing Bottom Ash Impoundment, Stilling Impoundment and Main Ash Impoundment would not take place until the proposed Bottom Ash Dewatering Facility and Process Water Basins are in service or other alternative solutions are in place.

The main operational change that would take place with the closure of the impoundments at CUF is the change in management of the onsite storm water and process water that is currently treated. The Main Ash Impoundment and Stilling Impoundment would be closed. A portion of the Main Ash Impoundment and the Stilling Impoundment would be repurposed as Process Water Basins to treat flows before discharge to the CCW channel via IMP 001, then discharge to the Cumberland River via Outfall 002. The basins would be designed and operated to ensure compliance with all TDEC regulations and limits and TN Water Quality Standards.

Existing outfall structures associated with the Main Ash Impoundment would be removed and/or replaced as needed to manage the runoff from the closed impoundments. Precipitation driven runoff from closed landfill areas should have much lower loadings of suspended solids, metals, and other constituents than certain process wastewaters. Final drainage would be routed to existing or new discharge points and comply with the modified NPDES and/or the TMSP permits to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified, as needed, to ensure the discharges meet permit limits which may or may not require a permit modification. Additionally, future storm water that comes in contact with CCR would be routed to the future Process Water Basin 1. Generally speaking, the proposed Process Water Basins 1 and 2 would accept the contact storm water from the existing onsite landfill areas and plant process water flows. These basins may be cross-tied or flows rerouted during basin maintenance.

As identified in the PEIS (TVA 2016b), in-place closure of the ash impoundments would minimize surface water flow to the impoundment which would enhance stability of the berms due to a reduction of hydraulic inputs.

Closure-in-Place would consist of dewatering and stabilizing ponded areas followed by redistributing CCR material within the footprint of the impoundments. The closed area would be covered in place with a TDEC approved cap system. To facilitate installation of Process Water Basin 1 and Process Water Basin 2, CCR within the Stilling Impoundment and a portion of the Main Ash Impoundment would be removed to the existing offsite landfill. The proposed Process Water Basins would be lined with a TDEC approved liner. For details of the potential cover and liner systems, see the Surface Water Technical Memorandum in Appendix D.

The replacement of the existing ash impoundments with a capped disposal area should reduce the quantity of solids and total and dissolved metals discharged through IMP 001 to Outfall 002 and ultimately to the Cumberland River.

Final drainage would be routed to existing or new discharge points and comply with the modified NPDES permit or covered under the TMSP to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified, as needed, to ensure the discharges meet permit limits. This may or may not require a permit modification.

The proposed lined Process Water Basins should also provide added treatment potentially reducing the quantities discharged even further. All work would be done in compliance with applicable regulations, permits and BMPs so potential impacts to surface water from this alternate would be negligible. Therefore, in-place closure of the existing ash impoundments should reduce the loadings to the Cumberland River and provide a beneficial impact.

Closure-by-Removal would also require rerouting plant flows that currently go to the impoundments. Storm water drainage would be directed as appropriate to ensure compliance with all applicable regulations and permits. New storm water outfalls would be installed to direct storm water runoff either west to Wells Creek or east to the existing discharge channel and discharges would either be covered by the site NPDES permit or the TMSP.

Under this alternative, all removed CCR material would be hauled to a permitted offsite landfill. Material placed within the receiving landfill is assumed to be fully contained by an approved liner system such that no impacts to surface water would occur.

3.7.2.2.2.3 *Landfill*

The CCR by-products that would be placed in the landfill are expected to include fly ash, bottom ash, and commercial grade gypsum. By-product generation and characterization would depend on the coal source. The design coal for the CCR landfill considerations would be based on the current CCR production utilizing 100 percent Illinois Basin coal.

The wastewater streams which could change substantively under this alternative are:

- The addition of the landfill leachate stream and contact storm water runoff.
- Non-contact surface runoff from the proposed landfill drainage area.

Each of the three by-products were evaluated using the synthetic groundwater leaching procedure (SGLP) water extraction to evaluate the metals that would potentially leach from the proposed new landfill's leachate collection system. This information was utilized to predict waste water impacts from the landfill operation. It should be noted that the landfill would also include waste water treatment sludge and that was not able to be simulated in this evaluation, however the amount of the sludge compared to the CCR would likely be *de minimis*.

The Hydrologic Evaluation of Landfill Performance Model was utilized to evaluate the proposed leachate collection system disposal facility (Stantec 2017). For details of this evaluation, see the Surface Water Technical Memorandum in Appendix D. Depending on the nature of this runoff stream, mitigation measures that may include wastewater treatment may be required prior to discharge.

Onsite Landfill Leachate and Run-Off

The CCR solids produced at CUF would be trucked and placed in the proposed new landfill. This proposed landfill system would have a liner system and a leachate collection system. The leachate would be discharged to a leachate pond and then would either be gravity fed via a pipe to Wells Creek (Option 1) or would be pumped to the proposed Process Water Basins or directly to the CCW (Option 2). The Process Water Basins would discharge via the existing IMP 001 or a new outfall to the CCW and ultimately out Outfall 002 to the Cumberland River. Ammonia concentrations in the landfilled materials would be dependent on the SCR process and plant specifics. To limit ammonia loading to surface water from the

proposed landfill, the amount of CCR exposed may be restricted to 10 acres or less as has been done at some other CCR landfills if needed. Details of the proposed landfill leachate and runoff are in the Surface Water Technical Memorandum (see Appendix D).

Option 1 – Leachate Discharged to Wells Creek
The leachate stream would be discharged to the leachate pond and then gravity fed via a pipe and discharged from a new outfall structure to Wells Creek. The modeled leachate waste stream was evaluated after mixing with Wells Creek to ascertain if in-stream mixing would meet Tennessee acute WQC. The leachate waste stream would have the potential to be a low flow stream, acidic in nature with the potential of having some detectable metals and ammonia levels. See the Metal Loading Section and Surface Water Technical Memorandum in Appendix D for more details.

Option 2 – Leachate Discharged to the Proposed Process Water Basin
The leachate stream would be discharged to the leachate pond and then pumped to either the Process Water Basins for treatment or directly to the CCW. The effluent from this basin could then discharge through either IMP 001 or a new outfall to the CCW and ultimately would be discharged out Outfall 002 to the Cumberland River. All waste streams would comply with NPDES permit limits and regulations. However, the leachate would be treated as required to meet all applicable permit requirements and in-stream water quality criteria, therefore potential impacts to surface water under this alternative would be expected to be minor.

Metals Loading and Ammonia Criteria Evaluation
To estimate the concentration of metals in both Options 1 and 2 after receiving leachate discharges from the proposed by-product landfill, the maximum SGLP data were used. The SGLP data were used instead of the toxicity characteristic leaching procedure data as the SGLP data were deemed more appropriate to model leachate discharges because of the use of non-acidified water in the method. Additionally, this method allows for analysis of more parameters than the toxicity characteristic leaching procedure method. The leachate data from the CCR products were identical in both Option 1 and Option 2.

In addition to the leachate loading and mixing evaluation, contact storm water runoff from the proposed landfill to Scott Branch and Wells Creek was also evaluated. In this evaluation, storm water modeled flows were utilized. However, rain water concentrations were used and assumed to be *de minimis* and were evaluated at half the minimum detection limit concentration. Additional details of the metals loading evaluations are in the CUF CCR EIS Technical Memorandum (Appendix D).

For Option 1 – As evaluated in Table 4-3 of the Surface Water Technical Memorandum (see Appendix D), the added loadings from the by-product leachate collection system discharge to Wells Creek would have the potential to have constituents with concentrations above the Tennessee WQC. When in-stream mixing was evaluated with the modeled leachate stream and Wells Creek, cadmium, copper, selenium and thallium were found to have the potential to be higher than the acute criteria for the Wells Creek's most stringent state water use designation. If this were to occur, mitigation measures, including waste water treatment prior to discharge from these outfall(s) or rerouting flows to the process water basins to be constructed, would be taken into consideration.

For Option 2 – As seen in Table 4-4 of Surface Water Technical Memorandum (see Appendix D), the added loadings from the by-product leachate collection system discharge

would be unlikely to increase the metals concentrations at the Cumberland River where this stream would discharge. Additionally, the concentrations would not exceed NPDES permit limits or Tennessee WQC, except for thallium. The results for thallium, however, are due to limitations in testing methods and do not represent true impacts to water quality due to thallium concentrations. The mass balance analysis indicates that the overall impact of current and future leachate operations would not cause impacts to surface water quality in Option 2. This analysis represents the estimated maximum discharges from this site, since the leachate flow used would be the peak flow during Phase III of the landfill operation. In addition, water quality standards are typically applied as an in-stream concentration after mixing in the receiving stream.

The evaluation for the storm water loading from the proposed landfill does have the potential to increase the metals and ammonia concentrations in both Wells Creek and Scott Branch. A loading calculation was performed utilizing preliminary storm water flow data. The peak flow data were utilized from the 100-year, 24-hour storm (See Appendix D, Table 4-5). Flows were utilized going into each storm water pond and the concentration was evaluated coming out of each storm water pond. Additionally, this loading and mixing calculation did not consider any treatment in the storm water ponds. It would be assumed that in-stream water quality standards would need to be met at the storm water outfall (for those discharges into Scotts branch) prior to mixing with the stream, since the stream is a zero-flow stream. The evaluation showed that all constituents evaluated would be below WQC, except for arsenic, mercury, selenium and thallium. If this were to occur, mitigation measures including waste water treatment prior to discharge from these outfall(s) would be taken into consideration in future designs and storm water discharges.

In addition to the theoretical evaluation, actual storm water samples were collected from the current dry stack at CUF just prior to discharge into the ash impoundment. This analysis displayed that all metal constituents were below WQC, except for arsenic and thallium. The increased concentrations of the mercury and selenium observed in the theoretical evaluation were not observed in the actual storm water samples from the dry stack and are therefore, considered to have a reduced risk of impacts from selenium and mercury. All thallium concentrations were below detection and were considered to be a function of the fact that the method's detection limit is higher than the criteria and therefore, has the potential to not be a foreseeable impact. In addition to the metals listed Appendix D, Table 4-6, total dissolved solids were above water quality criteria, which could be an indicator of potential water quality issues due to dissolved solids.

Currently, a treatability study is being conducted to better project the water quality of the leachate and storm water discharges from the proposed landfill and the treatment options that could be employed if required. TVA would conduct a characterization of the leachate and runoff streams post-construction to confirm they would not significantly impact the Cumberland River, Wells Creek or Scott Branch. The waters would be analyzed for metals and other parameters. If determined to be necessary, appropriate mitigating measures would be evaluated and implemented to ensure that the discharge meets NPDES permit requirements for the water quality parameters. These mitigation methods could possibly include: rerouting discharge waste streams to facility outfall(s), the addition of water treatment, and/or implementing BMPs as potential examples.

Ammonia Model
An ammonia model was used to evaluate the expected ammonia releases from the landfill. The current NPDES permit requirements include “report only” monitoring for IMP 001 that ultimately discharges to the Cumberland River; however, if the concentration is found to be over 2.08 milligrams per liter then corrective actions are required. The model was based on conservative assumptions at the time of release and included mixing of the leachate stream with Wells Creek to meet the acute criteria when pH of the waste streams ranged from 6 to 9 standard units. The leachate pond would have the ability to be released in a batch process so that if any treatment is required this discharge flow can be isolated. No direct negative (toxic) impacts on water quality of surface waters are anticipated, based on modeled data.

Ammonia was also evaluated in the storm water runoff from the proposed new dry CCR landfill. This discharge would be through new storm water outfalls to Scott Branch or Wells Creek. Flows were utilized going into each storm water pond and the concentration was evaluated coming out of each storm water pond. It would be assumed that in-stream water quality standards would need to be met at the storm water outfall prior to mixing with the stream, since Scott Branch is a zero-flow stream. The modeled concentration of the Total Ammonia as Nitrogen was found to be below the chronic toxicity levels when pH was ranged from 6 to 9 standard units and before accounting for mixing with Scott Branch.

TVA would conduct a characterization of the leachate and runoff streams to confirm they would not significantly impact Wells Creek or Scott Branch. The waters would be analyzed for nutrients (including ammonia), metals and other parameters. If determined to be necessary, appropriate mitigation measures would be evaluated and implemented to ensure that the discharge NPDES permit requirements for the water quality parameters are met (TVA 2017c).

After accounting for the impacts of the CCR storage leachate and storm water, the impacts after mixing with the Cumberland River would be minor. However, there would be potential impacts in Wells Creek and Scotts Branch due to the addition of these waste streams. TVA would conduct a characterization of the leachate and runoff streams to determine if there would be impacts to the Cumberland River, Wells Creek or Scotts Branch. The waters would be analyzed for metals and other parameters. If determined to be necessary, appropriate mitigation measures would be evaluated and implemented to ensure that the discharge requirements for the water quality parameters are met.

3.7.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts to surface water associated with implementation of the Bottom Ash Dewatering Facility and closure of ash impoundments would be the same as identified under Alternative B. Additionally, surface water impacts associated with the construction and operation of the proposed onsite CCR landfill would also be the same as those described for Alternative B.

However, for this alternative, CCR removed from the impoundments would be hauled to the onsite landfill (Fly Ash Stack) for long-term storage. Runoff from the onsite landfill would be managed through the new Process Water Basins. Treatment of all runoff would comply with applicable regulations and permits, and should result in only minor surface water impacts.

For details of the potential cover and liner systems, see the Surface Water Technical Memorandum in Appendix D.

3.7.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Surface water impacts under Alternative D are expected to be the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and the same as Alternative B for the impoundment closure activities.

However, in contrast to Alternatives B and C, this alternative considers the transport of future CCR to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage. Minor impacts associated with construction and operation of the onsite landfill would not occur as both existing and future CCR produced by CUF would be transported to an existing offsite permitted landfill. It is assumed the pre-existing landfill would have necessary permits that would be protective of water quality. Because this is an existing permitted landfill, there would be no changes from the existing environment within the landfill boundaries under this alternative.

3.7.3 Summary of Impacts to Surface Water

Impacts to surface water associated with the CCR management projects are summarized in Table 3-9.

Table 3-9. Summary of Impacts to Surface Water

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor when appropriate BMPs are implemented.
	Long-term beneficial impact due to reduction of mass loading of constituents.	Option 1 would result in minor benefit to water quality. Option 2 would result in an increased benefit to water quality as compared to Option 1 due to the expected decrease in metals concentrations with the removal of the bottom ash waste stream and reduction in water use.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor when appropriate BMPs are implemented.
	Change in management of onsite storm water and process water. All discharges would comply with current or potential NPDES permit measures and other state and federal regulations.	No impact.

Project	Impact	Severity
Landfill		
Onsite Landfill	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor temporary impacts due to runoff would be minimized through BMPs.
	Direct impact related to filling and/or culverting 3,573 feet of perennial stream and 1,211 feet of intermittent stream.	Impacts to surface water features onsite would be mitigated by adherence to permit requirements.
	Potential impacts to Wells Creek and or Scott Branch from leachate and storm water discharges.	Mitigation measures may be required and implemented to meet permit requirements.
Offsite Landfill	No direct or indirect impact to surface water resources anticipated.	No impact.

3.8 Floodplains

3.8.1 Affected Environment

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

CUF is located along the left descending bank of Cumberland River between approximately River Mile (RM) 102.5 and RM 104.0, adjacent to Wells Creek from its mouth to about creek mile 2.6. Scott Branch is a tributary of Wells Creek at about Wells Creek mile 1.5. The 2010 Stewart County, Tennessee, Flood Insurance Rate Map for CUF is presented in Figure 3-5.

The 100- and 500-year flood elevations at CRM 102.8 would be 379.6 and 385.3 feet, respectively (TVA 2016b). The floodplain of Wells Creek is depicted as Zone A on the Flood Insurance Rate Map, which means that flood elevations on Wells Creek have not been determined. The drainage area of Wells Creek is about 57 square miles (USGS 2017). Because the drainage area of the Cumberland River at Wells Creek is far greater than the drainage area of Wells Creek or Scott Branch, the 100-year flood elevations on the Cumberland River would govern water surface elevations in a 100-year flood. Therefore, the 100- and 500-year flood elevations on Wells Creek and Scott Branch in the vicinity of CUF would be 379.6 and 385.3 feet, respectively.

The existing ash impoundments and onsite stacks are enclosed within a perimeter earthen dike that has a low crest elevation at approximately 394 to 395 feet, which is more than 9 feet above both the 100- and 500-year flood elevations of the Cumberland River (Stantec 2016).

The proposed CCR landfill would be in the watershed of a tributary of Scott Branch, outside the FEMA-mapped floodplains of Wells Creek and Scott Branch, well above the 100- and 500-year elevations of the Cumberland River.

3.8.2 Environmental Consequences

TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. For certain "Critical Actions," the minimum floodplain of concern is the 500-year floodplain.

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

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations, and no work would be conducted that would result in a change in existing conditions. Therefore, there would be no direct or indirect impacts to floodplains because there would be no physical changes to the current conditions.

3.8.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed Bottom Ash Dewatering facility and Bottom Ash Impoundment and North Ditch would be located within the perimeter dike, isolated from the 100- and 500-year floods of the Cumberland River, which would be consistent with EO 11988 for critical actions. Under the combination Closure-in-Place and Closure-by-Removal options, a portion of the Main Ash Impoundment and Stilling Impoundment would be excavated to approximately elevation 376 feet, or more than 3 feet below the 100-year flood elevation. A segment of the perimeter dike would be lowered, but would still provide protection for the 100-year flood. The portion of the impoundment that would be Closed-by-Removal, would be lined and repurposed as new Process Water Basins would be located within the perimeter dike, which would be consistent with EO 11988.

The proposed onsite CCR landfill and the proposed access road from Old Scott Road to the landfill would be located outside the 100-year floodplain and well above the 500-year flood elevation of the Cumberland River. A perennial stream is located within the footprint of the proposed CCR landfill; however, adverse impacts would be minimized by adherence to

mitigation measures required as part of water quality, wetlands, stream, and storm water permitting. These mitigation measures would also minimize flooding impacts and preserve the natural and beneficial values served by floodplains. Therefore, the CCR landfill and access road would be consistent with EO 11988.

3.8.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under Alternative C, impacts associated with construction and operation of the Bottom Ash Dewatering Facility, closure of the CCR impoundments, and construction and operation of the onsite landfill would be the same as Alternative B. Under the Closure-by-Removal option, however, there would be no offsite transport of CCR as CCR from the impoundments would be excavated and transported to the onsite existing landfill for long-term storage.

Under Alternative C there would be no impacts to the FEMA mapped 100-year floodplain area associated with the transport of CCR from the impoundments to the existing onsite landfill.

3.8.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under Alternative D, impacts associated with construction and operation of the Bottom Ash Dewatering Facility are expected to be the same as described for Alternatives B and C and the same as described for Alternative B for the ash impoundment closures.

Under this alternative, future CCR produced at CUF would be transported to the Bi-County Solid Waste Management Landfill for long-term storage, and no construction related activities would be required to develop a landfill, which would be consistent with EO 11988.

By adhering to standard BMPs and mitigation measures as required under water quality, wetlands, stream, and storm water permits, Alternatives A, B, C, and D would have no significant impacts on floodplains.

3.9 Vegetation

3.9.1 Affected Environment

CUF and surrounding areas are located within the Western Highland Rim, a subregion of the Interior Plateau Ecoregion. This region is characterized by rolling hills with a geologic base of limestone, chert, and shale. The original oak-hickory forests were mostly removed in the 1800s in association with iron-ore mining; however, the region is once again heavily forested (Griffith and Omernik 2001).

Land use/land cover based on National Land Cover data within the project areas and within the vicinity (5-mile radius) of CUF is summarized in Table 3-3. Land cover near CUF is primarily deciduous forest, hay/pasture, herbaceous/grassland, and cultivated crops. Land cover on each of the proposed project areas is shown on the Environmental Features Map of the project sites (Figures 3-6 and 3-7). The proposed project area which would include the dewatering facility is primarily developed land (27.7 acres) and herbaceous areas (2.1 acres). The ash impoundment closure areas are predominantly open water (41.5 acres) and previously developed land (13 acres). The temporary use areas are primarily developed land (128 acres). The proposed onsite landfill area is located within previously undeveloped land on CUF property and is primarily deciduous forest (173.2 acres) with a very small amount of wetlands (0.5 acre). More information about wetlands can be found in Section 3.13.

The proposed project areas for the dewatering facility and ash impoundment closures are highly disturbed and either devoid of native vegetation or consist of early successional habitats dominated by grasses and non-native herbaceous plant communities. The proposed onsite landfill project area is a mosaic of previously logged areas and second growth hardwood forest. White and red oaks were the most abundant species within the proposed project area. American elm, American beech, and eastern red cedar are also common. One small forested wetland occurs at the northern end of the proposed landfill project area. No uncommon vegetation or otherwise sensitive plant communities have been identified within the proposed project areas at CUF. Plants observed during the project site visit conducted in November 2016 are listed in Table 3-10.

According to TDEC (TDEC 2017b) there are two rare plant communities listed as occurring in Montgomery and Stewart counties. While neither of these communities are ranked as Globally Rare, they are considered of conservation concern in Tennessee. These communities are Highland Rim Sinkhole and Depression Pond (rare, not state-listed, S2S3) and Pennyroyal Karst Plain Prairie and Barrens (rare, not state-listed, S2). These communities cannot be distinguished by using the land use/land cover data, however, they are unlikely to occur as site surveys revealed there are no known sinkholes or high quality herbaceous communities within any proposed project areas.

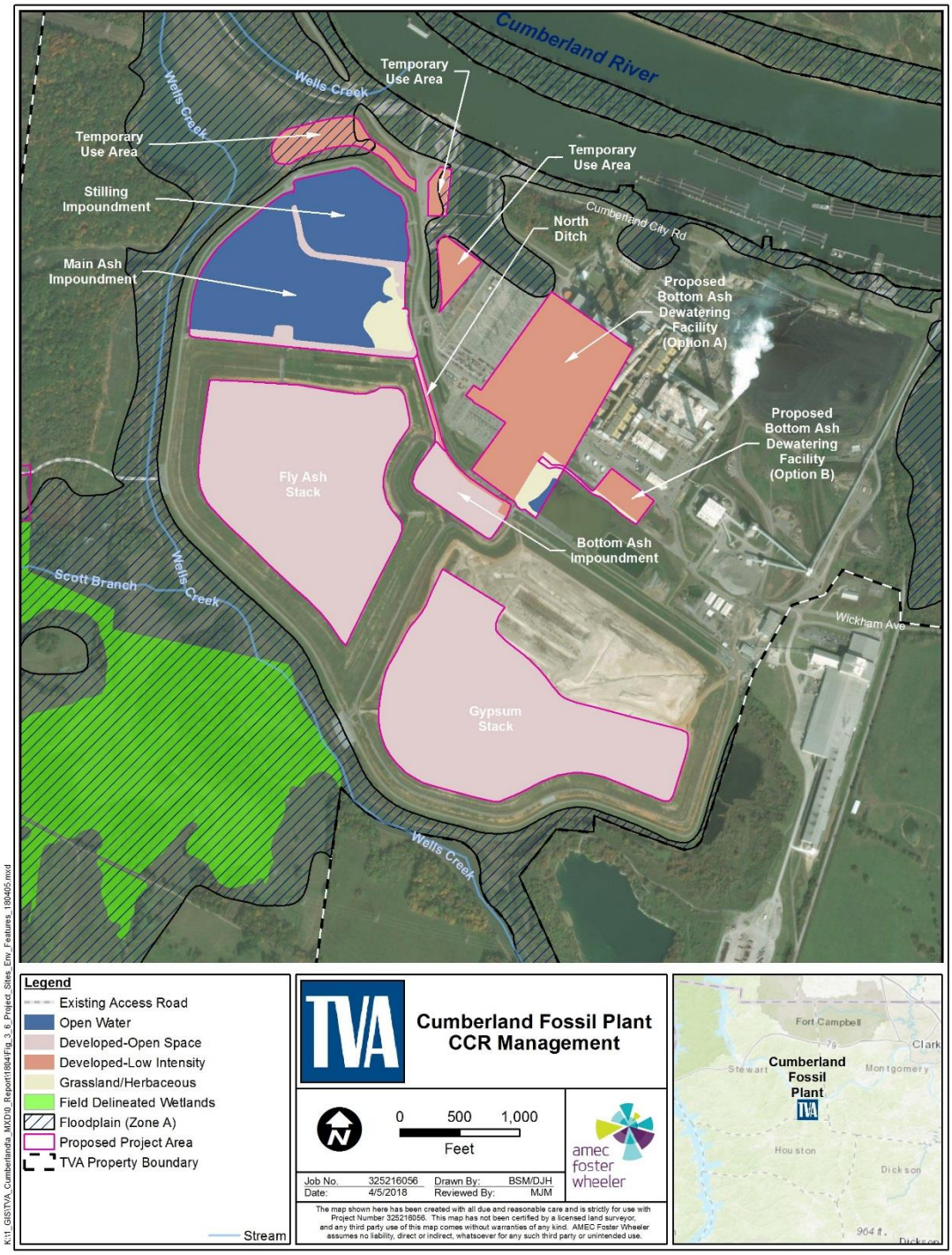

Figure 3-6. Environmental Features of the Proposed Bottom Ash Dewatering and Ash Impoundment Project Areas at Cumberland Fossil Plant

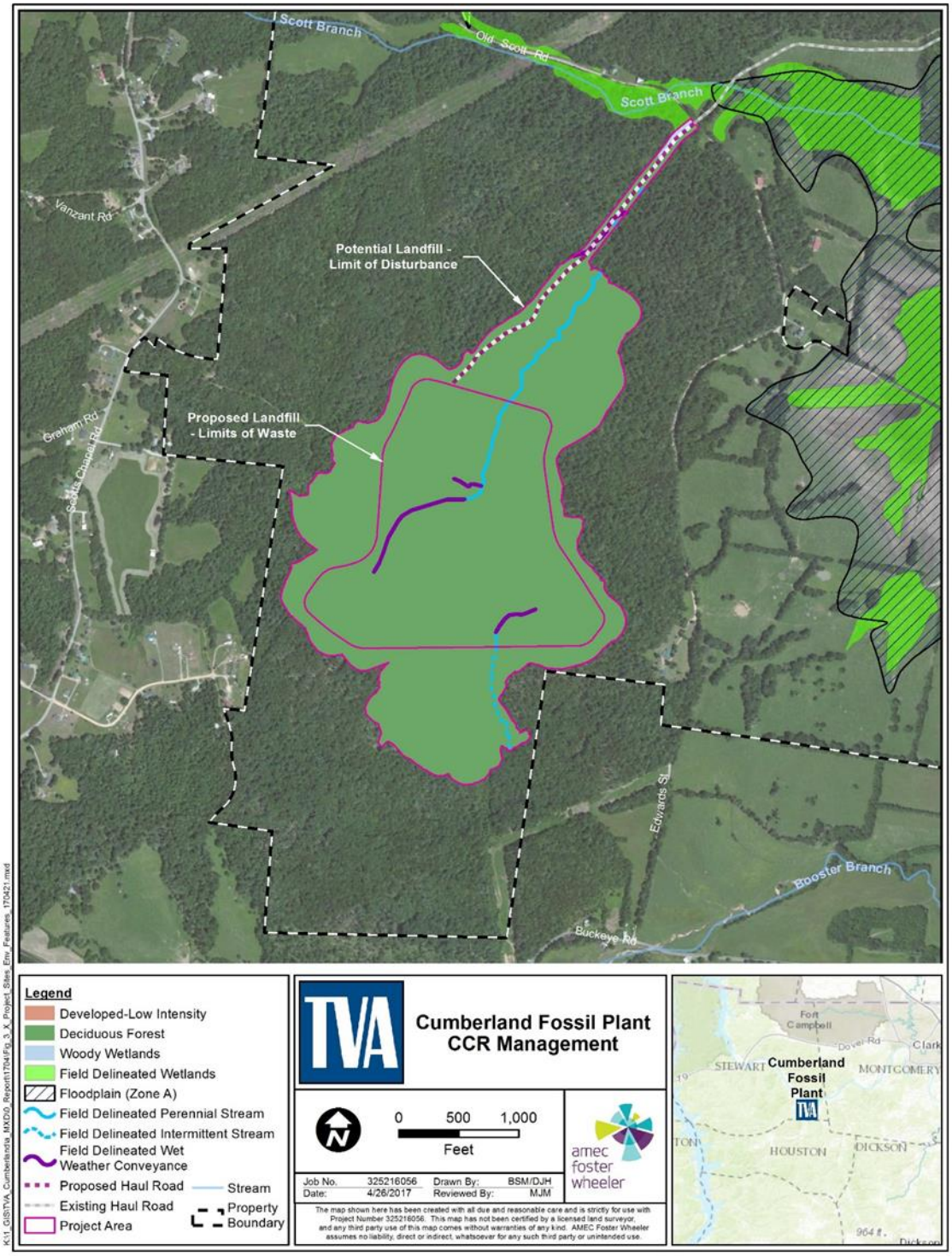

Figure 3-7. Environmental Features of the Proposed Onsite Landfill at Cumberland Fossil Plant

Table 3-10. Vegetation Observed within the Proposed Project Areas at CUF

Common Name	Scientific Name	Areas Surveyed: Plant Footprint[1]	Areas Surveyed: Proposed Landfill
Trees and Shrubs			
American beech	*Fagus grandifolia*		C
American elm	*Ulmus americana*	O	C
American hornbeam	*Carpinus caroliniana*		O
American persimmon	*Diospyros virginiana*		R
Black cherry	*Prunus serotina*		U
Black willow	*Salix nigra*	O	O
Boxelder	*Acer negundo*		O
Chinese privet	*Ligustrum sinense*	O	O
Chinkapin oak	*Quercus muehlenbergii*		C
Coralberry	*Symphoricarpos orbiculatus*		U
Eastern cottonwood	*Populus deltoides*	O	O
Eastern red cedar	*Juniperus virginana*	O	C
Eastern redbud	*Cercis canadensis*		O
Flowering dogwood	*Cornus florida*		O
Green ash	*Franxinus pennsylvanica*	O	O
Hackberry	*Celtis occidentalis*	O	O
Honey locust	*Gleditsia triacanthos*		
Japanese honeysuckle	*Lonicera japonica*		O
Loblolly pine	*Pinus taeda*		
Northern red oak	*Quercus rubra*		A
Osage orange	*Maclura pomifera*		
Pignut hickory	*Carya glabra*		O
Red maple	*Acer rubrum*	O[2]	C
Shagbark hickory	*Carya ovata*		R
Sourwood	*Oxydendrum arboreum*		R
Staghorn sumac	*Rhus typhina*		O
Sweet gum	*Liquidambar styracifua*	O	O
Sycamore	*Platanus occidentalis*	O	O
White oak	*Quercus alba*		A
Winged elm	*Ulmus alata*		U
Yellow poplar	*Liriodendron tulipifera*		O
Herbaceous Plants			
Bermuda grass	*Cynodon dactylon*	C	
Blackberry	*Rubus sp.*		C
Broomsedge	*Andropogon virginicus*	O	C
Cattail	*Typha latifolia*	O	U
Christmas fern	*Polystichum acrostichoides*		O
Cocklebur	*Xanthium sp.*		
Common ragweed	*Ambrosia artemisiifolia*		U
Common reed	*Phragmites australis*	C	
Common rush	*Juncus effusus*	O	
Fescue	*Festuca* sp.	C	

		Areas Surveyed	
Common Name	**Scientific Name**	**Plant Footprint[1]**	**Proposed Landfill**
Ironweed	*Vernonia* sp.		
Johnson grass	*Sorghum halepense*	O	U
Milkweed	*Asclepias* sp.		
Perilla mint	*Peri indicutescens*		
Sedge	*Carex lurida*	O	
Slender rush	*Juncus tenuis*	O	
Thistle	*Cirsium* sp.		
Wild teasel	*Dipsacus silvesteris*		
Woolgrass	*Scirpus cyperinus*	U	

[1]Includes the project area for the dewatering facility, ash Impoundments and temporary use areas.

[2]A: Abundant, C: Common, O: Occasional, U: Uncommon, R: Rare.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

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

3.9.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Impacts to vegetation would generally result from earthmoving activities associated with the construction and operation of the dewatering facility, impoundment closure (both in-place and by-removal), temporary use areas, and landfill construction.

Construction activities associated with the proposed projects would result in the disturbance of plant communities from heavy equipment use and the potential introduction and/or spread of invasive plant species from borrow material. Invasive plants that pose a threat in the region include, but are not limited to, autumn olive, Japanese honeysuckle, Chinese lespedeza, Chinese privet, wild teasel, and Johnson grass. Wild teasel, Japanese honeysuckle and Chinese privet were observed during the February 2017 field visit. However, the generalized transformation of existing ash impoundments from highly disturbed or open water environments to stable, controlled and vegetated landscapes that would result under Alternative B, provide a net improvement in the overall composition of the plant communities of these sites and their ability to resist establishment by invasive species. Following construction, the temporary use areas would revert to their current state or be replanted with herbaceous vegetation. BMPs consisting of erosion control measures and use of approved seed mixes designed to establish desirable vegetation would mitigate the potential spread of invasive species.

The proposed Bottom Ash Dewatering Facility would be constructed on a site that is heavily disturbed and comprised of fill material. Within the entire 30.3 acres required for this project, all of the land is highly disturbed due to previous development and includes only 2.1 acres of herbaceous habitat consisting of turfgrass and ruderal herbaceous vegetation.

This area does not contain unique vegetation with conservation value. Therefore, there would be long-term minor adverse impact to vegetation resulting from construction and operation of the dewatering facilities.

The temporary use areas are almost entirely developed land except for 0.2 acre of herbaceous land cover that is primarily turfgrass and ruderal vegetation at the edge of a gravel parking lot. These areas would be impacted mostly by laydown and storage of equipment during construction. Post construction, these areas would revert to their original use; therefore, the overall impact to vegetation in the temporary use areas would be short-term and minor.

The existing CCR impoundments are primarily non-vegetated open water areas or previously disturbed barren lands. Closure-in-Place of the Main Ash Impoundment and Stilling Impoundment would include placement of a cover system over a portion of the area while the remaining area would be converted to Process Water Basin 1 and Process Water Basin 2. The cover system would include 6 inches of topsoil that could sustain herbaceous native plant growth or sod. Although the use of borrow material as part of the cover system has the potential to introduce invasive plants, BMPs consisting of erosion control measures and use of approved seed mixes or sod designed to establish desirable vegetation would mitigate that risk. Therefore, in the short-term, impacts to vegetation resulting from impoundment Closure-in-Place would be adverse but minor; however, in the long-term, there would be minor beneficial impacts as a result of installation of cover systems over the Bottom Ash Impoundment and a portion of the Main Ash Impoundment that would support herbaceous vegetation.

Potential indirect impacts to vegetation related to transportation of the existing CCR from the Stilling Impoundment and a portion of the existing CCR from the Main Ash Impoundment would be less than those described below for the Closure-by-Removal option as only a portion of the CCR from the Main Ash Impoundment would be removed.

Impacts to vegetation under the Closure-by-Removal option are limited to construction phase disturbance of the same previously disturbed lands described above. Naturalized plant communities like those of surrounding cover types may be expected to reestablish within the former impoundment areas. Consequently, this option 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.

Potential indirect impacts to vegetation relate to the transportation of existing CCR material to the offsite landfill under the Closure-by-Removal option. The haul route to the Bi-County Solid Waste Management Landfill would utilize previously constructed roads which currently support landfill traffic. Additional trucks hauling CCR materials along this route would potentially result in minor increases of fugitive dust and exhaust emissions that could indirectly impact vegetation resources along the route due to deposition. However, BMPs such as covered loads and responsible equipment maintenance would be implemented as appropriate to minimize impacts. Therefore, no notable indirect impacts to vegetation are expected to occur from the transport of CCR to the Bi-County Solid Waste Management Landfill.

Construction of the proposed onsite landfill would involve ground disturbing activities that would include grubbing, grading, and excavation. The proposed onsite landfill area would

result in permanent loss of approximately 173.2 acres of deciduous forest resulting in long-term adverse impacts.

There is abundant deciduous forest habitat (61,203 acres) of similar quality within a 5-mile radius of CUF, however, rendering the overall impact to vegetation within the proposed landfill area minor. Soil excavations, removal of vegetation, grading, and construction activities also have the potential to disturb soil stability and increase erosion, and could result in the potential spread of invasive species. These indirect impacts would be minimized using standard BMPs consisting of erosion control measures and other measures to help reduce the spread of invasive species (Bowen 2012).

3.9.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with construction and operation of the dewatering facility, in-place ash impoundment closure, disturbance of the temporary use areas and landfill construction and operation would be the same as Alternative B. However, CCR removed from the ash impoundments would be transported to the onsite existing landfill for long-term storage. The existing onsite landfill is entirely composed of developed open space with no vegetative cover. Therefore, there would be no additional impacts to vegetation associated with this activity.

3.9.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with construction and operation of the Bottom Ash Dewatering Facility and disturbance of the temporary use areas would be the same as Alternatives B and C, and the same as those identified under Alternative B for ash impoundment closure. However, under Alternative D, future CCR produced at CUF would be transported offsite, and no onsite landfill would be constructed. Therefore, there would be no impact associated with landfill construction, and overall impacts to vegetation would be less than those associated with Alternatives B and C.

3.9.3 Summary of Impacts to Vegetation

Impacts to vegetation due to implementation of the proposed CCR management projects are summarized in Table 3-11. Given the developed nature of CUF, impacts of vegetation are expected to be primarily restricted to construction of the proposed onsite landfill.

Table 3-11. Summary of Impacts to Vegetation

Project	Impact	Severity
Bottom Ash Dewatering Facility	Removal of vegetation from this heavily disturbed site which lacks notable plant communities to support construction. Potential spread of invasive species mitigated with BMPs.	Minor. BMPs consisting of erosion control measures and use of approved seed mixes designed to establish desirable vegetation would mitigate the potential spread of invasive species.
Ash Impoundment Closure		
Closure-in-Place	Short-term adverse impact due to loss of vegetation and potential spread of invasive species from borrow material during closure activities.	Minor. Use of approved, non-invasive seed mixes designed to establish desirable vegetation would mitigate the potential spread of invasive species.
	Installation of a cover system over the Bottom Ash Impoundment and a portion of the Main Ash Impoundment that would support herbaceous vegetation.	Minor beneficial impact.
Closure-by-Removal	Short-term adverse impact due to loss of vegetation and potential spread of invasive species from borrow material during closure activities.	Minor and adverse impact in the short-term, but minor and positive in the long-term.
	Naturalized plant communities may reestablish within the former impoundment areas.	
Landfill		
Onsite Landfill	Construction related activities mitigated with the use of BMPs to control erosion.	Minor impact.
	Long-term adverse impact due to loss of vegetation in landfill area, however, abundant habitat of similar quality is present within the vicinity of CUF.	
Offsite Landfill	No direct or indirect impacts anticipated.	No impact.

3.10 Wildlife

3.10.1 Affected Environment

The proposed project areas for the dewatering facility and ash impoundment closures have been heavily impacted and altered due to construction and operation of CUF. As described in Section 3.9 Vegetation, plant communities in these areas have been heavily disturbed; consequently, the wildlife communities associated with these habitats consist of more common species that readily adapt to utilizing disturbed habitats. These areas are not expected to support unique or rare wildlife species.

Within the proposed landfill project area, there are 173.2 acres of deciduous forest (see Table 3-3). Numerous common bird and mammal species utilize deciduous forests as habitat. During a site visit performed in November 2016, several common wildlife species were observed within the proposed project areas. These species are listed in Table 3-12. Common mammals included white-tailed deer, coyote, raccoon, and gray squirrel; whereas typical bird species observed included common crow, blue jay, Carolina chickadee, tufted titmouse, song sparrow and northern cardinal. During a mist netting study performed for the proposed onsite landfill in 2011, five species of bats were found in the forested area adjacent to the proposed landfill site: big brown bat, evening bat, eastern pipistrelle, eastern red bat, and southeastern myotis (ESI 2011).

Several migratory bird species of concern are listed in the region surrounding CUF. These include Bachman's sparrow, bald eagle, blue-winged warbler, cerulean warbler, chuck-will's-widow, dickcissel, fox sparrow, Kentucky warbler, least bittern, loggerhead shrike, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, sedge wren, short-eared owl, willow flycatcher, wood thrush, and worm eating warbler (U.S. Fish and Wildlife Service [USFWS] 2017b). The deciduous forest within the proposed landfill project area may seasonally provide habitat for some of these species, including Kentucky warbler, red-headed woodpecker, and worm-eating warble. Federal and/or state-listed migratory bird species known to occur near CUF are addressed in greater detail in Section 3.12 (Threatened and Endangered Species).

Riparian corridors along streams may provide nesting habitat for migratory bird species, such as prothonotary warblers, warbling vireo, Louisiana water thrush, and red-winged blackbirds, as well as habitat for common amphibians, mammals, and aquatic reptiles (TVA 2016b). Habitat for these species may be provided by the perennial and intermittent streams, and the 0.5 acre of forested wetland that are located within the proposed landfill area.

Non-forested habitat such as the limited amount of herbaceous habitat within the project areas for the impoundments, including areas of common reed and cattails, do provide some habitat for wildlife, primarily birds such as red-winged blackbirds and great blue herons. Other small areas of previously disturbed/mowed herbaceous habitats found in the temporary use areas and dewatering facility project areas, are primarily dominated by non-native grasses and herbaceous plants. These areas may provide very limited habitat for a variety of common bird species, primarily foraging areas (TVA 2016b). Wildlife species present in the more developed portions of the site include those often associated with human presence. During the November 2016 site visit conducted for this project, several common bird species were observed within the project areas for the dewatering facility, temporary use areas and impoundments (see Table 3-12).

Table 3-12. Wildlife Observed Within the Proposed Project Areas at CUF During the November 2016 Site Visit

		Areas Surveyed	
Scientific Name	**Scientific Name**	**Plant Footprint[1]**	**Proposed Landfill**
Birds			
American crow	*Corvus brachyrhynchos*	X	X
American robin	*Turdus migratorius*		
Black vulture	*Coragyps atratus*		
Bluejay	*Cyanocitta cristata*		X
Carolina chickadee	*Poecile carolinensis*		X
Eastern bluebird	*Sialia sialis*		
European starling	*Sturnus vulgaris*		
Great blue heron	*Ardea herodias*	X	
Killdeer	*Charadrius vociferus*	X	
Mourning dove	*Zenaida macroura*	X	X
Northern bobwhite	*Colinus virginianus*		X
Northern cardinal	*Cardinalis*		X
Northern mockingbird	*Mimus polyglottos*		X
Red-tailed hawk	*Buteo jamaicensis*	X	
Red-winged blackbird	*Agelaius phoeniceus*	X	
Sandhill crane[2]	*Grus canadensis*		X
Song sparrow	*Melospiza melodia*	X	X
Tufted titmouse	*Baeolophus bicolor*		X
Turkey vulture[2]	*Cathartes aura*		
White-breasted nuthatch	*Sitta carolinensis*		X
Wild turkey	*Meleagris gallopavo*		X
Mammals			
Coyote	*Canis latrans*		X
Eastern chipmunk	*Tamias striatus*		X
Eastern gray squirrel	*Sciurus carolinensis*		X
Fox squirrel	*Sciurus niger*		
Raccoon	*Procyon lotor*		X
White-tailed deer	*Odocoileus virginianus*		X

[1] Includes the project area for the dewatering facility, ash Impoundments and temporary use areas.

[2] Not observed onsite. Observed as a flyover.

The open water of the impoundments offers suitable habitat and foraging opportunities for water birds, amphibians, and mammals. Despite the continual disturbance of open water features at facilities like CUF, wildlife, including mallards, great blue heron, and Canada goose, often use them (TVA 2003, TVA 2004). During the November 2016 site visit, great blue heron and American coot were observed using the edges of open water within the main ash impoundment. Per the TVA natural heritage database, no heron colonies are known to occur near CUF and none were observed during the November 2016 site visit.

No caves have been documented at CUF and none were observed during the November 2016 site visit. One cave occurs within 2.6 miles of CUF in Houston County.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations, and no work would be conducted that would result in loss or disturbance of wildlife habitat beyond existing conditions. Therefore, no project-related environmental impacts with respect to wildlife would occur under this alternative.

3.10.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed dewatering facility would be constructed on a disturbed site that offers relatively low quality wildlife habitat. Under this alternative, the resident, common and habituated wildlife found in the area proposed for the construction of the dewatering facility would continue to opportunistically use other available habitats within the CUF property. During construction and operation, most wildlife present within the project site would likely disperse to adjacent and/or similar habitats. Direct temporary effects to some individuals may occur if those individuals are immobile during the time of construction, especially if construction would occur during breeding/nesting seasons as the species are less mobile during those times. However, given the disturbed nature of the project area, any impacts during construction and operation would be minor.

The proposed options for Impoundment closure activities would occur within a highly disturbed and fragmented industrial landscape that offers minimal habitat for wildlife. A loss in marginally suitable habitat for waterfowl would occur because of this action; however, higher quality habitat is available in areas surrounding CUF that could be utilized by waterfowl. Resident wildlife found in these project areas would continue to opportunistically use available habitats within the surrounding area. No tree clearing would occur in conjunction with closure activities within the CCR impoundments. Therefore, no direct impacts would occur to tree roosting/nesting bird or mammal species.

Immediately following the construction period, wildlife use of the closed impoundments may be limited, as the geosynthetic and protective soil cover system may be expected to provide limited foraging and nesting habitat for grassland species. Under one closure option, a portion of the Main Ash Impoundment and the Stilling Impoundment would be converted to Process Water Basins. This may provide a small amount of marginally suitable habitat for waterfowl. Due to the previously disturbed nature of the site, habitat for wildlife is not expected to change significantly post closure (TVA 2016b).

CCR removed from the impoundments under all closure options would be transported to the Bi-County Solid Waste Management Landfill for disposal. This is an existing permitted landfill and is a highly disturbed area that provides poor habitat for wildlife species. There would be no additional direct impacts to land cover types and their associated wildlife populations resulting from closure of the impoundments. Lands within the former ash impoundments would be restored using approved, non-invasive seed mixes designed to establish desirable vegetation that would support periodic use by wildlife. Following

construction these lands may be expected to undergo succession to naturalized habitats that may offer somewhat improved habitat quality over time (TVA 2016b).

In consideration of the highly disturbed habitats present within the project area, and the availability of higher quality wildlife in proximity, potential direct and indirect impacts to associated wildlife are expected to be minor and potentially slightly beneficial following ash impoundment closure.

Temporary laydown areas are located on lands previously disturbed, fragmented, and of poor quality for use by wildlife. During use of the laydown areas, wildlife habituated to the area are expected to move to other plentiful suitable environments offsite; however, as above, immobile species may be impacted. Post construction, these areas would return to their previous state. Impacts to wildlife utilizing these areas would be minor and temporary.

Impacts to wildlife from construction and operation of the proposed landfill would generally result from loss of 173.2 acres of deciduous forest habitats. This area is relatively undisturbed and is expected to support a range of wildlife species, including migratory birds. During construction, most mobile wildlife present within the project site would likely disperse to adjacent and/or similar habitat, whereas direct mortality may result to less mobile species. Within a 5-mile radius, there is approximately 61,203 acres of deciduous forest. Therefore, due to the large amount of similar habitat in the region, the construction and operation of the onsite landfill is not expected to substantially impact the local population of any wildlife species, including migratory birds that may use the existing forested habitats within the landfill area. Although forested habitat within the project area would be removed, adjacent areas provide forested habitats that would accommodate displaced biota. While the proposed project would result in alteration of habitats and displacement of resident wildlife species, these effects are not expected to result in notable alteration or destabilization of any species. Therefore, although there would be impacts to wildlife resulting from the development and operation of the proposed landfill, those impacts would be minor.

Although no caves were observed during the November 2016 site visit, should caves be identified during the project construction, they would be examined for use by wildlife, including threatened and endangered species.

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

3.10.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility, ash impoundment closure, temporary use areas, and the construction and operation of the onsite landfill would be the same as identified under Alternative B.

However, under this alternative, CCR removed from the impoundments would be transported to the existing onsite landfill for long-term storage, a highly disturbed area that

provides poor habitat for wildlife species. Therefore, overall impacts to wildlife under Alternative C would be the same as Alternative B.

3.10.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Impacts to wildlife under this alternative, are expected to that the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and temporary use areas, and the same as Alternative B for the ash impoundment closure activities.

However, in contrast to Alternatives B and C, this alternative considers the transport of future ash to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage. Under this alternative no construction related activities would be required to develop a landfill. Consequently, impacts to wildlife from this alternative due to construction would be less than those described for Alternatives B and C.

3.10.3 Summary of Impacts to Wildlife

TVA has determined that impacts to wildlife related to the CCR management projects are minor as summarized in Table 3-13.

Table 3-13. Summary of Impacts to Wildlife

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary Loss of low quality habitat during construction and long-term loss of low quality habitat during operation. Existing wildlife species are adapted to disturbance.	Minor impact.
Ash Impoundment Closure		
Closure-in-Place	Loss of low quality open water habitats. Long-term beneficial impacts as the Process Water Basins may also provide some habitat for waterfowl.	Minor adverse impacts in the short-term, but beneficial impact in the long-term.
Closure-by-Removal	Loss of low quality open water habitats. Long-term beneficial impacts as lands may be expected to undergo succession to naturalized habitats that may offer somewhat improved habitat quality as compared to Closure-in-Place. Long-term beneficial impacts as the Process Water Basins may also provide some habitat for waterfowl.	Minor adverse impacts in the short-term, but beneficial impact in the long-term.
Landfill		
Onsite Landfill	Removal of vegetation, especially deciduous forests that provides wildlife habitat.	Minor impact due to presence of adjacent habitats of similar quality.
Offsite Landfill	No impacts related to landfill construction and operation.	No impact.

3.11 Aquatic Ecology

3.11.1 Affected Environment

The primary aquatic environments related to the CUF CCR actions include Barkley-Reservoir (Cumberland River, a tributary to the Ohio River), Wells Creek (a tributary to the Cumberland River), and Scott Branch (a tributary to Wells Creek) (see Figures 1-1 and 3-5). The Cumberland River is impounded prior to its confluence with the Ohio River to create Lake Barkley. Near CUF, Lake Barkley-Cumberland River is more riverine, approximately 72 miles upstream of Lake Barkley Dam. CUF is located along the left descending bank near RM 103. Lake Barkley-Cumberland River adjacent to CUF is characterized as having poor to fair shoreline aquatic habitat with no aquatic macrophytes. The fish community consists of more warmwater species with a mix of species typical of both rivers and reservoirs due to the CUF proximity to the main stem of Lake Barkley and more riverine conditions near the CUF (TVA 2016a).

TVA sampled fish (electrofishing and gill netting) upstream and downstream of CUF between RM 102 and 107 in the spring, summer, and autumn of 2015. Upstream of CUF, 1,576 fish (34 species) were collected in the Spring 2015, 753 fish (32 species) were collected in the Summer 2015, and 597 fish (37 species) were collected in the Autumn 2015. Typical species upstream of CUF included gizzard shad, spotfin shiner, emerald shiner, yellow bass, bluegill, longear sunfish, and largemouth bass.

Wells Creek is a small tributary of the Cumberland River that flows south-north through the central portion of the CUF property. Scott Branch is a tributary of Wells Creek that flows west-east through the property. An unnamed intermittent stream (tributary to Scott Branch) flows through the middle of the proposed landfill site. The lower reach of this stream near its confluence to Scott Branch has flowing water. The upper reach of this stream within the proposed landfill footprint is dry during parts of the year and only experiences water flows during wet weather. Due to their proximity and connection to the Cumberland River, species composition and abundances are expected to be similar to that described above for the Cumberland River.

The ash impoundments have open water zones and are expected to be represented by common aquatic species with a relatively limited community composition.

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

TVA sampled fish upstream and downstream of CUF between RM 102 and 107 in the spring, summer, and autumn of 2015. Upstream of CUF, 1,576 fish (34 species) were collected in the Spring 2015, 753 fish (32 species) were collected in the Summer 2015, and 597 fish (37 species) were collected in the Autumn 2015. Typical species upstream of CUF

included gizzard shad, spotfin shiner, emerald shiner, yellow bass, bluegill, longear sunfish, and largemouth bass. Downstream of CUF, 1,643 fish (32 species) were collected in the Spring 2015, 604 fish (27 species) were collected in the Summer 2015, and 705 fish (31 species) were collected in the Autumn 2015. Typical species downstream of CUF included threadfin shad, longear sunfish, emerald shiner, largemouth bass, bluegill, gizzard shad, and yellow bass. Ecological health ratings were similar for both the upstream and downstream sites for all three seasons, ranging from fair to good (TVA 2016a).

As part of the same TVA 2015 study on the Cumberland River near CUF between RM 102 and 106.6, benthic (or bottom-dwelling) invertebrates were also collected. Oligochaetes, chironomids, and Asiatic clams were the dominant taxa both upstream and downstream of CUF. Ecological health ratings were similar between the upstream and downstream sites for all three seasons, ranging from fair to good (TVA 2016a).

A 2011 mussel survey conducted to characterize the freshwater mollusk community on the Cumberland River (spot dives) and Wells Creek (along sampling transects) near CUF found low abundances of a small number of relatively common mussel species. The three most numerous freshwater mussel species included mapleleaf, wartyback, and pink heelsplitter. On the Cumberland River, 24 mussels were collected from 23 locations (Catch per unit effort = 9 mussels/hour). On Wells Creek, 11 mussels were collected along four transect locations (density = 0.05 mussels/square meter) (Third Rock Consultants 2011).

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and no work would be conducted that would result in loss or disturbance of aquatic resources beyond existing conditions. Therefore, no project-related environmental impacts with respect to aquatic ecosystems would occur under this alternative.

3.11.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.11.2.2.1 Bottom Ash Dewatering Facility

The proposed dewatering facility would be constructed on a site that is already disturbed from former and current operations at CUF. Invertebrates, fish, and mussel fauna of the Cumberland River or Wells Creek would not be affected by the Bottom Ash Dewatering Facility as there would be no direct impact to the river/creek or shorelines. Discharges to aquatic resources would take place through the permitted existing outfall and would necessarily meet existing NPDES permit requirements. Because NPDES requirements are designed to be protective of aquatic life in receiving waters, impacts to aquatic fish and shellfish species near CUF are not anticipated. Potential indirect impacts to aquatic resources resulting from surface water runoff during construction activities for Bottom Ash Dewatering Facility would be mitigated through the implementation of storm water erosion controls in accordance with a SWPPP which would be prepared for this project. Therefore, there would be no impacts to aquatic ecosystems from dewatering activities.

Temporary laydown areas are similar to the area proposed for the dewatering facility in that they are previously disturbed with no aquatic resources present. Therefore, there would be no impacts to aquatic ecosystems with regard to temporary laydown areas.

TVA may construct a recirculation system in a subsequent phase and most bottom ash sluice transport water would be recirculated. Consequently, discharges to the permitted outfall would be reduced, which would have an incrementally beneficial impact on aquatic life in in receiving waters.

3.11.2.2.2 Ash Impoundment Closure

Primary construction activities associated with Closure-in-Place and Closure-by-Removal would be located within the footprint of the existing impoundments and existing approved borrow areas. Under all closure alternatives, wastewater discharges during dewatering would be required to meet existing permit limits, and sampling would continue to be performed at the approved outfall structure in accordance with the NPDES permit. Because ash impoundments are considered treatment systems and not aquatic habitat, and because laydown areas avoid encroachment or alteration of streams and water bodies, direct impacts to aquatic ecosystems within jurisdictional waters would be avoided with closure activities.

Surface water impacts related to ash impoundment closure construction activities are not anticipated. Should minor alterations of surface waters be required, any activities within areas containing aquatic resources would be appropriately permitted and would utilize approved BMPs. Indirect impacts to aquatic resources of adjacent water bodies (i.e., Wells Creek and Cumberland River) may be associated with storm water runoff due to temporary construction activities associated with site preparation, closure activities, and dewatering of the ash impoundment. Ash impoundment dewatering activities may temporarily increase flow to Wells Creek and the Cumberland River. Aquatic biota may be temporarily displaced due to increased flows, but would quickly repopulate following dewatering of the ash impoundment. Any construction activities would adhere to permit limit requirements and would utilize BMPs as described TVA's guide for environmental and best management practices to minimize indirect effects on aquatic resources during the construction phase (TVA 2017a)). Where soil disturbance could occur, the area would be stabilized and vegetated with noninvasive grasses and mulched as described in the above-mentioned handbook. Following the construction phase, care and maintenance of the approved closure system and site-wide management of storm water using appropriate BMPs would minimize indirect impacts to the aquatic community in the receiving waters.

Indirect impacts to the downstream reach of Wells Creek after ash impoundment closure are not anticipated as hydrology of the creek is influenced by the Cumberland River, not Wells Creek. As such, the reduction of flow from the outfall to Wells Creek would not decrease the available habitat and overall aquatic biomass.

Based on the use of an approved outfall structure in accordance with the NPDES permit for wastewater discharge and the use of appropriate BMPs to control storm water runoff, impacts to aquatic resources resulting from ash impoundment closure (both Closure-in-Place and Closure-by-Removal) are expected to be short-term and minor.

3.11.2.2.3 Landfill Construction and Operation

Construction of the landfill involves ground disturbing activities that would include grubbing, grading, and excavation. One perennial stream, one intermittent stream, and four wet weather conveyance/ephemeral streams were documented in the area surrounding the proposed landfill and access road site (see Figure 3-5). The total linear footage of the portion of the perennial stream and the intermittent stream within the proposed landfill project area is 3,573 feet and 1,211 feet respectively. The total linear footage of the four

wet weather conveyances/ephemeral streams is 4,111 feet. The perennial stream flows northeast through the center of the proposed landfill site. The lower reach of the perennial stream near its confluence with Scott Branch has flowing water. The upper reach of this stream within the proposed landfill is dry during parts of the year and only experiences water flows during wet weather conditions. Aquatic habitat of this stream as well as the intermittent stream and wet weather conveyances is limited as it is dry during much of the year. However, the lower portion at the confluence to Scott Branch exhibits diverse flow conditions which would support fish and benthic macroinvertebrates. Direct and permanent impacts to aquatic biota and their habitats would be limited to stream loss and/or culverting of both perennial (3,573 feet) and intermittent streams (1,211 feet) within the proposed landfill project area. These activities would be done in compliance with applicable TDEC ARAP and USACE 404 permits obtained for the proposed actions, including any required mitigation. Construction activities would adhere to permit limit requirements and would utilize appropriate BMPs that would minimize potential indirect impacts associated with downstream transport and accumulation of sediments.

The direct impact of stream alteration would also be offset and mitigated by construction of a surface runoff ditch and implementation of mitigation requirements as necessary. However, some onsite habitat restoration may be expected in the long-term as the surface runoff ditch sections would develop flow regimes, substrates and subsequent habitats which would be similar to the filled section of the streams that would be altered. Watershed level impacts would be minor given the local abundance of similar aquatic resources.

Indirect impacts to downstream reaches of the unnamed streams and Scott Branch may be associated with storm water runoff due to temporary construction activities, or upstream construction activities within the stream. Construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources during the construction phase, such as the use of silt fencing and other measures to prevent the deposition of sediments in receiving streams. Additionally, flow alteration in downstream sections of the unnamed stream and Scott Branch would be caused by runoff from the landfill site. These impacts would be mitigated using sediment basins and other BMPs onsite. Following the construction phase, care and maintenance of the approved closure system and site-wide management of storm water with appropriate BMPs would minimize indirect impacts to the aquatic community of the receiving waters.

Indirect impacts to aquatic resources of more distant receiving water bodies (i.e., Wells Creek and the Cumberland River) may be associated with storm water runoff due to temporary construction activities associated stream alteration (filling), culverting, and construction of the leachate and sediment basins. Any construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources during the construction phase.

Construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources. Following the construction phase, site-wide management of storm water using appropriate BMPs would minimize indirect impacts to the aquatic community of the surrounding waters (Cumberland River and Wells Creek). Thus, impacts to aquatic resources resulting from the onsite landfill are expected to be short-term and minor.

3.11.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility ash impoundment closure and the proposed landfill would be the same as identified under Alternative B. Existing CCR from closure of the impoundments would not be transported to an offsite landfill, but would be deposited into the existing onsite landfill, a highly disturbed area that provides no habitat for aquatic biota. Therefore, impacts associated with ash impoundment closure would be the same as described for Alternative B. Aquatic biota habituated to these areas would be expected to move offsite, although immobile species would be impacted.

3.11.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Impacts to aquatic resources under Alternative D are expected to be of the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and to the same as Alternative B for ash impoundment closure.

Under this alternative, the proposed landfill would not be constructed, and therefore, there would be no direct impacts to the unnamed streams located on the proposed landfill site, and there would be no indirect impacts to surrounding waters. Therefore, implementation of Alternative D would result in short-term minor indirect impacts to aquatic resources during construction of the Bottom Ash Dewatering Facility. However, as there would be no impacts associated with onsite landfill construction, impacts to aquatic resources would be less than Alternatives B and C.

3.11.3 Summary of Impacts to Aquatic Resources

As summarized in Table 3-14, TVA has determined that impacts to aquatic resources related to the CCR management projects are minor.

Table 3-14. Summary of Impacts to Aquatic Resources

Project	Impact	Severity
Bottom Ash Dewatering Facility	Indirect temporary impact associated with runoff during construction. Discharge during operation would comply with NPDES permit requirements.	Minor impact. Minimized with the use of BMPs. Minor impact during operation. Construction of recirculation system would have an incrementally beneficial impact on aquatic life due to reduction in discharge.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Indirect temporary impact from wastewater and storm water discharge from permitted outfall structure associated with dewatering and closure activities.	Minor impact.

Project	Impact	Severity
Landfill		
Onsite Landfill	Direct and permanent impact to unnamed streams that flow through the proposed landfill site. Indirect temporary impacts to downstream reached of the unnamed streams and Scott Branch associated with storm water runoff during construction-related activities.	Long-term permanent impact to aquatic habitat would be minor and mitigated per permit requirements. Temporary minor impact, minimized with the use of BMPs.
Offsite Landfill	No direct or indirect impact to aquatic resources.	No impact.

3.12 Threatened and Endangered Species

3.12.1 Affected Environment

The Endangered Species Act 16 USC §§ 1531-1543, was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. Likewise, a threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Under Section 7 of the ESA, federal agencies are required to consider the potential effects of their proposed action on endangered and threatened species and critical habitats. If the proposed action has the potential to affect these resources, the federal agency is required to consult with the USFWS.

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

3.12.1.1 Wildlife

According to the TDEC, 43 wildlife species of conservation concern occur in Stewart, Montgomery, and Houston counties (Table 3-15) (TDEC 2016c). While CUF is entirely within Stewart County, it is within 3 miles of Montgomery County and Houston County, therefore these counties were included in the analysis. The USFWS Information for Planning and Conservation (IPaC) tool contains a listing of the federally listed species that have potential to occur near the project area. A review of the TVA Regional Natural Heritage database in February 2017 indicated that of those species listed by USFWS and TDEC, two species are currently known, or have been known, to occur within a 5-mile

radius of CUF: the bald eagle and the northern long-eared bat. Species contained on the TVA, TDEC, and USFWS IPaC lists are included in Table 3-15.

3.12.1.1.1 Terrestrial Animals

3.12.1.1.1.1 *Birds*

None of the wintering birds observed during the November 2016 site visit within the project area were state or federal species of concern. Table 3-15 contains a listing of bird species observed during the November 2016 site visit.

American bitterns reside in wetland or riparian habitats including both freshwater and brackish marshes as well as the edges of lakes or ponds. They typically require areas with emergent aquatic vegetation and scattered shrubs. Generally, larger areas of wetland (2.5 hectares or more) are required for nesting, while smaller wetlands can be utilized for foraging for the American Bittern (Gibbs, Melvin, and Reid 1992). No records of the American bittern exist within 3 miles of CUF. As emergent aquatic vegetation is generally not available within the CUF ash impoundments, little habitat for these species exists within CUF. The forested wetland within the proposed landfill area does not provide suitable habitat for this species.

Bachman's Sparrow is a large sparrow with a large bill and a rounded tail that is federally listed as a species of management concern and state-listed endangered with a rank of S1B. While Bachman's sparrow can be found in old fields, savannas, and woodlands, the preferred habitat is open pine or oak woods with a dense herbaceous understory (NatureServe 2015). As the forested area of the proposed landfill area is semi-open deciduous forest, it is possible that Bachman's sparrow may be found in the vicinity; however, no records of Bachman's sparrow are known to occur within 3 miles of CUF.

Bald eagles are typically found near large, open bodies of water such as rivers, lakes, and reservoirs. Bald eagles will nest on cliffs or large trees near water (NatureServe 2015). A search of the TVA natural heritage database shows 19 records of bald eagles within Stewart County. There is one record of a bald eagle nest that was active from 2005-2009 near CUF, approximately 0.26 mile north of CUF between the two TVA transmission line ROW(s). Because the trees in the deciduous forest portion of the proposed landfill are generally too small to support a nest, it is unlikely that bald eagles would utilize that habitat for nesting, however, they may be seen flying over and near the project area foraging over the Cumberland River.

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

Table 3-15. Species of Conservation Concern Within Houston, Montgomery, and Stewart Counties and Within the Vicinity of CUF

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State[2] (Rank[3])	
Amphibians				
Barking Treefrog	*Hyla gratiosa*	--	D (S3)	P
Hellbender	*Cryptobranchus alleganiensis*	--	D (S3)	N
Fish				
Blue Sucker*	*Cycleptus elongatus*	--	T (S2)	N
Lake Sturgeon*	*Acipenser fulvescens*	--	E (S1)	
Southern Cavefish	*Typhlichthys subterraneus*	--	D (S3)	N
Slenderhead Darter	*Percina phoxocephala*	--	D (S3)	N
Mollusks		--		
Clubshell	*Pleurobema clava**	LE	E (SH)	N
Muddy Rocksnail	*Lithasia salebrosa*	--	** (S2)	N
Orangefoot Pimpleback	*Plethobasus cooperianus*	LE, XN	E (S1)	N
Pink Mucket	*Lampsilis abrupta*	LE	E (S2)	N
Rabbitsfoot	*Quadrula cylindrica**	T	--	N
Ring Pink	*Obovaria retusa*	LE, XN	E (S1)	N
Rough Pigtoe	*Pleurobema plenum*	LE, XN	E (S1)	N
Slabside Pearly Mussel	*Pleuronaia dolabelloides*	LE	**(S2)	N
Tan Riffleshell	*Epioblasma florentina walkeri*	LE	E (S1)	N
Crustaceans				
An Amphipod	*Stygobromus vitreus*	--	Rare (S2)	N
Mammoth Cave Crayfish	*Orconectes pellucidus*	--	Rare (S3)	N
Birds				
American Bittern	*Botaurus lentiginosus*	--	** (S1)	N
Bachman's Sparrow	*Aimophila aestivalis*	--	E (S1B)	P
Bald Eagle*	*Haliaeetus leucocephalus*	--	D (S3)	P
Bewick's Wren	*Thryomanes bewickii*	--	E (S1)	P
Cerulean Warbler	*Dendroica cerulea*	--	D (S3B)	N
Golden Eagle	*Aquila chrysaetos*	--	T (S1)	N
Henslow's Sparrow	*Ammodramus henslowii*	--	D (S1B)	N
Lark Sparrow	*Chondestes grammacus*	--	T (S1B)	P
Little Blue Heron	*Egretta caerulea*	--	D (S2B, S3N)	P
Savannah Sparrow	*Passerculus sandwichensis*	--	**(S1B, S4N)	N
Swainson's Warbler	*Limnothlypis swainsonii*	--	D (S3)	N
Vesper Sparrow	*Pooecetes gramineus*	--	D (S1B, S4N)	N
Mammals				
American Pygmy Shrew	*Sorex hoyi*	--	** (S2)	P
Cinereus Shrew	*Sorex cinereus*	--	D (S4)	P
Eastern Small-footed Bat	*Myotis leibii*	--	D (S2S3)	P
Gray Bat	*Myotis grisescens*	LE	E (S2)	NP
Indiana Bat	*Myotis sodalis*	LE	E (S1)	P
Meadow Jumping Mouse	*Zapus hudsonius*	--	D (S4)	P
Northern Long-eared Bat*	*Myotis septentrionalis*	LT	** (S1S2)	P
Southeastern Shrew	*Sorex longirostris*	--	D (S4)	P
Southern Bog Lemming	*Synaptomys cooperi*	--	D (S4)	P

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State[2] (Rank[3])	
Reptiles				
Alligator Snapping Turtle	*Macrochelys temminckii*	--	D (S2S3)	N
Copperbelly Watersnake	*Nerodia erythrogaster neglecta*	--	**(S2S3)	P
Eastern Slender Glass Lizard	*Ophisaurus attenuatus longicaudus*	--	D (S3)	P
Northern Pinesnake	*Pituophis melanoleucus*	--	T (S3)	N
Western Pygmy Rattlesnake	*Sistrurus miliarius streckeri*	--	T (S2S3)	P
Insects				
Acuminate Snaketail	*Ophiogomphus acuminatus*	--	**(S2)	N
Coleman Cave Beetle	*Pseudanophthalmus colemanensis*	C	**(S1)	N
Plants				
American Ginseng	*Panax quinquefolius*	--	S-C (S3S4)	Y
Beak Grass	*Diarrhena obovata*	--	S (S1)	N
Bearded Rattlesnake-root	*Prenanthes barbata*	--	S (S2)	N
Blue Mud-plantain	*Heteranthera limosa*	--	T (S1S2)	N
Blue Sage	*Salvia azurea* var. *grandiflora*	--	S (S3)	N
Bristly Sedge	*Carex comosa*	--	T (S2)	N
Buffalo Clover	*Trifolium reflexum*	--	E (S1)	N
Buffalo Currant	*Ribes odoratum*	--	T (S1)	N
Butternut	*Juglans cinerea*	--	T (S3)	N
Compass Plant	*Silphium laciniatum*	--	T (S2)	N
Cow-parsnip	*Heracleum maximum*	--	S (S2)	P
Cream Wild-indigo	*Baptisia bracteata* var. *leucophaea*	--	S (S1S2)	N
Creamflower Tick-trefoil	*Desmodium ochroleucum*	--	E (S1)	P
Earleaved False-foxglove	*Agalinis auriculata*	--	E (S2)	N
Featherfoil	*Hottonia inflata*	--	S (S2)	N
Fen Orchid	*Liparis loeselii*	--	T (S1)	N
Fraser's Loosestrife	*Lysimachia fraseri*	--	E (S2)	N
Hair Grass	*Muhlenbergia glabrifloris*	--	S (S1)	N
Hairy Hawkweed	*Hieracium longipilum*	--	S (S1)	N
Lake Cress	*Neobeckia aquatica*	--	S (S2)	N
Lamance Iris	*Iris brevicaulis*	--	E (S1)	N
Lance-like Spike-rush	*Eleocharis lanceolata*	--	S (S1)	N
Limestone Blue Star	*Amsonia tabernaemontana* var. *gattingeri*	--	S (S3)	N
Maryland Milkwort	*Polygala mariana*	--	S (S1)	N
Matted Spike-rush	*Eleocharis intermedia*	--	E (S1)	N
Missouri Gooseberry	*Ribes missouriense*	--	S (S2)	P
Muskingum Sedge	*Carex muskingumensis*	--	E (S1)	N
Naked-stem Sunflower	*Helianthus occidentalis*	--	S (S2)	N
Nuttall's Waterweed	*Elodea nuttallii*	--	S (S2)	N
Ovate-leaved Arrowhead	*Sagittaria platyphylla*	--	S (S2S3)	N
Ozark Downy Phlox	*Phlox pilosa ssp. ozarkana*	--	S (S1S2)	P
Pale False-foxglove	*Agalinis skinneriana*	--	T (S1S2)	N
Pale-purple Coneflower	*Echinacea pallida*	--	E (S1)	N

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State[2] (Rank[3])	
Prairie Ragwort	*Packera plattensis*	--	S (S1)	N
Price's Potato-bean	*Apios priceana*	LT	E (S3)	P
Purple Milkweed	*Asclepias purpurascens*	--	S (S1)	N
Rock Goldenrod	*Solidago rupestris*	--	E (S1)	N
Sand Grape	*Vitis rupestris*	--	E (S1)	N
Sessile-fruited Arrowhead	*Sagittaria rigida*	--	E (S1)	N
Short-beaked Arrowhead	*Sagittaria brevirostra*	--	T (S1)	N
Short's Bladderpod	*Physaria globosa*	LE	E (S2)	N
Short's Rock-cress	*Boechera shortii*	--	S (S1S2)	N
Silky Dogwood	*Cornus obliqua*	--	S (S2)	N
Southern Prairie-dock	*Silphium pinnatifidum*	--	T (S2)	N
Spreading False-foxglove	*Aureolaria patula*	--	S (S3)	N
Sticky Hedge-hyssop	*Gratiola viscidula*	--	S (S1)	N
Swamp Lousewort*	*Pedicularis lanceolata**	--	S (S1S2)	N
Sweet Coneflower	*Rudbeckia subtomentosa*	--	T (S2)	N
Sweet-scented Indian-plantain	*Hasteola suaveolens*	--	S (S2)	N
White Water-buttercup	*Ranunculus aquatilis* var. *diffusus*	--	E (S1)	N
Yellow Water-crowfoot	*Ranunculus flabellaris*	--	T (S2)	N

Sources: TDEC 2016c, TVA 2017c and USFWS 2016c

[1] Federal Status Codes:

LE = Listed Endangered
LT = Listed Threatened; C = Candidate
XN = Non-essential experimental population in portion of range
-- = Not Listed by USFWS

[2] State Status Codes:

E = listed endangered S = species of special concern
T = listed threatened ** = rare, but not state listed
S-C = species of special concern, commercially exploited

[3] State Rank:

S1 = critically imperiled S2 = imperiled S3 = vulnerable S4 = apparently secure
SS = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)
Migratory Species may have separate ranks for different population segments (e.g. S1B, S2N, S4M);
SB = rank of breeding population SN = rank of non-breeding population

[4] Habitat Codes:

Y = Species has been documented in existing habitats in project areas and suitable habitat is present
N = No records of species within the vicinity and habitats within project areas do not overlap with species habitat requirements
P = Some habitats within the project areas are consistent with species recorded habitat preferences, no records of species in the vicinity
P (Limited) = Only habitats within selected areas of the proposed project areas are consistent with species recorded habitat preferences, no records of species in the vicinity

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

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

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

Henslow's sparrows utilize pastures and native grasslands with a preference for areas with tall grass species with a residual layer of dead vegetation (Reinking et al. 2000). This species has not been recorded within 3 miles of CUF. Based on the limited amount of herbaceous cover within the project area, it is unlikely that this species would be found therein.

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

Little blue herons can be found in wetland environments such as marshes, ponds, lakes, meadows, mudflats, lagoons, streams and other calm, shallow, freshwater habitats. They nest in trees and shrubs approximately 4 meters off the ground near freshwater. However, this species is primarily seen as a passing migrant in Tennessee (NatureServe 2015). The project area likely contains suitable habitat for the little blue heron in the wetland and open water areas; however, no known records occur within 3 miles of CUF.

Savannah sparrows utilize a wide range of vegetation types for nesting and foraging including tundra, coastal salt marshes, sedge bogs, grassy meadows, pasture, and cropland, although it is most commonly found in idle native and conservation reserve program lands. Generally, it avoids areas with high tree cover (NatureServe 2015). Because of the limited non-forested habitat, it is unlikely that the savannah sparrow would be found within the project area.

Swainson's warblers nest in areas with dense shrub vegetation. It is a very secretive bird and is infrequently observed. It is most commonly seen nesting in cane breaks, low floodplain forests, and rhododendron and mountain laurel thickets. Tennessee is within the breading range of the Swainson's warbler (NatureServe 2015). The forested area lacks a

dense shrub understory and it is unlikely that the Swainson's warbler would be found in the project area. Additionally, no known records occur within 3 miles of CUF.

Vesper sparrows are a ground nesting bird that utilize a variety of open habitats including prairies, pastures, fields, woodland clearings, and dry shrub lands. Tennessee is primarily in the migration and non-breeding resident range for vesper sparrows, however, there may be nesting birds in the state (NatureServe 2015). The TVA Natural Heritage Database has one record of vesper sparrows foraging at Lake Kyle, 12.7 miles from CUF. The project area has limited amounts of open herbaceous habitat. Consequently, it is unlikely that this species would be found within the project areas.

3.12.1.1.1.2 *Mammals*

Bats

Eastern small-footed bat is primarily found in hilly or mountainous forests. They forage over ponds and riparian areas, as well as in upland habitats such as open forests, clearings, strip mines, and ridgetops. Warm season roosts are generally in cracks and crevices of rocks along talus slopes or rocky outcroppings. They are also known to use manmade structures for warm season roosts. This species is known to return to the same warm season roosts annually. Winter hibernation occurs in caves or mine tunnels (NatureServe 2015). This species may be found foraging and roosting during summer in or near the existing ash impoundments and the forested areas of the proposed landfill. However, no records are known to occur within 3 miles of CUF.

Gray bats almost exclusively roost in large caves found in Alabama, Arkansas, Kentucky, Missouri, and Tennessee with some smaller populations found in nearby states. They are sometimes found roosting in mines or buildings (NatureServe 2016). The TVA database has seven records of gray bats in Stewart County. The closest record is 14.8 miles from CUF. Suitable roosting habitat for gray bats is not present within the proposed project areas because of a lack of caves. Low quality foraging habitat for this species may occur over open water areas associated with Wells Creek, the Cumberland River or ash impoundments. Bellamy Cave is within 8 miles of CUF and provides suitable winter habitat (hibernacula) for the gray bat (Brady et al. 1982). Hibernacula are assigned priority numbers primarily based on winter population sizes and to protect essential hibernation sites across the species' range. Bellamy Cave is assigned Priority 1 (highest priority) based on its current and/or historically observed winter population and stable microclimate.

The Indiana bat is listed as federally endangered by the USFWS (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). Indiana bats disperse from wintering caves to areas throughout the eastern United States. 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. Summer roosting habitat is represented by trees having snags, cavities or exfoliating bark. Use of living trees, especially species such as shagbark hickory, mature white oaks, and other trees with suitable roost characteristics near suitable snags, has also been documented. Multiple roost sites are generally selected. The availability of trees of a size and sun exposure are other another important limiting factors contributing to roost site suitability (Tuttle and Kennedy 2002, Harvey 2002, Kurta et al. 2002). A search of the TVA database indicates one record of Indiana bat within 21.1 miles of CUF. The forested areas within the landfill area and open areas over Wells Creek, the Cumberland River and the ash impoundments may provide suitable foraging habitat for this

species. Additionally, CUF is within known swarming area for Indiana bats that hibernate within Bellamy Cave in Montgomery County (USFWS 2015a). An acoustic survey conducted within the proposed landfill area indicated a high probability that some of the calls recorded during the survey were those of Indiana bats. However, no Indiana bats were captured during mist netting operations within the project area (ESI 2011). No active summer roost sites were identified within the project areas.

Northern long-eared bats are found in the United States from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, reaching into eastern Montana and Wyoming, and extending southward to parts of southern states from Georgia to Louisiana. Suitable winter habitat (hibernacula) includes underground caves and 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 greater than or equal to 3 inches). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats forage in upland and lowland woodlots, tree-lined corridors, and water surfaces, feeding on insects. In general, habitat use by northern long-eared bats is thought to be similar to that used by Indiana bats, although northern long-eared bats appear to be more opportunistic in selection of summer habitat (USFWS 2016a). A search of the TVA Natural Heritage Database in January 2017 indicates that a known hibernaculum for the northern long-eared bats occurs within 2.6 miles of CUF in Houston County. Therefore, CUF is considered swarming habitat for this species. One northern long-eared bat (adult reproductive male) was captured during a mist netting study in 2011, approximately 1.1 miles south of the landfill area in Houston County in a young lowland forest (ESI 2011).

In November 2016, an assessment was conducted to determine bat habitat suitability within forested areas of the proposed landfill limit of disturbance and the project areas associated with the impoundments and the Bottom Ash Dewatering Facility. Based on this survey, and the 2011 endangered bat survey described above, it was determined that the forested area and associated streams on the proposed landfill site may be utilized by Indiana, northern long-eared, and eastern small-footed bats for foraging habitat. These species may also utilize the proposed landfill area as summer roosting habitat; however, due to the scarcity of suitable roosting trees, it was determined that this habitat was of low quality for summer roosting. The open water areas of Wells Creek, the Cumberland River and the existing ash impoundments may provide foraging habitat for bats.

Other Mammals

American pygmy shrews are small primarily nocturnal rodents that can be found in a variety of moist habitats though they appear to prefer openings in boreal forests. They utilize burrows in or using soil, as well as fallen logs and debris (NatureServe 2015). Low quality habitat for this species may be found in the proposed landfill area, however there are no records within 3 miles of CUF.

Cinereus shrews are a medium sized burrowing shrew that can utilize a variety of habitats, however, there is evidence that it prefers damp forests. Nesting season can last from March-September. Nests are typically above ground in fallen logs or other debris (NatureServe 2015). Cinereus shrews may be found within the low-quality habitat of the proposed landfill project area, however there are no records within 3 miles of CUF.

Southeastern shrews are small burrowing shrews that utilize a variety of habitats. It seems to prefer moist habitats such as bogs and damp woods, however, this species has also been observed utilizing upland shrubby and wooded areas. Overall, the southeastern shrew prefers areas with dense ground cover (NatureServe 2015). This species may be found within low quality habitat of the proposed landfill project area, specifically within the small wetland region, however, there are no records within 3 miles of CUF.

Southern bog lemming is a small burrowing mammal that is most commonly found in wet habitat such as bogs, fens, riparian areas, and wetlands. Occasionally, southern bog lemmings may be found in upland areas, provided there is a thick, moist humus layer. This species is active throughout the day and night year-round (NatureServe 2015). The southern bog lemming may be found within the proposed landfill project area, specifically within the small wetland region, however, there are no records within 3 miles of CUF.

Meadow jumping mice are small soil burrowing mammals that breed from April to early September. This species utilizes moist lowland habitats, particularly areas with thick, low vegetation, and little canopy cover. Meadow jumping mice are usually nocturnal but may be seen in daylight. They hibernate from early fall to late spring (NatureServe 2015). Meadow jumping mice may be found within the proposed landfill project area, specifically within the small wetland region, however there are no records within 3 miles of CUF.

3.12.1.1.1.3 *Reptiles*

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

Copperbelly watersnakes rely on a matrix of shallow or floodplain wetlands surrounded by forest. They move from wetland to wetland while foraging and hibernate in forested wetlands or adjacent upland forests. Hibernation occurs from October to April (USFWS 2015b). The small wetland area within the limits of the proposed access road, may in part, support copperbelly watersnakes. The forested habitats, especially the small forested wetland area, within the landfill area may provide suitable habitat for hibernation. However, there are no records of this species within 3 miles of the project area.

Eastern slender glass lizards rely on sandy soil for burrowing and are primarily found in open areas such as grasslands, pastures, scrubby areas, right of ways, and fallow fields (U.S. National Park Service [NPS] 2017a; NatureServe 2015). Due to the limited amount of open herbaceous areas, it is unlikely that this species would be found in the project area.

Northern pinesnakes are egg laying snakes that breed in spring, with hatchlings emerging in late summer. Northern pinesnakes' preferred habitat is characterized by xeric, pine or pine-oak dominated woodlands with open understory and sandy soils for burrowing (NatureServe 2015). As no pine or pine oak dominated woodlands are within the project boundaries, it is unlikely that this species would be found within the proposed project areas for the landfill, dewatering site, or ash impoundment closures.

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

3.12.1.1.1.4 *Insects*

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

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

3.12.1.1.1.5 *Amphibian*

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

3.12.1.1.1.6 *Fish*

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

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

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

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

3.12.1.1.1.7 *Mollusks and Crustaceans*

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

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

Orangefoot pimpleback is a mussel found in medium to large rivers in sand, gravel, and cobble substrate in deep water with heavy currents (NatureServe 2015). There is no habitat for orangefoot pimpleback in the proposed project areas.

Ring pink is a mussel found in medium to large rivers usually near sand and gravel bars (NatureServe 2015). There is no habitat for ring pink in the proposed project areas.

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

Slabside pearly mussel is usually found in shallow waters of creeks to large rivers with moderate to swift currents (NatureServe 2015). There is no habitat for this species within the proposed project areas.

Tan riffle shell is a mussel found in creeks and medium rivers, usually in headwaters, riffles, shoals and in sand and gravel substrates (NatureServe 2015). There is no habitat for this species in the proposed project areas.

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

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

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

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

3.12.1.2 Plants

A review of the TVA Regional Natural Heritage database indicated that no state-listed or federally listed threatened or endangered plant species, or associated designated critical habitat are known to occur on or within 5 miles of CUF (TVA Natural Heritage Database 2016). Two federally listed plant species are known to exist in the surrounding counties, and an additional 49 species of plants listed by the TDEC as threatened, endangered, or species in need of management in Tennessee are known to occur within Stewart, Montgomery, and Houston counties (Table 3-16). Of these 51 species, one, the American Ginseng was observed during a field survey of the landfill site conducted in August 2017. Habitat requirements for each of these species, preferred habitat for each species, and the possibility of habitat within the project areas are addressed in Table 3-16.

Table 3-16. Habitat Requirements for Plant Species of Conservation Concern Within Surrounding Counties and within 5 Miles of CUF

Common Name	Habitat Requirements	Habitat within the Proposed Project Areas*
American Ginseng	Slopes of rich deciduous hardwood forest containing beech, maple, hickory, oak, basswood, and tulip poplar[1].	Y
Beak Grass	Lowland riparian or floodplain forests[2].	N
Bearded Rattlesnake-root	Sandy oak-hickory-pine woodlands, savannahs, prairies, and pine barrens[3].	N
Blue Mud-plantain	Shallow water or immersed at pond edges or roadside ditches[3].	N
Blue Sage	Dry prairies, oak cedar hills[4].	N
Bristly Sedge	Wetland dependent, streams, ponds, bogs, wet meadows. Often in shallow water or on woody debris[3].	N
Buffalo Clover	Sandy soils[4].	N
Buffalo Currant	Limestone bluffs[5].	N
Butternut	Rich woods of river terraces, dry rocky slopes[3].	N
Compass Plant	Prairies, both open and disturbed sites[3].	N
Cow-parsnip	Moist, partially shaded places[4].	P
Cream Wild-indigo	Prairies, open woods[4].	N
Creamflower Tick-trefoil	Prairies, old fields, roadsides, right of ways, mixed hardwood and temperate forests[6].	P
Earleaved False-foxglove	Barrens[1.]	N
Featherfoil	Pools, swamps, streams, quiet backwaters[3].	N
Fen Orchid	Moist ravines, bogs, fens, wet meadows, sand edges of lakes. May colonize open and disturbed habitat during reforestation[3].	N
Fraser's Loosestrife	Rich woods, open slopes[3].	N
Hair Grass	Areas of repeated disturbance. Found on dry/baked soils of prairies, gravels, and rocky slopes, edges of forests, wet bottomland woods and at marsh edges[6].	N
Hairy Hawkweed	Fields, prairies, roadsides[3].	N

Common Name	Habitat Requirements	Habitat within the Proposed Project Areas*
Lake Cress	Areas surrounding rivers such as oxbows, forested floodplains, pools, lake margins, slow moving streams, roadside sloughs, marshes[6].	N
Lamance Iris	Open moist woodlands[3].	N
Lance-like Spike-rush	Shores, stream beds, pine woods, disturbed places[3].	N
Limestone Blue Star	Wet woods, streambanks, gravel bars, and rocky streams on limestone habitat[6].	N
Maryland Milkwort	Sandy alluvial woods and disturbed areas[1].	N
Matted Spike-rush	Wetland areas, lake shores, tidal meadows, disturbed areas[3].	N
Missouri Gooseberry	Upland woods, thickets, prairie ravines, pastures[3].	P
Muskingum Sedge	Deciduous, lowland, wet, floodplain woods and thickets[3].	N
Naked-stem Sunflower	Open areas with sandy soil[7].	N
Nuttall's Waterweed	Aquatic plants, mostly calcareous lakes and rivers[3].	N
Ovate-leaved Arrowhead	Streams and lakes[3].	N
Ozark Downy Phlox	Rocky, dry, open woods, valleys, thickets, meadows, prairies, glades[5].	P
Pale False-foxglove	Open, wet to xeric, grassland communities[6].	N
Pale-purple Coneflower	Rocky prairies, open woodlands, glades[3].	N
Prairie Ragwort	Prairies, meadows, open woods, highways, railroads, and similarly disturbed areas. Usually over limestone[3].	N
Price's Potato-bean	Open rocky wooded slopes and floodplain edges[6].	N
Purple Milkweed	Dry-moist, open woods, ridgetops, thickets, glades, prairie openings, streambanks, wet meadows[5].	N
Rock Goldenrod	Riverbanks[3].	N
Sand Grape	Gravelly banks, river bottoms, stream beds, washed, usually on calcareous soils[3].	N
Sessile-fruited Arrowhead	Calcareous or brackish shallow water, shores of ponds, swamps and rivers[3].	N
Short-beaked Arrowhead	Ponds, lakes[6].	N
Short's Bladderpod	Open rocky areas, talus, ledges, and open cedar glades[3].	N
Short's Rock-cress	Bluffs, rock ledges, wooded slopes, floodplains[3].	N
Silky Dogwood	Alluvial woods, river, stream banks, wet meadows, marshes, ditches[3].	N
Southern Prairie-dock	Usually over limestone parent material in open barrens, glades, and prairies[6].	N
Spreading False-foxglove	Steep limestone bluffs in open mixed hardwood forests. Parasitic on oak roots[6].	N
Sticky Hedge-hyssop	Wet Barrens and Marshes[1].	N
Swamp Lousewort	Wet meadows with limestone soils[4].	N

Common Name	Habitat Requirements	Habitat within the Proposed Project Areas*
Sweet Coneflower	Prairies, stream banks, woodland openings[3].	N
Sweet-Scented Indian-plantain	Rich woods, wet shaded areas bordering streams[3].	N
White Water-buttercup	Ponds, lakes, streams, ditches, edges of rivers[3].	N
Yellow Water-crowfoot	Shallow water or drying mud[3].	N

Sources:
[1] TDEC 2017a
[2] Michigan Natural Features Inventory (O'Conner and Penskar 2004)
[3] Flora of North America Editorial Committee 1993
[4] NPIN 2013
[5] Missouri Botanical Garden
[6] NatureServe 2015
[7] Hilty, J. Illinois Wildflowers 2016
*Habitat Codes:
Y = Species has been documented in existing habitats in project areas and suitable habitat is present
N = No records of species within the vicinity and habitats within project areas do not overlap with species habitat requirements
P = Some habitats within the project areas are consistent with species recorded habitat preferences, no records of species in the vicinity.

American ginseng is a state-listed Species of Special Concern-Commercially Exploited. Special Concern Species means any species or subspecies of plant which is uncommon in Tennessee, or has unique or highly specific requirements or scientific value and therefore requires careful monitoring of its status. The plant is considered Commercially Exploited, due to large numbers being taken from the wild and propagation or cultivation insufficient to meet market demand.

As shown in Table 3-16, several species associated with forested areas are considered to have potentially suitable habitat present within the proposed landfill area. However, because the proposed onsite landfill project area consists of previously logged areas and second growth hardwood forest that generally lack specialized habitats (rich mesic woodlands, bluffs, rock ledges, glades, etc.) the potential for occurrence within the proposed landfill project area is considered to be low. Notably, only one of these species have been observed within CUF to date, and only the swamp lousewort has been observed within 3 miles of the plant site.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not construct a new CCR disposal site and would continue current plant operations at CUF. Therefore, no new work would be conducted that could potentially alter project-related environmental conditions within the project area. Therefore, no impacts to threatened or endangered species, or species of conservation concern or any suitable habitat would occur under this alternative.

3.12.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed dewatering facility would be constructed on a site that is heavily disturbed and largely comprised of fill material from past and present CUF operations. The site is unsuitable for the species listed in Table 3-16. Suitable habitat for federally listed aquatic species does not occur within the project area; therefore, direct impacts to state-listed or federally listed threatened and endangered aquatic species are would not occur with implementation of the Bottom Ash Dewatering Facility. Additionally, because water discharges would continue to be routed through the permitted outfall and would meet existing NPDES permit requirements, and because NPDES requirements are designed to be protective of aquatic life in receiving waters, indirect impacts to listed fish and shellfish species near CUF are not anticipated. Construction and operation of the proposed Bottom Ash Dewatering Facility would have no effect on any species of conservation concern or their associated habitat. Gray bat, Indiana bat and northern long-eared bat are known to use unconventional roosts. If construction of the Bottom Ash Dewatering Facility were to require the demolition of structures that could potentially be considered suitable unconventional bat roosts, a survey would be conducted of the structures prior to demolition.

No tree clearing would occur as a product of the ash impoundment closure activities. A reduction in low quality foraging habitat would occur as the impoundments provide limited foraging for water birds such as the little blue heron. Similarly, these areas provide limited amount of foraging habitat for bats. Therefore, this alternative would reduce foraging area for bats. However, higher quality foraging habitat is available for birds and bats in adjacent areas such as Wells Creek and the Cumberland River. Because the limits of disturbance for closure activities are limited to the current impoundment footprints, except for highly disturbed areas designated as temporary use areas, no suitable habitat for plant or terrestrial threatened or endangered species would be impacted. Additionally, CCR impoundment dewatering activities may temporarily increase flow to Wells Creek and the Cumberland River. Aquatic biota may be temporarily displaced due to increased flows, but would quickly repopulate following dewatering of the ash impoundment.

Any construction activities would adhere to permit limit requirements and would utilize BMPs as described in TVA's guide for environmental and best management practices to minimize indirect effects on aquatic resources during the construction phase (TVA 2017a). Because any discharges associated with would meet existing NPDES permit requirements, and because NPDES requirements are designed to be protective of aquatic life in receiving waters, indirect impacts to listed fish and shellfish species near CUF are not anticipated. CCR from the Stilling Impoundment and a portion of the CCR from the Main Ash Impoundment would be removed and transported to an existing offsite landfill. There would

be no additional direct impacts to threatened or endangered species and their associated habitats as a result of ash impoundment closure actions.

The area within the limits of disturbance for the proposed landfill may provide low quality habitat for 17 of the wildlife species of conservation concern listed in Table 3-15, however, none of these species are known to occur within the project area. Only the bald eagle and northern long-eared bat have been observed within 3 miles of CUF. During construction and operation of the landfill, mobile species would be able to move to the abundant similar habitat surrounding the project area. For example, the nearby Cross Creek National Wildlife Refuge may provide high quality habitat for some of listed species. Less mobile species would be impacted during the construction and operation of the proposed projects. However, no listed species are known to occur within the limits of the proposed project areas. Therefore, the potential for direct impacts is considered very low. It is not expected that the proposed landfill project site would provide habitat for listed species after construction and operation are underway.

Bat mist netting studies (ESI 2011) and a site survey conducted in November 2016 have determined that the forested area within the proposed landfill project area is of low summer roosting quality for threatened and endangered bats, and it may also be used as a foraging area. The proposed action includes the removal of approximately 174 acres of forest. As part of TVA's ESA programmatic biological assessment for bats, TVA programmatically quantified and minimized removal of potentially suitable summer roosting habitat during time of potential occupancy by Indiana bat and northern long-eared bat. The project area occurs within 5 miles of a documented northern long-eared bat hibernacula. Accordingly, TVA will track and document removal of potentially suitable summer roost trees and include in annual reporting in accordance with Section 7(a)(2) consultation. Additionally, if removal of suitable bat roost tree habitat needs to be removed when bats may be present on the landscape, TVA would set aside funding to be applied towards future bat-specific conservation projects. TVA currently plans to conduct the majority (at least 134 acres) of tree removal between November 15 and March 31, when Indiana and northern long-eared bats are not on the landscape. At most, 40 acres of tree removal would occur between August 1 and November 15. No tree removal would occur between June 1 and July 31 to avoid any potential direct impact to juvenile bats at a time when they are unable to fly.

A number of activities associated with the proposed action, including tree clearing, were addressed in TVA's programmatic biological assessment on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) (TVA 2017d). For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. Therefore, direct and indirect impacts to federally listed bat species are expected to be minor. These activities and associated conservation measures are identified in Appendix E.

A total of 51 federally or state-listed plant species known to occur within the counties surrounding CUF. However, based on the characteristics of the potentially affected habitats, four species are considered to have habitat requirements that are overlapping with those of the project areas. Only swamp lousewort, a state sensitive species, has been recorded within 5 miles of CUF. In general, the forested habitats within the proposed landfill project area are characterized as previously logged areas and second growth hardwood forest that generally lack specialized habitats (rich mesic woodlands, bluffs, rock ledges, glades, etc.). As such they are not known to be of high quality and the potential occurrence of these five species is considered to be low.

The federally threatened Price's potato-bean has been recorded in Stewart County. Surveys for this species were conducted by a competent botanist within all project areas in August 2017. No individuals of this species were found within the areas surveyed. Therefore, no impacts to Price's potato-bean would occur for any of the proposed actions.

American ginseng is one of many plant and animal species protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora of 1973, an international trade agreement which regulates harvest and export of this species. As a result, American Ginseng is protected from over-harvesting and not due to habitat loss.

The habitat within the proposed project areas at CUF ranges from unsuitable to low quality for state threatened and endangered plant species. No state-listed species are known to occur within the project areas as there have been no records to date. Implementation of this alternative would result in the loss of approximately 174 acres of relatively low quality forested habitat. For these reasons, impacts to threatened and endangered species is expected to be minor under Alternative B.

The proposed actions would not impact Cumberland River or Wells Creek aquatic habitats. Stream tributaries within the proposed landfill project area are unsuitable for occupation by the blue sucker and as noted in Section 3.11 a 2011 mussel survey on the Cumberland River and Wells Creek near CUF found low abundances of a small number of relatively common mussel species. None of the listed mussel species was found proximate to the proposed project areas. Construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources during the construction phase. Therefore, indirect impacts to federally or state-listed aquatic species are not expected as a result of TVA actions.

3.12.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility, and proposed landfill would be the same as identified under Alternative B. The ash impoundment closure would be similar to Alternative B, however, CCR removed from the impoundments would be transported to the existing onsite landfill for long-term storage rather than transported offsite to the existing permitted landfill. The existing onsite landfill is highly disturbed and provides no habitat for threatened and endangered species, therefore there would be no additional impact.

3.12.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under this alternative, impacts associated with implementation of the Bottom Ash Dewatering Facility would be to the same as Alternatives B and C. Impacts associated with ash impoundment closure would be the same as identified under Alternative B. However, under this alternative, the proposed landfill would not be constructed and all future CCR generated at CUF would be transported offsite to an existing, permitted landfill. Therefore, because the habitat in the areas associated with the Bottom Ash Dewatering Facility and ash impoundment closures are of poor quality for use by threatened and endangered species, overall impacts under Alternative D would be minor, and less than Alternatives B and C.

3.12.3 Summary of Impacts of Threatened and Endangered Species

The habitat within the proposed project areas at CUF ranges from unsuitable to low quality for threatened and endangered species. No listed species are known to occur within the project areas. A summary of impacts to threatened and endangered species is provided in Table 3-17.

Table 3-17. Summary of Impacts to Threatened and Endangered Species

Project	Impact	Severity
Bottom Ash Dewatering Facility	No direct impacts to threatened or endangered species. Potential indirect impacts to bats due to light and noise disturbance.	Negligible impact due to implementation of conservation measures identified in the TVAs programmatic biological assessment on routine actions and federally listed bats.
Ash Impoundment Closure	No direct impacts to threatened or endangered species. Potential indirect impacts to bats due to light and noise disturbance.	Negligible impact due to implementation of conservation measures identified in TVA's programmatic biological assessment on routine actions and federally listed bats.
Landfill		
Onsite Landfill	Removal of 173.7 acres of forested habitat. Site is of low roosting quality for threatened and endangered bats, and may be used as a foraging area.	Minor impact.
Offsite Landfill	No direct or indirect impacts to threatened or endangered species. Potential indirect impacts to bats associated with noise and vibration during loading and transport of CCR.	Negligible impact due to implementation of conservation measures identified in TVA's programmatic biological assessment on routine actions and federally listed bats.

3.13 Wetlands

3.13.1 Affected Environment

The USACE regulates the discharge of fill material into waters of the United States, including wetlands, pursuant to Section 404 of the CWA (33 USC 1344). Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands and to preserve and enhance their natural and beneficial values.

As defined in Section 404 of the CWA, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands and wetland fringe areas can also be found along the edges of

many watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits including flood storage, erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

CUF is located within the Western Highland Rim subdivision of the Interior Plateau Ecoregion which is characterized by dissected, rolling terrain of open hills, with elevations of 400 to 1,000 feet (Griffith et al. 2001). Natural vegetation includes mostly oak-hickory forests with some areas of bluestem prairie and cedar glades.

Wetlands identified on National Wetland Inventory (NWI) maps within the project areas include a total of 148 acres of freshwater ponds and lakes (including man-made impoundments), and 2.9 acres of riverine wetland systems (streams). Wetlands were delineated within the project areas in August 2014 and confirmed in December 2016 (Amec Foster Wheeler 2017). Potential jurisdictional wetlands were evaluated in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) The field survey identified a total 0.5 acre of forested wetland, 4,111 linear feet of wet weather conveyances and 4,785 linear feet of streams within the landfill disturbance area (Table 3-18).

Table 3-18. Summary of Wetland Features Identified within the Proposed Project Areas

Feature Type	Dewatering Facility Area[1]	Ash Impoundment Closure Areas[2]	Temporary Use Areas[3]	Landfill Area[4]	Total
NWI Mapped					
Lake (acres)	--	39.4	108.6	--	148.0
Riverine (acres)	--	--	0.1	2.8	2.9
Forested/Shrub Wetland (acres)	--	--	--	--	
Total	**0.0**	**39.4**	**108.7 ac**	**2.8 ac**	**150.9**
Field Delineated					
Stream (perennial and intermittent) (feet)	--	--	--	4,785	
Wet Weather Conveyance (feet)	--	--	--	4,111	
Forested/Shrub Wetland (acres)	--	--	--	0.5	
Total	**0.0**	**0.0**	**0.0**	**0.5 acres/ 8,896 feet**	

[1] Includes dewatering facility project area
[2] Includes Main Ash Impoundment, Bottom Ash Impoundment and North Ditch limits of disturbance.
[3] Includes temporary use areas utilized as part of proposed project activities including portions of the Fly Ash Stack and
Gypsum Stack areas
[4] Includes the landfill and access road limits of disturbance.

Source: NWI and Amec Foster Wheeler 2017

Most of the NWI mapped wetland acreage is associated with the ash impoundments and fly ash and gypsum stacks. However, waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA are not considered to be jurisdictional. Other non-jurisdictional wetland and open water features located within the limits of the ash impoundments are part of the CUF treatment system, and would therefore not be regulated as jurisdictional wetlands under Section 404 of the CWA.

Land use/land cover data shows that wetlands comprise less than 1 percent of the land use within the CUF property and approximately 2.5 percent (2,207 acres of emergent herbaceous and woody wetlands) of the lands within the surrounding 5-mile radius (see Table 3-8).

As shown on Table 3-19, the field delineation identified a total of 0.5 acre of wetlands located within the project area defined for the landfill. The wetlands are located in the far northern end of the project area near the intersection with Old Scott Road. Also, 4,785 linear feet of streams and 4,111 linear feet of wet weather conveyances were identified within the project area defined for the proposed landfill and haul road. These areas are shown on Figures 3-5 and 3-7. The USACE performed a jurisdictional determination to indicate wetlands and stream features that would require mitigation during the Section 404 permitting process.

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change in the management of CCR produced at CUF. As a result, no new work would be conducted that could potentially alter project-related environmental conditions within the project area. Therefore, there would be no impacts to wetland resources with this alternative.

3.13.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed Bottom Ash Dewatering Facility would be constructed within a previously disturbed site with no wetland resources identified. Therefore, there would be no impacts to wetlands from activities related to this project.

Ash impoundments and manmade drainage features within the existing plant boundary are not considered jurisdictional. Due to the location and composition of these wetlands they do not provide the surrounding watershed with any significant wetland functions such as flood abatement, nutrient or sediment retention, or high quality wildlife habitat. Therefore, impacts to these wetlands would be considered minor and would be mitigated by appropriate compensation in accordance with permit requirements.

Indirect impacts to nearby jurisdictional or non-jurisdictional wetlands outside the project area 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 impoundments primarily receive their hydrology via diffuse surface flow and direct precipitation. The dewatering and modification of hydrology from the CCR impoundments is expected to have a negligible effect on these wetlands.

All CCR excavated from the impoundments under the proposed combination of in-place and by-removal closure of the Main Ash Impoundment and Stilling Impoundment and under the Closure-by-Removal option for all of the impoundments, would be excavated and transported to the Bi-County Solid Waste Management Landfill. Because this is an existing permitted landfill, there would be no changes from the existing environment within the landfill boundaries under this closure option. The haul route to the landfill would utilize previously constructed roads which are already subjected to vehicular traffic and no new roads would need to be constructed. Therefore, there would be no impact to wetlands because of transporting existing CCR to the offsite landfill.

Construction, operation and maintenance of the proposed onsite landfill would result in a direct loss of 0.5 acre of jurisdictional forested wetlands. However, effects of wetland and stream impacts at the landfill site would be minor when viewed in the context of the 2,033.3 acres of forested wetland resources and a total of 2,206.9 acres of all wetland resources (forested and emergent) within the surrounding 5-mile region. Unavoidable direct impacts to wetlands would be mitigated as required by both state and federal agencies in accordance with the Tennessee Water Quality Control Act and Section 404 of the CWA. Therefore, development of the proposed landfill would be consistent with EO 11990.

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

3.13.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR

Under this alternative, impacts associated with construction and operation of the Bottom Ash Dewatering Facility, impoundment closure, and onsite landfill construction would be the same as identified under Alternative B. However, under Alternative C, existing CCR from the impoundments would be excavated transported to the existing onsite landfill rather than being transported to an offsite landfill. Since there are no jurisdictional wetland resources located in these areas, there would be no change in the impacts associated with this alternative beyond what was identified for Alternative B.

3.13.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future Ash

Under this alternative, impacts associated with construction and operation of the Bottom Ash Dewatering Facility are expected to be of the same as Alternatives B and C, and to the same as Alternative B for the ash impoundment closure (both Closure-by-Removal and Closure-in-Place options). However, under Alternative D, future ash would be transported to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage. Therefore, the onsite landfill would not be constructed, thus eliminating the impacts identified for this action. As described for Alternative B, there would be no impact to wetlands from the transportation of CCR material to the offsite landfill. Therefore, there would be no impacts to wetland resources under Alternative D.

3.13.3 Summary of Wetland Impacts

Wetland impacts associated with implementation of the proposed projects are summarized in Table 3-19. Wetland impacts would be minimal when viewed in the context of wetland resources within the surrounding 5 miles, impacting less than 0.1 percent of wetlands within the region. In terms of EO 11990, there is no practicable alternative that would avoid impacting such wetlands given the operational constraints associated with the proposed projects. Such unavoidable direct impacts to wetlands would be mitigated as required by both state and federal agencies in accordance with Section 404 of the CWA.

Table 3-19. Summary of Impacts to Wetlands

Project	Impact	Severity
Bottom Ash Dewatering Facility	None.	No impact.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	None.	No impact.
Landfill	Impacts associated with construction including soil/vegetation disturbing activities and the placement of fill. No practicable alternative to the loss of 0.5 acre of wetlands determined to be jurisdictional under Section 404 of the CWA.	Minor.

3.14 Solid and Hazardous Waste

3.14.1 Affected Environment

3.14.1.1 Solid Waste

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

Under TDEC Rule 0400-11-.01-.01, special wastes include sludges, bulky wastes, pesticide wastes, industrial wastes, combustion wastes, friable asbestos and certain hazardous wastes exempted from RCRA Subtitle C requirements.

The primary solid wastes that result from the operation of CUF are collectively known as CCR. The primary CCR waste streams at CUF are fly ash, bottom ash and gypsum. TVA has historically managed storage of CCR materials generated at CUF in a combination of onsite dry stacks, wet stacks, and impoundments.

When generating at full capacity, CUF consumes approximately an average of 5.6 million tons of coal annually and produces approximately 1 million tons of CCR a year. The projected average annual CCR production rates at CUF are provided in Table 3-20.

Table 3-20. Summary of Projected Average Annual CCR Production at CUF

Waste Materials	Tons/Year	Tons/Day	Yd^3/Year	Yd^3/Day
Fly Ash	282,000	773	222,200	609
Bottom Ash	70,000	192	54,600	150
Gypsum	629,000	1,723	452,400	1,240
Total	981,000	2,688	729,200	1,999

Fly ash and boiler slag are comprised of the noncombustible particles or components in coal. Both fly ash and bottom ash are composed primarily of silica, aluminum oxide and iron oxide. These waste streams also contain a variety of heavy metals at limited concentrations including arsenic, cadmium, chromium, copper, lead, mercury and selenium. In Tennessee, CCR are regulated as special wastes that require special waste approval for the wastes to be disposed of at a landfill specifically permitted to receive those types of wastes (Class I or II disposal facility).

Demolition and construction debris would be generated during the demolition of the metal buildings, footings, asphalt, etc. to allow for the construction of the new dewatering facilities. The facilities would be inspected for regulated materials (asbestos, lead paint, etc.) and would be properly abated prior to demolition. These wastes, if generated, would be disposed as required by state and federal regulations. Remaining demolition debris would be disposed offsite.

3.14.1.2 Hazardous Waste

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

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

RCRA regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for management and disposal of hazardous wastes. Subtitle C of RCRA includes separate, less stringent regulations for certain potential hazardous wastes. Used oil, for example, is regulated as hazardous waste if it is disposed of, but is separately regulated if it is recycled. Specific requirements are provided under RCRA for generators, transporters, processors and burners of used oil that are recycled. Universal wastes are a

subset of hazardous wastes that are widely generated. Universal wastes include batteries, lamps and high intensity lights and mercury thermostats. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions.

CUF is considered a small quantity generator of hazardous waste by TDEC. The primary hazardous wastes currently generated include small quantities of waste paint, waste paint solvents, paper insulated lead cable, mercury contaminated debris, debris from sandblasting and scraping, paint chips, solvent rags due to cleaning electric generating equipment, Coulomat (used to remove moisture from oil) and liquid-filled fuses.

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no change to the management of CCR at CUF would occur as long as capacity is available. In the long-term, however, once capacity to manage CCR produced at CUF is exceeded, plant operations would be impacted as there would be no option for storage of CCR produced at CUF and therefore theoretically, the amount of solid wastes produced at CUF would decrease. However, as CUF is one of the coal plants that TVA plans to continue operating in the future, this alternative is not consistent with the project purpose and need.

3.14.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.14.2.2.1 Bottom Ash Dewatering Facility

Construction of the dewatering facility would entail site preparation and construction activities that would generate typical construction debris and small volumes of solid waste as summarized below:

- Paper, wood, glass, and plastics would be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers during project construction.
- Scrap metal would result from welding, cutting, framing and finishing operations, electrical wiring, disposal of packing materials and empty nonhazardous chemical containers.
- A limited amount of soils would result from grading and excavation related to foundation construction.

Construction waste and debris would be placed in roll-offs and disposed of at a permitted offsite construction and demolition landfill. TVA would manage all solid wastes generated from construction of the proposed facility in accordance with applicable state regulations and following procedures outlined in TVA's current Environmental Procedures and applicable BMPs. Any soils generated due to grading or excavation would be managed onsite.

A small amount of landscaping wastes would also result from grubbing and land clearing operations. These landscaping wastes may be disposed onsite through open burning or

sent offsite for disposal. TVA would adhere to all appropriate state and county regulatory requirements if burning of landscape waste is conducted.

Hazardous waste generated during site preparation and construction may include limited quantities of fuels, lubricating oils, solvents, paints, adhesives, welding material, and other hazardous materials. Appropriate spill prevention, containment, and disposal requirements for hazardous materials would be implemented to protect construction and plant workers, the public, and the environment. A permitted third-party waste disposal facility would be used for ultimate disposal of the wastes.

3.14.2.2.1.1 *Operation Impacts*

CCR generation depends mainly on the amount and type of coal burned rather than the methods for handling these products; therefore, CCR production rates would not change from existing conditions due to implementation of Alternative B.

Limited quantities of used oils would be generated during operation of the proposed dewatering facilities from vacuum pumps, liquid and slurry transfer pumps, gear boxes, compressors and other machinery. Hydraulic oils may also be generated from components of the dewatering facility and associated equipment. These types of used oil are currently generated by CUF, and the increase in generation rate of these wastes is not expected to be significant. Used oil is recycled in accordance with applicable regulations and TVA's procedures.

Hazardous waste streams that are likely to be generated during the operation of the dewatering facility are maintenance-related and include adhesives, paints, paint chips, degreasing solvents, absorbents, oily and solvent contaminated rags, sandblasting wastes, and abrasive wastes. Only a limited increase in hazardous waste generation is expected to occur from operation of the dewatering facility, and CUF is not expected to change generator status from small quantity generator.

The transport, handling, storage, use, and disposal of hazardous materials would follow federal, state and TVA requirements. Hazardous materials would be handled in limited quantities, and there is very limited potential for significant impacts related to their handling.

Operation of the dewatering facilities would also generate limited quantities of universal wastes (mercury-containing relays and other mercury-containing devices, batteries and lamps). Although a limited increase in the quantities of these wastes that are generated at CUF would occur from operation of the dewatering facilities, CUF is expected to remain a small quantity handler of universal waste. These wastes would continue to be managed in accordance with RCRA requirements and TVA BMPs.

3.14.2.2.1.2 *Ash Impoundment Closure*

As identified in the PEIS (TVA 2016b), the primary waste stream resulting from the proposed impoundment closures (either Closure-in-Place or Closure-by-Removal) would be solid nonhazardous waste. The primary solid nonhazardous wastes generated are summarized below:

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

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

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

Under the Combination of Closure-in-Place and Closure-by-Removal option, a portion of the CCR in the Main Ash Impoundment (approximately 245,700 yd^3) and 180,000 yd^3 of CCR from the Stilling Impoundment would be transported to the existing onsite landfill or offsite to a permitted disposal facility. This would have a negligible impact on the long-term capacity of this facility. Storage of existing CCR in the existing onsite facility would decrease the capacity of the landfill. This impact would be minor; however, as future CCR generated at CUF would be disposed in the proposed onsite landfill.

Under the Combination of Closure-in-Place and Closure-by-Removal option for the Main Ash Impoundment and Stilling Impoundment and the Closure-by-Removal option for all impoundments, TVA would excavate and relocate the CCR from ash impoundments to existing offsite facilities. OSHA requirements for workers engaged in excavation activities would be applied. Transport of CCR would be managed under the requirements set forth under RCRA Subtitle D and in accordance with pertinent state and local requirements and impacts to solid waste and hazardous waste generation are not significant. CCR transported to the existing landfill would have a negligible impact on the long-term capacity of this facility.

3.14.2.2.2 Onsite Landfill

3.14.2.2.2.1 *Construction Impacts*

Construction of an onsite landfill would require site preparation which would include vegetation removal over the 173.7-acre site, excavation, re-compaction of subgrade over the 81.4-acre landfill footprint, and installation of an approved liner and cover system.

The primary wastes resulting from these activities are:

- Landscaping/vegetative waste
- Construction waste and debris

Landscaping wastes would result from grubbing land clearing and grading necessary to construct the landfill and support areas. Some of the wood from the forested areas (approximately 174 acres) is harvestable but a portion of the wood, mainly stumpage, is considered economically unusable due to difficulties and costs associated with grinding. As discussed previously, these materials may be disposed offsite or onsite through open burning, done in accordance with appropriate local and state regulations.

Construction waste and debris, such as paper, wood, and plastics would be generated during landfill construction. This construction waste would be placed in roll-offs and disposed of at a permitted offsite construction and demolition landfill.

In addition to these nonhazardous waste streams, limited quantities of hazardous solvents, paints and adhesives, spill absorbent, oil and solvent contaminated rags and empty containers would be generated. Additionally, there is the potential for spills or releases of fuels, coolants, oils and hydraulic fluids from construction machinery. These waste streams would be generated in very limited quantities. As described for dewatering facility construction and impoundment closure construction activities, TVA would manage all solid and hazardous wastes generated from construction activities in accordance with federal, state and local requirements.

3.14.2.2.2.2 *Operation Impacts*

Operation of the landfill would not change the quantity of CCR wastes generated at CUF annually. However, implementation of this alternative would result in a long-term change in the management of CCR as all material would be stored in an onsite landfill. This would be a positive impact as CCR management would be in accordance with TVA goals related to long-term management of CCR.

Other solid waste streams associated with operation of the proposed landfill would be limited in quantity. Periodic clean-out of the proposed storm water ponds would result in soils and vegetative wastes. Clean-out of the storm water ponds is likely to occur only once or twice over the lifespan of the proposed landfill. Each cleanout event would generate a waste volume of approximately 30 to 50 percent of the combined capacities of the impoundments. These wastes would be disposed of onsite or offsite at a landfill.

The largest solid waste stream that would be routinely generated from operation of the proposed landfill is leachate sludge from the leachate storage impoundments. The proposed design provides for leachate storage impoundments. The leachate sludge would be periodically removed from the leachate storage impoundments and managed in the onsite landfill.

Other solid wastes that would be generated from operation of the proposed landfill include paper and plastics from packaging of maintenance-related materials, small quantities of oils and fuels from spills, small quantities of paints, adhesives, etc. from maintenance. Pumps, valves and controls associated with the leachate management system would require replacement during operations.

Various hazardous wastes, such as used oils, hydraulic fluids and engine coolants could be produced during landfill operations. These hazardous wastes would be managed similarly to hazardous wastes generated during operations at the dewatering facilities.

At some point in the future, the landfill would implement closure activities following an approved closure plan. Construction type wastes would be generated during preparation and installation of the final cover. These solid and hazardous wastes would be similar to those generated during impoundment closure activities. TVA would manage all waste generated during landfill closure in accordance pertinent federal, state and local requirements.

After the landfill is closed, post-closure care would generate vegetative debris and soils from maintenance of drainage swales and storm water basins and sludge from the leachate storage impoundments. Other small volume solid waste streams could be generated during post-closure care such as lubricating oils and filters from construction equipment and pumps associated with leachate collection system, small quantities of oils and fuels from

spills or leaks, and small quantities of paints and other wastes from maintenance. TVA would manage these wastes in accordance with standard procedures for spill prevention and cleanup and waste management protocols. Wastes generated by construction activities would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements. Hazardous waste streams generated from operation of the Bottom Ash Dewatering Facility would be limited and would not change the status of CUF from a small quantity generator. Therefore, impacts associated with generation of solid and hazardous waste would be minor. However, there would be a long-term minor beneficial impact associated with the change in management of solid wastes produced at CUF as all CCR would be disposed in a dry manner in a new CCR landfill.

3.14.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR

Under this alternative, solid and hazardous waste impacts associated with construction and operation of the Bottom Ash Dewatering Facility, closure of the ash impoundments, and landfill construction and operation would be the same as described for Alternative B. However, all CCR from the impoundment closures at CUF would be transported to the existing onsite landfill. The haul route to the existing landfill would use roads that are already subjected to vehicular traffic and no new roads would need to be constructed and, therefore, no additional construction-related solid or hazardous waste would be generated.

Under the Combination Closure-by-Removal option, approximately 1.3 million yd^3 of CCR in the Main Ash Impoundment and Stilling Impoundment, and 334,000 yd^3 of CCR from the Bottom Ash Impoundment would transported to the existing onsite landfill. Therefore, this alternative would have minor impact on the existing permitted capacity remaining in these facilities.

Under the Closure-by-Removal option, approximately 1.3 million yd^3 of CCR in the Main Ash Impoundment/Stilling Impoundment, and 334,000 yd^3 of CCR from the Bottom Ash Impoundment maybe transported to the existing onsite landfill. Therefore, this alternative would decrease the capacity of the existing landfill. This impact would be minor, yet greater than the Closure-in-Place option..

3.14.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future Ash

Under this alternative, solid and hazardous waste impacts associated with construction and operation of the Bottom Ash Dewatering Facility would be the same as Alternatives B and C and the same as Alternative B for closure of the ash impoundments.

For Alternative D future CCR produced at CUF would be transported to an existing offsite permitted landfill (Bi-County Solid Waste Management Landfill) and not be disposed of onsite; therefore, solid and hazardous wastes associated with construction and operation of the landfill would not occur.

The haul route to the Bi-County Solid Waste Management Landfill would use roads that are already subjected to vehicular traffic and no new roads would need to be constructed.

Operation of Alternative D would not change the quantity of CCR wastes generated annually by CUF. However, this alternative would result in solid waste disposal that would affect the lifespan of the Bi-County Solid Waste Management Landfill and its long-term ability to meet disposal needs of the region. As of this writing, the Bi-County Solid Waste Management Landfill has approximately 70 years of capacity (Bi-County Solid Waste Management Landfill, personal communication, December 2016). If CCR from CUF were stored at this landfill, its long-term capacity would be reduced.

Relative to current generation rates, the quantity of equipment maintenance-related solid and hazardous wastes would increase under Alternative D. These wastes include used lubricating oil, used hydraulic fluids, coolants, oily sorbents and rags, waste fuel, batteries and lamps. Due to the greater number of vehicles needed to transport CCR daily to an offsite landfill, quantities of these materials generated under this alternative would be greater than Alternatives B and C.

All waste generated due to the transport of CCR to the offsite landfill would be handled in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

3.14.3 Summary of Impacts Related to Solid and Hazardous Waste

Wastes generated by construction activities would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements. Hazardous waste streams generated from operation of the dewatering facility would be limited and would not change the status of CUF from a small quantity generator. Therefore, impacts associated with generation of solid and hazardous waste would be minor. Impacts to solid and hazardous waste associated with implementation of the proposed projects is summarized in Table 3-21.

Table 3-21. Summary of Impacts Related to Solid and Hazardous Waste

Project	Impact	Severity
Bottom Ash Dewatering Facility Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Small volumes of nonhazardous construction waste and hazardous wastes would be generated from site preparation and construction activities. TVA would manage all waste handled in accordance with TVA's current Environmental Procedures as well as complying with applicable federal and state management requirements.	Minor impact.
Landfill		
Onsite Landfill	Limited quantities of nonhazardous solid wastes and hazardous wastes generated during operation, closure and post closure care. Wastes would be managed in accordance with applicable federal and state requirements. Change in management of solid wastes produced at CUF as all CCR would be disposed in a dry manner in a new CCR landfill.	Minor impact. Long-term positive impact.
Offsite Landfill	Solid and Hazardous waste generated by maintenance of equipment used to transport CCR to the offsite landfill. As all waste would be handled in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements. Potential loss of disposal capacity.	Minor impact. Potential long-term negative impact due to reduction in the disposal capacity of the offsite landfill.

3.15 Visual Resources

3.15.1 Affected Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 3.16.

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

Scenic visibility of a landscape may be described in terms of three distance contexts: (1) foreground, (2) middleground and (3) background. In the foreground, an area within 0.5-mile of the observer, individual details of specific objects are important and easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, object characteristics are distinguishable but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the project areas within the CUF facility that encompasses both permanent and temporary impact areas, as well as the physical and natural features of the landscape. Parts of the CUF property are devoid of vegetation and most of it has been heavily disturbed by previous industrial activities. The most dominant visual components of the CUF facility include the older 1,000-foot high emissions stacks and the newer 635-foot high stacks, cooling towers, and connecting transmission lines. Other major visual components of the large-scale industrial site include the powerhouse buildings, emission control buildings and ducts, and the coal pile and coal handling facilities.

The proposed onsite landfill site is located on the southwestern portion of CUF property and is currently forested and undeveloped. Topography within the proposed landfill site consists of relatively steep ridges and valleys. The site exhibits as much as 190 feet of topographical relief with tree-covered ridges and valleys. Portions of the site have been logged, and previously built unpaved and gravel access roads are still present in areas. The existing site features are shown on Figure 3-7.

The large-scale industrial CUF facility provides a sharp visual contrast to the surrounding rural and undeveloped landscape. Views of the CUF facility include broadly horizontal buildings and industrial equipment. Predominant focal points include the existing smokestack and cooling towers and the plumes they emit. Views of the plumes are heavily influenced by seasonal variations in weather and atmospheric conditions and they are typically more visible during the winter. Most of the area encompassed by the proposed onsite landfill includes a naturally appearing landscape that shows little evidence of human alteration. The composition of vegetation and the patterns of vegetation are the prominent features and consist of a variety of deciduous trees and stream channels. Scenic attractiveness of the area is common to minimal and scenic integrity ranges from moderate to low.

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

There are no sensitive viewing receptors within the foreground of the project area. The nearest residential areas are in Cumberland City, approximately 0.2 mile from the eastern edge of the CUF property. There are numerous residences in close proximity to the western boundary of the CUF property (some are within 100 feet) along Scotts Chapel Road, near the proposed onsite landfill location. The nearest church and cemetery are the United Methodist Church and cemetery in Cumberland City, approximately 0.4 mile east of the CUF property (Figure 3-8). Groups that have direct views of the project areas include authorized employees, contractors and visitors to the plant site. Views of the project areas are generally restricted to the foreground (i.e., within 0.5 mile) and include residents and visitors of the adjacent Cumberland City. The proposed onsite landfill may be viewed by residents and other motorists traveling along Scotts Chapel Road. In other directions, however, views of the plant may be buffered by nearby vegetation and the local topography. The proposed projects could also potentially be viewed by recreational boaters and other users along the Cumberland River as well as motorists along Highways 149 and 233.

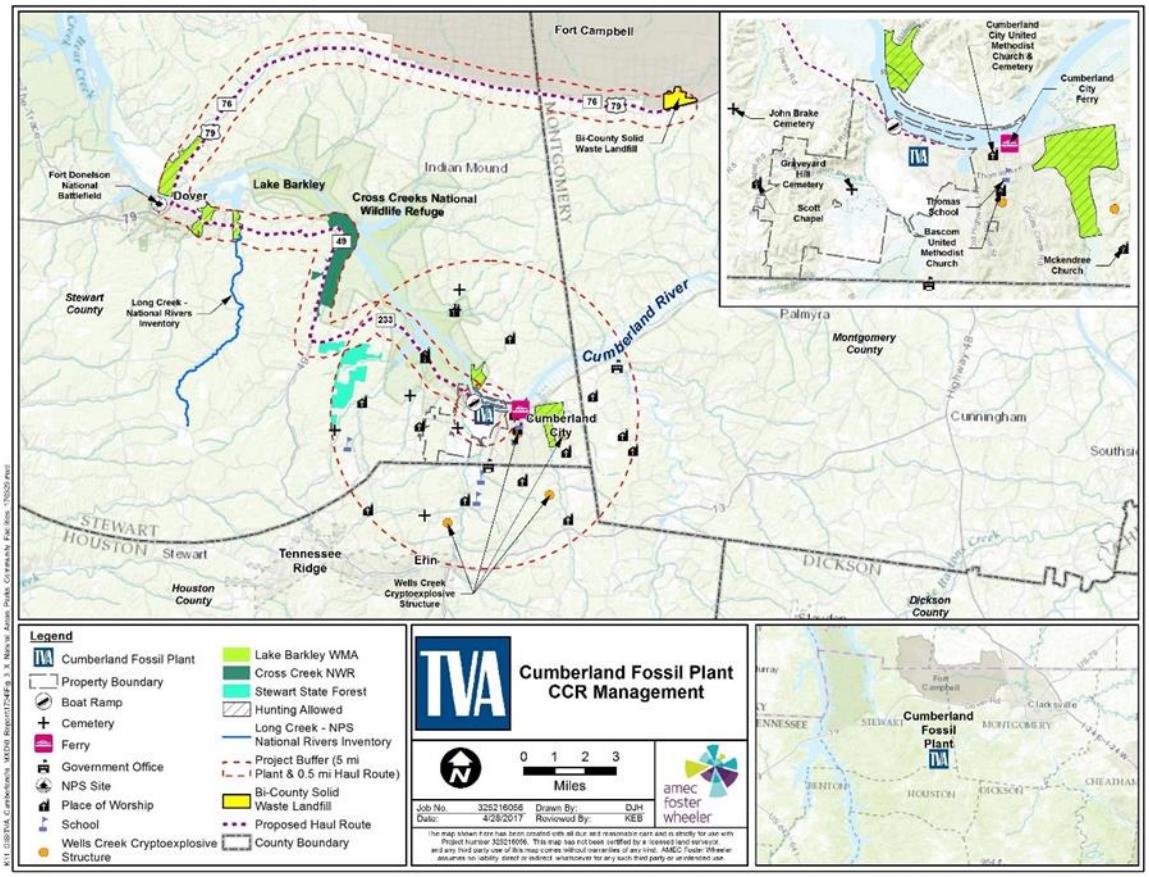

Figure 3-8. Natural Areas, Parks and Community Facilities Within the Vicinity of the Proposed Project Areas

3.15.2 Environmental Consequences

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

3.15.2.1 Alternative A – No Action Alternative

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

3.15.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.15.2.2.1 Construction Impacts

During the construction phase of the proposed projects there would be slight visual discord from the existing conditions due to an increase in personnel and equipment in the area. Impacts from additional vehicular traffic are expected to be insignificant as the roads are already predominately used for industrial activity. In addition, the transport of CCR to an offsite landfill under the Closure-by-Removal option could indirectly impact the landscape character along the haul route. This small increase in visual discord would be temporary and only last until all activities have been completed by TVA.

3.15.2.2.2 Operation Impacts

The proposed Bottom Ash Dewatering Facility primarily would be seen by employees and visitors to CUF. The tallest feature of the dewatering facilities (conveyor discharge) would be approximately 40 feet, which would be notably shorter than the existing stacks at CUF (1,000 feet). The proposed facility components would be visually similar to other industrial elements present in the current landscape. Therefore, the facility would generally be absorbed by existing CUF components and would become visually subordinate to the overall landscape character associated with the plant site.

Permanent impacts as a result of the ash impoundment closures would include minor discernible alterations that would be viewed in the foreground of plant operations. In the foreground, the closure of the ash impoundments and cover with natural vegetation and the conversion of the Main Ash Impoundment and Stilling Impoundment to a Process Water Basins may enhance the landscape character compared to the current condition. In more distant views, the closure of the impoundments would likely merge with the overall industrial components of the facility. The proposed activities would have minimal public visibility and primarily would be seen by employees and visitors to the CUF facility. Therefore, the closed impoundments would generally be absorbed by existing CUF facility components and would become visually subordinate to the overall landscape character associated with the plant site.

Visual impacts associated with the Closure-by-Removal option would be similar to that identified for Closure-in-Place. Following construction however, based upon the improved visual characteristics of a vegetated former impoundment, the scenic attractiveness and scenic quality of the ash impoundment areas may be expected to improve to some degree relative to the existing condition.

The construction of the proposed onsite landfill would contrast with the color of the landscape during some phases of operation. The current landscape at the proposed site is predominantly green and brown as a result of the existing forested landcover on the site. The dominant shapes in the landscape include the vertical lines of the trees and the existing transmission structures to the north and south. The color and shape contrast would be greatest in the foreground to residents to the west of the proposed landfill location, although the contrasts would be less noticeable in the middleground and background. While the CCR in the landfill would contrast with the natural landscape color, it would eventually be covered with an earthen layer and grassy vegetation. Use of the landfill over its estimated lifespan would result in the gradual increase in its height. Once the landfill is closed it is expected to reach a maximum height of approximately 263 feet. While this feature would be visible to motorists and residents along Scotts Chapel Road in the foreground, it is not anticipated to create visual discord at the middleground and background distances as the topography and vegetation within the surrounding area provide some screening and allow the landscape to absorb the minor visual changes.

The Bi-County Solid Waste Management Landfill is an existing permitted landfill; therefore, placement disposal of existing CCR material at this location would result in no changes from the existing environment within the landfill boundaries. The haul route to the landfill would utilize previously constructed roads which are already subjected to vehicular traffic. Any sensitive visual receptors along the haul route are already subjected to vehicular traffic destined for the landfill, and no new roads would need to be constructed.

The scenic attractiveness of the areas proposed for the dewatering facility and ash impoundment closure are already of minimal quality. Therefore, any discord resulting from the construction activity is not anticipated to result in a change in the scenic quality. Additionally, for the ash impoundment closures, the scenic quality of the project area may be expected to improve to some degree relative to the existing conditions based upon the improved visual characteristics of a vegetated closure system. Therefore, visual impacts resulting from these activities would be minor.

The scenic attractiveness of the proposed onsite landfill location is common and the proposed landfill would contribute to a notable change in visual integrity of the landscape. However, it is not expected that the existing scenic class would be reduced by two or more levels, which is the threshold of significance of impact to the visual environment. Scenic attractiveness may be reduced to minimal in the foreground but would remain common in the middleground and background. The forms, colors and textures of the landscape that make up the scenic attractiveness would be affected in the foreground but would remain minimal. Impacts to scenic integrity are anticipated to be greatest in the foreground for area residents and other passing motorists along local roads. In the middleground and background, impacts are not considered to be significant as they are not expected to alter the overall landscape. Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed landfill is constructed is considered to remain at fair to good.

3.15.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR

Under Alternative C, impacts associated with construction and operation of the Bottom Ash Dewatering Facility, impoundment closure, and construction and operation of the onsite landfill would be the same as identified under Alternative B. However, existing CCR from the impoundments would be transported onsite to the existing onsite facility rather than being transported to an offsite landfill. Since there are no visual resource impacts associated with the current management of CCR in the onsite facility, the impact would be the same as that identified in Alternative B.

3.15.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future Ash

Under Alternative D, impacts to visual resources, are expected to be the same as Alternatives B and C for the Bottom Ash Dewatering Facility and to the same as Alternative B for the ash impoundment closure. However, under this alternative, any future CCR generated at CUF would be transported to the Bi-County Solid Waste Management Landfill. Therefore, the onsite landfill would not be constructed, thus eliminating the visual impacts identified for this action.

As described for Alternative B, there would be no impact to visual resources from the transportation of CCR material to the offsite landfill. Therefore, visual impacts resulting from implementation of Alternative D would be negligible.

3.15.3 Summary Impacts Related to Visual Resources B

Impacts to visual resources are summarized in Table 3-22.

Table 3-22. Summary of Impacts to Visual Resources

Project	Impact	Severity
Bottom Ash Dewatering Facility Ash Impoundment Closure (in-place and by-removal) Onsite Landfill	Temporary visual discord during construction.	Minor impact.
Bottom Ash Dewatering Facility	Long-term change in visual integrity of the landscape is not discernible from existing scenery. Potential beneficial impact in long-term due to re-vegetation of cover systems.	Negligible impact.
Ash Impoundment Closure		
Closure-in-Place	Potential beneficial impact due to the long-term change in the visual integrity of the landscape	Minor beneficial impact.

Project	Impact	Severity
	due to re-vegetation of cover systems.	
Closure-by-Removal	Potential beneficial impact in long-term due to re-vegetation of cover systems.	Similar to Closure-in-Place, but slightly improved due to overall change to a natural visual landscape.
Landfill		
Onsite Landfill	Long-term change in visual integrity of the landscape which would result in an impact to the viewshed of some members of the surrounding community. Minimal change to overall scenic value.	Minor impact.
Offsite Landfill	Long-term change in visual integrity of the landscape along the haul route.	Negligible impact.

3.16 Cultural and Historic Resources

3.16.1 Affected Environment

3.16.1.1 Regulatory Framework for Cultural Resources

Cultural resources or historic properties include prehistoric and historic archaeological sites, districts, buildings, structures, and objects as well as locations of important historic events. Federal agencies, including TVA, are required by the National Historic Preservation Act (NHPA) (54 USC 300101 et seq) and by NEPA to consider the possible effects of their undertakings on historic properties. “Undertaking” means any project, activity, or program, and any of its elements, which has the potential to affect a historic property and is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. An agency may fulfill its statutory obligations under NEPA by following the process outlined in the regulations implementing Section 106 of NHPA. Additional cultural resource laws that protect historic resources include the Archaeological and Historic Preservation Act (54 USC 300101 et seq.), Archaeological Resources Protection Act (16 USC 470aa-470mm), and the Native American Graves Protection and Repatriation Act (25 USC 3001-3013).

Section 106 of the NHPA requires that federal agencies consider the potential effects of their actions on historic properties and allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Section 106 involves four steps: (1) initiate the process, (2) identify historic properties, (3) assess adverse effects, and (4) resolve adverse effects. This process is carried out in consultation with the SHPO and other interested consulting parties, including federally recognized Indian tribes.

Cultural resources are considered historic properties if they are listed or eligible for listing in the NRHP. The NRHP eligibility of a resource is based on the Secretary of the Interior’s

criteria for evaluation (36 CFR 60.4), which state that significant cultural resources possess integrity of location, design, setting, materials, workmanship, feeling, association and:

a. Are associated with events that have made a significant contribution to the broad patterns of our history; or

b. Are associated with the lives of persons significant in our past; or

c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value; or

d. Have yielded, or may yield, information (data) important in prehistory or history.

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

3.16.1.2 Area of Potential Effects

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

For Alternative B, TVA would construct the Bottom Ash Dewatering Facility; close the ash impoundments (either in-place or by-removal); and construct an onsite CCR Landfill. The archaeological APE is defined as the project footprint and includes approximately 30 acres for the proposed Bottom Ash Dewatering Facility, a 58-acre project area for the ash impoundment closures, approximately 128 acres to be used for temporary use areas, and a project area encompassing approximately 174 acres for landfill development that includes an 81.4-acre landfill footprint (see Figure 1-1). The APE for architectural resources consists of the half-mile viewshed surrounding the proposed dewatering facility and landfill as well as the impoundments to be closed where the project could alter the existing viewshed of a historic resource (e.g., constructing a new building or changing topography or vegetation).

For Alternative C, TVA impacts associated with the construction and operation of the dewatering facility, in-place closure of the impoundments and construction of the onsite landfill would be the same as described in Alternative B. However, under the Closure-by-Removal option, CCR from the Main Ash Impoundment and Stilling Impoundment and/or the Bottom Ash impoundment would be hauled and placed in the existing onsite landfill. The archaeological and historic architectural APE for Alternative C would be the same as for Alternative B related to the Bottom Ash Dewatering Facility dewatering facilities and impoundments to be closed as well as the onsite landfill to be constructed.

For Alternative D, impacts associated with the construction and operation of the dewatering facility and in-place closure of the impoundments would be the same as Alternative B. However, no onsite landfill would be constructed and any future CCR generated at CUF would be transported to an offsite permitted landfill. Therefore, the archaeological and

historic architectural APE for Alternative D would be the same as for Alternative B related to the dewatering facility and impoundment closures. The offsite, permitted Bi-County Solid Waste Management Landfill is located on previously developed and disturbed lands. Future CCR from CUF would be transported to the landfill along existing roadway corridors which had previously been disturbed during their construction.

3.16.1.3 Previous Studies

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

TVA has conducted two archaeological investigations under Section 106 of the NHPA within the APE. Both investigations consisted of Phase I archaeological surveys and involved systematic subsurface shovel testing at 100-foot intervals (30.5-meters) and a visual examination of ground surfaces with greater than 50 percent surface exposure and any terrain with a slope greater than 20 percent. The first investigation took place in the summer of 2012 and covered a large area encompassing approximately 1,180 acres ahead of proposed landfill activities (Barrett and Holland 2013). In that investigation, a total of 26 new archaeological sites were identified (40SW697 through 40SW722) and evaluated. Of these, 24 were recommended as not eligible for the NRHP. Two sites, 40SW702 and 40SW710, which are prehistoric in nature, were recommended as undetermined as to their NRHP eligibility status and further work was recommended if they were to be adversely affected. The survey also re-evaluated one previously identified archaeological site, 40SW63, and conducted a surface reconnaissance at site 40SW219 (Brunsoni Furnace). Investigations at 40SW63, a multi-component prehistoric open habitation, resulted in the site being identified as undetermined as to NRHP eligibility status and further work was recommended. Investigations at the previously NRHP listed Brunsoni Furnace (40SW219) were limited to surface reconnaissance only. A more detailed map was created for the site components and an extension of the NRHP boundary was recommended based on new surface findings. Further work was also recommended at 40SW219 if deposits within the extension area were to be adversely affected by future development. The Tennessee SHPO concurred with the findings described above in a letter dated November 5, 2012 (see Appendix E).

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

In January 2017, TVA contracted for an architectural assessment regarding the proposed construction and operations of an onsite landfill at CUF (Mohr et al. 2017). The APE for historic architectural resources was defined as the area within a 0.5-mile radius of the proposed landfill site, an access road, and two borrow areas. A total of 17 resources over

50 years of age were identified and included six previously surveyed structures, as well as eleven newly documented resources. The structures located within the APE date between the mid-1800s and 1968 and consist of single family dwellings, agricultural outbuildings, a church, and a bridge.

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

Pursuant to 36 C.F.R. Part 800.3(f)(2), TVA consulted with federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the NRHP. These tribes are listed in Chapter 5.

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action Alternative

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

3.16.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

The proposed construction footprint for the dewatering facility, ash impoundment areas, and proposed temporary laydown and borrow areas have been thoroughly disturbed by past construction and excavation activities. Therefore, construction would not disrupt archaeological resources.

A 2017 architectural historic survey (Mohr et al. 2017) determined there are 17 resources over 50 years of age within the APE for indirect impacts. One of these resources, the Brunson/Hollister House and Hollister Cemetery, is listed on the NRHP. However, TVA has determined that construction and operation of the proposed Bottom Ash Dewatering Facility and impoundment closure (both in-place and by-removal) would not have an adverse visual effect on the Hollister House. The remaining 16 resources have been determined NRHP ineligible by TVA. Therefore, TVA determined that no indirect adverse visual impacts would result for these properties from the construction of the dewatering facilities and ash impoundment closure activities. The Tennessee SHPO concurred with these findings in a letter dated June 21, 2017 (Appendix E).

As described above, one NRHP eligible historic architectural resource, the Brunson/Hollister House and Hollister Cemetery is within the APE for indirect impacts. TVA determined that there would be No Adverse Visual Impact to these resources from the proposed access road and landfill due to their distance from the proposed construction areas and the obstructed views provided by the surrounding topography and vegetation within the APE. The Tennessee SHPO concurred with these findings in a letter dated June 21, 2017 (Appendix E).

One archaeological site eligible for the NRHP (40SW219 – Brunsoni Furnace) is located within the APE for potential landfill limits of disturbance. The site was listed on the NRHP in 1988 under a Multiple Property Submission form entitled: Iron Industry on the Western Highland Rim 1790s-1920s. The furnace was in operation in the early portion of the 19th century and its remains today occupy an approximate 14-acre area. Proposed landfill construction activities would adversely impact deposits at 40SW219. The SHPO concurred with this determination in a letter dated June 26, 2017 (Appendix D). TVA has developed a research design to conduct archaeological investigations at the site that would mitigate adverse effects to deposits. TVA initiated consultation with the Tennessee SHPO for approval of the research design and the development of a MOA regarding mitigation activities. The MOA was executed on October 10, 2017.

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

3.16.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR

Cultural impacts would be the same as those described for Alternative B. There would be no change in impacts to cultural resources associated with the onsite disposal of existing CCR under the impoundment Closure-by-Removal option.

3.16.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future Ash

Cultural resource impacts under Alternative D are expected to be of the same as Alternatives B and C for construction of the Bottom Ash Dewatering Facility and the same as Alternative B for impoundment closure (both in-place and by-removal). However, in contrast to Alternatives B and C, this alternative considers the transport of future ash to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage.

Under Alternative D, no direct impacts to historic properties would occur as the onsite landfill would not be constructed. The Bi-County Solid Waste Management Landfill is a permitted landfill that has previously undergone the Section 106 review process to evaluate impacts to historic properties. Because the Bi-County Solid Waste Management Landfill is previously permitted, no additional impact to cultural resources would occur from the addition of CCR material from CUF to this landfill.

Indirect impacts from transporting CCR to the Bi-County Solid Waste Management Landfill could include an increase in vibrations and noise that may affect historic resources located

adjacent to the haul route to the Bi-County Solid Waste Management Landfill. Based on a record search, no historic resources listed on the NRHP were identified along the proposed CCR haul route. In addition, this route would utilize existing roadways and as such if any unrecorded cultural resources are present along the haul route they are already subjected to vehicular traffic. Moreover, if any unrecorded cultural resources are present along the haul route, any increase in noise and vibration due to increased truck traffic would be intermittent and not expected to impair or adversely affect them. Therefore, Alternative D would have no direct or indirect impacts on historic resources.

3.16.2.5 Summary of Impacts to Cultural Resources

Impacts to Cultural Resources related to the CCR management projects are summarized in Table 3-23.

Table 3-23. Summary of Impacts to Cultural Resources

Project	Impact	Severity
Bottom Ash Dewatering Facility Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Impacts to archeological and historic resources related to construction and operation.	No effect.
Landfill		
Onsite Landfill	Direct adverse impact to archeological site from construction. No visual impacts from operation on Hollister House.	TVA would enter in to consultation with the TN-SHPO for approval of the research design and the development of a Memorandum of Agreement regarding mitigation activities.
Offsite Landfill	Offsite transport of CCR.	No effect.

3.17 Natural Areas, Parks, and Recreation

3.17.1 Affected Environment

Natural areas include state or federally managed areas, ecologically significant sites, and any Nationwide Rivers Inventory (NRI) streams. Parks and recreation facilities include open areas, boat ramps, community centers, swimming pools, and other public places. The spatial extent for the analysis of impacts is set as a 5-mile radius buffer around CUF project area which encompasses the proposed onsite landfill, dewatering facility, and CCR impoundment closure project areas; and a 0.5-mile radius around the Bi-County Solid Waste Management Landfill and associated haul route (i.e., Alternatives B and D). A 5-mile buffer is a large-enough area of consideration to give a liberal estimate of any effects from construction activities proposed by the alternatives. Conversely, a smaller 0.5-mile buffer for the haul route is more appropriate because of a lack of broad construction activities and the linear nature of transporting CCR to the existing Bi-County Solid Waste Management Landfill.

A review of the current TVA Regional Natural Heritage database, National Park Service NRI database, and Tennessee Wildlife Resource Agency database indicates multiple natural

areas (i.e., managed areas, ecologically significant sites, and an NRI stream) and parks or recreation areas (i.e., boat ramps) in the study areas. These locations provide recreational opportunities for local residents and tourists and are an important part of the regional economy and for long-term conservation.

Within the 5-mile CUF study area lie portions of Lake Barkley and Lake Barkley Wildlife Management Areas (WMAs), Cross Creeks National Wildlife Refuge (NWR), Stewart State Forest, and multiple sites around the Wells Creek Crater Structure sites (see Figure 3-8). Lake Barkley has served as navigation, flood control, and hydropower for Kentucky and northern Tennessee since the Barkley Dam was built on the Cumberland River in 1957 (USACE 2017). Today, Lake Barkley and its multiple WMAs including River Bend Recreation Area (1 mile north of CUF) and Guices Creek Recreation Area (1.5 miles west of CUF) are managed for fish and wildlife conservation and recreation. Following the creation of Lake Barkley, the Fish and Wildlife Service established Cross Creeks NWR (1.5 miles northwest of CUF) along the Cumberland River to provide winter habitat for migratory birds (USFWS 2017a and 2017c). This refuge supports hunting, fishing, and bird watching. Stewart State Forest (4.5 miles west of CUF) is 1,710 hectares of oak and hickory forest established in 1935 used by hunters, hikers, mountain bikers, and also for biannual military training (Tennessee Department of Agriculture 2017). Wells Creek Structure sites are small locations that contain geologically important remnants of a meteorite that struck the area 100 to 300 million years ago (Memphis Archaeological and Geological Society 2006).

Boat access to the Cumberland River is abundant in the area. In total, seven boat ramps are found within 5 miles of CUF on both sides of the river. The closest of these publicly accessible boat ramps is located on TVA property off Old Cumberland City Road. This location also allows shoreline fishing. No other parks or community facilities exist within the 5-mile buffer around CUF (see Figure 3-8).

The haul route to the Bi-County Solid Waste Management Landfill follows existing roadways through portions of Cross Creeks NWR, Stewart State Forest, the Fort Donelson National Battlefield, the Dover Recreation Area, and Long Creek. Long Creek is listed on the National Park Service's NRI due to its scenic, recreational, and fishery "outstanding remarkable values" (NPS 2017c). Fort Donelson National Battlefield, which also includes a National Cemetery and the Dover Hotel, is an American Civil War memorial and museum. Access to these facilities is from Highway 79, west of the town of Dover, Tennessee (NPS 2017b). Further along the haul route is Fort Campbell, an active military base bordering SR-49 to the north. Fort Campbell, which, in addition to its stated military purpose, provides public hunting and fishing opportunities for permitted individuals (U.S. Army MWR 2017).

Access to the Cumberland River and Lake Barkley is provided by eight public boat ramps along the haul route. No other natural areas, parks, or recreational sites exist within a 0.5-mile buffer around the haul route to the Bi-County Solid Waste Management Landfill.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action Alternative

Under this alternative there would be no changes to CCR management operations at CUF; therefore, there would be no impacts to natural areas, parks or recreation.

3.17.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

There is a publicly accessible boat ramp located on CUF property approximately 0.4-mile northwest of the proposed Bottom Ash Dewatering Facility Site. The ramp would not be directly impacted by construction and operation of the dewatering facility. Users of the boat ramp may be indirectly impacted during construction from increased construction traffic on SR 233. This traffic increase would be short-term and is unlikely to interfere with use or enjoyment of these facilities. As such, impacts would be minor.

Additionally, operational noise may indirectly affect fishing enjoyment at the boat ramp, but these effects would be temporary and not outside the peak noise normally encountered at the CUF (see Section 3-19, Noise). Overall, any indirect impacts to users of the boat ramp would be minor and temporary.

There would be no direct impact to natural areas, parks or recreation facilities due to Closure-in Place of the Bottom Ash Impoundment; however, similar to above, users of the boat ramp on CUF property may be indirectly affected by increased construction traffic and noise during closure activities. In addition, indirect impacts associated with transport of CCR from a portion of the Main Ash Impoundment and Stilling Impoundment to an existing offsite facility under the proposed combination Closure-in-Place and Closure-by-Removal option would be less than those described below under the Closure-by-Removal option as the volume of CCR transported would be lower. However, overall, any indirect impacts would be temporary and minor. There would be no indirect impact to natural areas, parks of recreation associated with the transport of CCR to the existing onsite landfill.

Under the Closure-by-Removal option, approximately 200 truck trips per day would be needed to transport CCR to the Bi-County Solid Waste Management Landfill. The haul route would follow existing roadways through Lake Barkley and Lake Barkley WMAs, Cross Creeks NWR, Stewart State Forest, Long Creek Scenic River, and Fort Campbell (Figure 2-4). In addition, the haul route would cross the primary access road to the Dover Hotel (part of the Fort Donelson National Battlefield). There would be no change in travel patterns or access to the facilities adjacent to the haul route; and, as noted in the Section 3.18, Transportation, the additional traffic generated as a result of transport of existing CCR to the offsite landfill would not impact level of service (LOS) on these roadways. However, there may be impacts to ease of movement along SR-49 due to the additional trucks, especially around Dover, Tennessee. These impacts are anticipated to be minor as hauling trips would be dispersed throughout a normal workday and would fit in with normal traffic patterns. Additionally, fugitive dust from the trucks would be reduced with BMPs designed to minimize emissions during transport. Noise impacts due to increased truck traffic along SR-49 are expected to be minor (see Section 3.19).

No natural areas or parks are on or adjacent to the proposed landfill at CUF (within 0.5 mile). As above, initial construction of the landfill would have an indirect impact on users of the onsite boat ramp.

Once constructed, CCR generated at CUF would be transported to the onsite landfill via the proposed onsite access route. Therefore, there would be no direct or indirect impact to natural areas, parks, or recreational facilities.

3.17.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under Alternative C, impacts associated with construction and operation of the dewatering facility, closure of the CCR impoundments, and construction and operation of the onsite landfill would be the same as Alternative B. However, CCR from the Impoundments would be excavated and transported to the existing onsite landfill for long-term storage. Therefore, there would be no offsite transport of existing CCR and no indirect impact to natural areas, parks, and recreation facilities along the haul route to the Bi-County Solid Waste Management Landfill.

3.17.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under Alternative D, impacts associated with construction of the Bottom Ash Dewatering Facility are expected to be the same as described for Alternative B and the same as described for Alternative B for the ash impoundment closure.

Under this alternative, future CCR produced at CUF would be transported to the Bi-County Solid Waste Management Landfill for long-term storage. Disposal of future CCR would generate an additional 374 truck trips per day along the haul route for the life of the landfill (currently estimated at approximately 18.8 years). As noted in Section 3.18, this additional traffic would not impact LOS on these roadways and there would be no change in travel patterns or access to the facilities located adjacent to the haul route. However, in contrast to Alternative B, it is possible that there would be a long-term indirect impact to users of these facilities due to the additional traffic, noise, and dust from the trucks transporting CCR to the landfill. In addition, the 200 truck trips per day needed to transport existing CCR under the Closure-by-Removal option would also occur for during the 18.8 years while current CCR is transported to the offsite landfill. Therefore, the total number of trips along the haul route under Alternative D is 574 truck trips per day. Consequently, the impact to the use or enjoyment of these resources would be minor, yet greater than Alternative B, given

3.17.3 Summary of Impacts to Natural Areas, Parks, and Recreation

Impacts to natural areas, parks, and recreation due to implementation of the proposed CCR management projects are summarized in Table 3-24.

Table 3-24. Summary of Impacts to Natural Areas, Parks and Recreation

Project	Impact	Severity
Bottom Ash Dewatering Facility	Short-term indirect impacts to users of the onsite boat ramp due to the increased traffic fugitive dust and noise along SR 233 during the construction period.	Minor impact.
Ash Impoundment Closure		
Closure-in-Place	Short-term indirect impacts to users of the onsite boat ramp due to the increased traffic, fugitive dust and noise along SR 233 during the construction period.	Minor impact.
Closure-by-Removal	Indirect impact to ease of access to facilities along the haul route resulting from transport of CCR to offsite landfill during closure activities.	Minor impact.
Landfill		
Onsite Landfill	Short-term indirect impacts to users of the onsite boat ramp due to the increased traffic along SR 233 during the construction period.	Minor impact.
Offsite Landfill	Indirect impact to ease of access to facilities along the haul route due to Increased traffic resulting from transporting CCR to the offsite landfill.	Minor impact. Magnitude of impact is dependent upon the amount of truck traffic; therefore, impact would be greatest under Alternative D where the truck transport is the greatest of any alternative.

3.18 Transportation

3.18.1 Affected Environment

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

Traffic generated by existing operations at CUF is composed of a mix of cars and light duty trucks, as well as medium duty to heavy duty trucks. The proposed dewatering facility, and Main Ash and Bottom Ash impoundments are all located on the CUF site. The north edge of the proposed onsite landfill, which is on TVA-owned property, is one mile southwest of the plant and is bordered on the north by Old Scott Road.

State highways provide ample access in the immediate vicinity of CUF. Principal access at CUF is via SR 233 (Cumberland City Road), which is two lanes wide. SR 149, another two-lane roadway, is approximately 1.2 mile east of CUF. The Cumberland City Ferry, which operates just east of CUF, provides a connection for SR 46 across the Cumberland River. To the west, SR 49 connects SR 233 to US 79 at Dover, Tennessee. US 79 crosses the Cumberland River at Dover.

The 2013 Annual Average Daily Traffic (AADT) volumes on the roadways in the immediate vicinity of CUF including SR 233 (Cumberland City Road), and SR 49 are provided in Table 3-25.

Table 3-25. Average Daily Traffic Volume (2013) on Roadways in Proximity to CUF

Roadway	Exist. Average Daily Vehicle Use (AADT)	Number of Lanes	Existing Level of Service
SR 233 (Cumberland City Road) at CUF	2,348	2	A
SR 233 (Cumberland City Road) just east of SR 49 at Carlisle	1,238	2	A
SR 49 just north of SR 233 at Carlisle	1,601	2	A
SR 49 just east of Dover at Lick Creek Bridge	3,369	2	A
US 79 just north of Dover at Cumberland River Bridge	8,678	4	A

Source: TDOT 2013.

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

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

3.18.2 Environmental Consequences

For the purposes of this EIS, impacts associated with the disposal of CCR at an existing offsite permitted landfill are analyzed based on the closest landfill that can currently accept CCR material, which is Bi-County Solid Waste Management Landfill approximately 37 miles by roadway northeast of CUF on US 79.

3.18.2.1 Alternative A – No Action Alternative

Under this alternative, TVA would continue current plant operations and not construct a Bottom Ash Dewatering Facility to manage CCR produced at CUF in a dry manner. TVA would not close the ash impoundments. Accordingly, TVA would not seek additional disposal options for dry placement of CCR generated at CUF. Rather, CCR would continue to be managed in the current impoundments and stacks for as long as storage capacity is available. Therefore, no impacts to transportation and local roads are anticipated.

3.18.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.18.2.2.1 Construction Impacts

The daily workforce traffic generated by the construction of the Bottom Ash Dewatering Facility, the impoundment closures, and the construction of the landfill is expected to peak at 260 workers. This would vary depending on the timing of the construction of the various components of this alternative; however, the worst-case value of 260 workers per day is used to establish an upper limit of the construction-related traffic impacts. For conservative purposes, it is assumed that there is one worker per passenger vehicle resulting in a construction workforce traffic count of 520 (260 inbound trips and 260 outbound trips). The construction workforce traveling to and from the plant site would contribute to the traffic on the local transportation network (such as SR 233 and SR 49). This workforce volume would occur at the beginning and end of the work day. Construction-related vehicles (dozers, backhoes, graders, loaders, etc.) would be delivered to or removed from each CCR impoundment site 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 temporary. It is assumed that these motorists would use interstate highways or major arterial roadways as much as possible, but would use lower functioning roadways (SR 233, SR 49) to access CUF. As a stand-alone value, this projected construction workforce traffic generates a negligible effect on the public roads around CUF.

Closure-in-Place of the Bottom Ash Impoundment is not anticipated to have an impact on transportation as there would be no transport of CCR. However, the proposed closure of the Main Ash Impoundment and Stilling Impoundment would include removal of CCR from a portion of the Main Ash Impoundment and Stilling Impoundment to support the development of a Process Water Basin 1 and Process Water Basin 2 respectively. This CCR would be transported offsite to an existing landfill for disposal. Transport of existing CCR offsite would require the use of public roadways and would therefore potentially affect traffic and LOS on local roads. This impact would be less than the under the Closure-by-Removal option as the volume of CCR transported offsite would be less. It is anticipated that all borrow material would be obtained from a location or locations within the CUF site boundary, and would not have an impact on the public transportation network. However, if offsite borrow material is needed, it would be hauled from one or more previously permitted commercial sites within 30 miles of CUF. As offsite borrow would only be used if needed, it is assumed the traffic volume generated by the hauling of borrow would be relatively low and haul trucks would use interstate highways or major arterial roadways as much as possible, but would use lower functioning roadways (SR 233, SR 49) to access CUF. Because the existing traffic volumes on these surrounding roadways is relatively low, the existing roadway network is expected to have sufficient capacity to absorb the potential

temporary construction traffic increase. Therefore, potential impacts of construction on roadway transportation are expected to be negligible.

Under Closure-by-Removal, existing CCR would be excavated from the impoundments and would be transported to the Bi-County Solid Waste Management Landfill. The haul route to the Bi-County Solid Waste Management Landfill primarily would utilize SR 233 (also known as Cumberland City Road), SR 49 and US 79 (see Figure 2-4).

As identified in the PEIS, TVA determined that loading operations are highly dependent on the rate at which CCR can be safely excavated, dried and moved to truck loading facilities. TVA considered these factors and determined the rate of truck loading to be 100 truckloads per day. This would result in approximately 200 truck trips per day along the haul route or approximately 23 truck trips per hour over a typical nine-hour workday throughout the estimated closure period (approximately 12 years). The effects of these truck trips on roads along the haul route are shown in Table 3-26.

The existing traffic volumes on Cumberland City Road and SR 49 are relatively low for two-lane roads. Existing LOS on Cumberland City Road and SR 49 are LOS A. The LOS on US 79, a four-lane road, is also LOS A.

Transport of CCR from the impoundments to the offsite landfill under the Closure-by-Removal option would add approximately 200 trips per day on Cumberland City Road, SR 49 and US 79. The largest percentage increase is about 16 percent on Cumberland City Road just east of SR 49. While this seems like a large percentage, the actual traffic volume increase is minor. The addition of these 200 trips on Cumberland City Road, SR 79 and US 79 would not change the existing LOS on these roads as there is sufficient capacity remaining on them to handle the increase in traffic resulting from the hauling of existing CCR from CUF.

Table 3-26. Traffic Impacts Associated with the Hauling of Existing CCR to Bi-County Solid Waste Management Landfill from CUF

Roadway	Exist. Average Daily Vehicle Use (AADT)[1]	Exist. Traffic plus CCR Hauling Traffic (AADT)	Traffic Increase (Percent)
SR 233 (Cumberland City Road) at CUF	2,348	2,548	8.5
SR 233 (Cumberland City Road) just east of SR 49 at Carlisle	1,238	1,438	16.1
SR 49 just north of SR 233 at Carlisle	1,601	1,801	12.5
SR 49 just east of Dover at Lick Creek Bridge	3,369	3,569	5.9
US 79 just north of Dover at Cumberland River Bridge	8,678	8,878	2.3

[1] Source: TDOT 2013.

The proposed hauling of CCR over public roadways would contribute to the number of vehicle miles traveled on those roadways, which is a factor in injury and fatal traffic crash rates. The number of truck-related crashes associated with the hauling of existing CCR from CUF could increase and could compromise driver safety. Therefore, while the impacts

of the additional CCR haul traffic on these roads may be absorbed, localized effects on traffic flow and safety may be evident. Three schools are adjacent to the haul route (Stewart County Middle School in Dover, Stewart County High School on US 79 and North Stewart Elementary School on US 79). The additional hauling of CCR along the haul route has the potential to interfere with school bus and passenger car traffic at these schools. If necessary, TVA would coordinate with Tennessee Department of Transportation and Stewart County transportation officials as needed to develop appropriate mitigative measures to reduce localized temporary transportation effects.

Otherwise on the remainder of the road network, which has relatively low traffic volumes, the percentage increases in traffic resulting from the transport of existing CCR from CUF are negligible and the impacts are expected to be minor.

3.18.2.2.2 Operation Impacts

3.18.2.2.2.1 *Bottom Ash Dewatering Facility*

The proposed dewatering facility would be constructed onsite at CUF. Once constructed, operation of this facility would not require an appreciable increase in workforce and, therefore, would not have an impact on the public transportation network.

3.18.2.2.2.2 *Ash Impoundment Closure*

Transportation related impacts associated with the closure of the ash impoundments would be associated with construction related impacts as described above. Once closed, operations associated with the repurpose of the Main Ash and Stilling Impoundments to a Process Water Basins would not require an appreciable increase in workforce and therefore would not have an impact on the public transportation network. Therefore, there would be no operational impacts on the public transportation network or any public roads.

3.18.2.2.3 Landfill

Under this alternative, future CCR generated at CUF would be transported to the new onsite landfill on TVA property. Articulated dump trucks would be used to haul CCR from the dewatering facility to the proposed landfill site along the onsite access road. Based on the current volume of CCR production, it is estimated that 141 truckloads per day would be needed to transport future CCR to the proposed landfill. This would result in approximately 282 truck trips per day along the onsite access road or approximately 32 trips per hour over a typical nine-hour workday. Transport of future CCR would occur daily over the life of the landfill (estimated to be approximately 18.8 years). The use of the onsite access road keeps the trucking of future CCR off public roadways, which is a benefit to the safety of the traveling public.

Under this alternative, the hauling of future CCR generated at CUF would not use public roadways; therefore, there is no impact to traffic and levels of service on public roads.

3.18.2.3 Alternative C – Bottom Ash Dewatering Facility, CCR Impoundment Closure (In-Place and By-Removal to Onsite Stacks), Onsite Landfill for Future CCR

Transportation impacts of Alternative C associated with implementation of the Bottom Ash Dewatering Facility, closure of the impoundments, and development of an onsite CCR landfill would be the same as Alternative B.

However, for Alternative C, existing CCR from the impoundments at CUF would be transported to the existing onsite landfill. No CCR would be hauled over any public

roadways; therefore, there is no impact to traffic and levels of service on public roads associated with transport of CCR removed from the impoundments.

3.18.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Transportation impacts of Alternative D are expected to be the same as Alternative B and C for the Bottom Ash Dewatering Facility and the same as Alternative B for impoundment closures. Under this alternative no construction related activities would be required to develop a landfill. Consequently, impacts from this alternative related to the construction workforce and vehicles would be less than those described for Alternatives B and C.

However, this alternative considers the transport of future CCR to a previously permitted offsite landfill for long-term storage. Like the existing CCR in the ash impoundments, future production CCR at CUF would also be transported to the Bi-County Solid Waste Management Landfill (see Figure 2-4).

As described under Alternative B, Closure-by-Removal of the Bottom Ash and Main Ash Impoundments with transport of existing CCR to an offsite landfill is expected to generate 200 truck trips per day that would occur daily for approximately 12 years. This would result in approximately 23 truck trips per hour along the haul route over a typical nine-hour workday. Future production CCR would also be hauled in over the road dump trucks to the existing landfill site. Based on the estimate of CCR produced daily and the capacity of an over the road dump truck, 187 truckloads of CCR per day would be needed to transport CCR to the proposed landfill. This would generate 374 truck trips per day along the haul route or approximately 42 truck trips per hour over a typical nine-hour workday. Transport of CCR would occur daily (during a typical five-day work week) over a period of approximately 18.8 years to accommodate long-term disposal of CCR generated at this facility. The number of truck trips per day needed to transport CCR offsite is higher than onsite transport of CCR because this alternative utilizes public roadways which requires the use of smaller over the road dump trucks instead of the larger articulated dump trucks. Additionally, the estimate of number of truckloads needed to manage future CCR is not bounded in the same manner as the hauling of existing CCR from the two impoundments as loading operations under the Closure-by-Removal option are highly dependent on the rate at which CCR can be safely excavated, dried and moved to truck loading facilities.

As identified above, the traffic volume generated by the construction workforce and the construction-related vehicles would be relatively minor. It is assumed that these motorists would use interstate highways or major arterial roadways as much as possible, but would use lower functioning roadways (SR 233, SR 49) closer to CUF. As a stand-alone value, this projected construction workforce traffic generates a negligible effect on the public roads around CUF.

Therefore, the total number of truck trips along the haul route under Alternative D is 574 truck trips per day and consists of the following:

- 200 truck trips per day – hauling of existing CCR from the two ash impoundments
- 374 truck trips per day – hauling of future CCR produced at CUF

The effects of these truck trips on public roads along the haul route are shown in Table 3-27.

Table 3-27. Traffic Impacts Associated with the Hauling of Existing and Future CCR to Bi-County Solid Waste Management Landfill from CUF

Roadway	Exist. Average Daily Vehicle Use (AADT)[1]	Exist. Traffic plus CCR Hauling Traffic (AADT)	Traffic Increase (Percent)
SR 233 (Cumberland City Road) at CUF	2,348	2,922	24.4
SR 233 (Cumberland City Road) just east of SR 49 at Carlisle	1,238	1,812	46.4
SR 49 just north of SR 233 at Carlisle	1,601	2,175	35.8
SR 49 just east of Dover at Lick Creek Bridge	3,369	3,943	17.0
US 79 just north of Dover at Cumberland River Bridge	8,678	9,252	6.7

[1] Source: TDOT 2013.

Hauling of existing and future CCR generated at CUF would add approximately 574 truck trips per day on Cumberland City Road, SR 49 and US 79. The largest percentage increase is about 46 percent on Cumberland City Road just east of SR 49. While this seems like a large percentage, the actual traffic volume increase is minor because the base volume is relatively small. The addition of these 574 truck trips on Cumberland City Road, SR 79 and US 79 would not change the existing LOS on these roads as there is sufficient capacity remaining on them to handle the increase in traffic resulting from the hauling of existing CCR from CUF. However, this additional truck traffic would increase roadway deterioration. Such deterioration would include wear and tear of the pavement, pavement rutting, and formation of potholes and destruction of soft (grass or loose gravel) shoulders.

The proposed hauling of CCR over public roadways would contribute to the number of vehicle miles traveled on those roadways, which is a factor in injury and fatal traffic crash rates. The number of truck-related crashes associated with the hauling of existing and future CCR from CUF could increase and could compromise driver safety. In addition, roadway conditions that are characterized by sharp turns (such as SR 49) also contribute to impacts to driver safety.

Three schools are adjacent to the haul route (Stewart County Middle School in Dover, Stewart County High School on US 79 and North Stewart Elementary School on US 79). The additional hauling of CCR along the haul route has the potential to interfere with school bus and passenger car traffic at these schools. TVA would coordinate with Tennessee Department of Transportation and Steward County transportation officials as needed to develop appropriate mitigative measures to reduce localized temporary transportation effects where necessary.

The percentage increases in traffic resulting from the transport of existing CCR from CUF are minor. However, impacts to traffic flow, roadway conditions and safety may be evident

and would be greater than Alternative B due to the increased number of trucks and duration of transport such that the impact would be moderate.

3.18.2.5 Summary of Impacts to Transportation

As summarized in Table 3-28, TVA has determined that all transportation impacts related to the CCR management projects would have a minor impact on the levels of service on the public road system near CUF. Increased traffic resulting from the hauling of future CCR to the offsite landfill would occur each work day for approximately 18 years. The impacts to levels of service along the haul route would be minor, but there would be an increase in the number of vehicle miles traveled on those roadways, which is a factor in injury and fatal traffic crash rates. The number of truck-related crashes associated with the offsite hauling of CCR from CUF could increase and could compromise driver safety. Therefore, localized effects on traffic safety may be evident.

Table 3-28. Summary of Impacts to Transportation

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary increased traffic resulting from construction activities. Negligible increase in traffic resulting from operations of the facility.	Minor impact.
Ash Impoundment Closures		
Closure-in-Place	Temporary increase in traffic on public roads from construction-related traffic associated with impoundment closures.	Minor impact, yet less than Closure-by-Removal.
Closure-by-Removal	Offsite transport of CCR increases traffic which results in roadway deterioration and potential increase in crash rates on public roadways during closure activities.	Minor impact.
Landfill		
Onsite Landfill	Temporary increase in construction-related traffic on public roadways. Onsite access road would be used to transport CCR to the onsite landfill.	Minor impact.
Offsite Landfill	Long-term increase in traffic resulting in roadway deterioration and potential increase in crash rates on public roadways.	Moderate impact. Magnitude of impact increases with number of trucks on public roadways.

3.19 Noise

3.19.1 Affected Environment

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

residences. Other receptors might include other developed sites where frequent human use occurs such as churches and schools.

Sound is measured in units of decibels (dB) on a logarithmic scale. The “pitch” (high or low) of the sound is a description of frequency, which is measured in Hertz (Hz). Most common environmental sounds are a composite of sound energy at various frequencies. A normal human ear can usually detect sounds within the frequencies from 20 Hz to 20,000 Hz. However, humans are most sensitive to frequencies between 500 Hz to 4,000 Hz.

Sound from a source spreads out as it travels from the source, and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy; atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over large distances from the source. An individual’s sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval. A continuous source of noise is rare for long periods and is typically not a characteristic of community noise (i.e., Community noise refers to outdoor noise near a community). Typical background day/night noise levels for rural areas range between 35 and 50 dB whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio, and sleeping.

Certain frequencies are given more “weight” during noise assessments because human hearing is not equally sensitive to all frequencies of sound. This adjusted unit of measure is known as the A-weighted decibel, or the dBA. The dBA scale corresponds to the sensitivity range for human hearing. A scale weighting reflects the fact that a human ear hears poorly in the lower octave-bands. It emphasizes the noise levels in the higher frequency bands heard more efficiently by the ear and discounts the lower frequency bands. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. A 10 dBA change is perceived as a doubling or halving of noise loudness; whereas a 20 dBA change is considered a “dramatic change” in loudness. Common indoor and outdoor noise levels are listed in Table 3-29.

3.19.1.1 Noise Regulations

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level, or Leq. The Leq value, expressed in dBA, is the energy-averaged, A-weighted sound level for the time period of interest. The day-night sound level (Ldn), is the 24-hour equivalent sound level Leq, which incorporates a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased annoyance during this period and the fact that when most people are more sensitive to noise while they are trying to sleep. The EPA (1974) guidelines recommended that Ldn not exceed 55 dBA for outdoor residential areas. The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985). These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (EPA 1974). For traffic-related noise, the Federal Highway Administration (FHWA) has set a threshold of 67 dBA as the sound level at which noise abatement should be considered. The Tennessee Department of Transportation (TDOT) has adopted this same threshold for projects in Tennessee.

Table 3-29. Common Indoor and Outdoor Noise Levels

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

3.19.1.2 Sources of Noise

There are numerous existing sources of noise at CUF. Operations at the existing coal plant generate varying amounts of environmental noise. Noise generating activities associated with the existing plant include coal unloading activities, periodic dozer operations associated with coal pile management and truck operations. Existing noise emission levels associated with these activities typically range from 59 to 87 dBA when measured 50 feet from the source (TVA 2014).

Noise sources common to activities evaluated in this EIS include noise from industrial activities, transportation noise, and construction noise. Transportation noise related to activities evaluated in the EIS primarily includes noise from highway traffic; however, there

would also be some noise related to rail and barge traffic at CUF. Three primary factors influence highway noise generation; traffic volume, traffic speed, and vehicle type. Generally, heavier traffic volumes, higher speeds, and greater numbers of trucks increase the sound level of highway traffic noise. Other factors that affect the sound level of traffic noise include a change in engine speed and power, such as at traffic lights, hills, and intersecting roads, as well as pavement type. Highway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in approximately a 3 dBA increase in noise levels, which would not normally be a perceptible noise increase. Railway noise depends primarily on the speed of the train but variations are present depending upon the type and condition of engines, wagons, and rails (Berglund and Lindvall 1995). The sources of noise associated with unloading of barges are related to the conveyor system used to transfer coal from the barges. Barge operations produce two types of noise: noises produced by a tug maneuvering the tow into and out of the loading area; and noises associated with the arrival and departure barge tow (USACE 1975). Since the proposed projects would not increase the amount of coal delivered to CUF, any increase in barge-related and railway noise associated with the project is expected to be very minor and intermittent.

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

3.19.1.3 Noise Receptors

CUF is bordered by wooded ridges to the west, open pasture with a mix of trees to the south and east, and the Cumberland River to the north. The residential areas nearest the CUF plant are in Cumberland City, approximately 0.2 mile from the eastern edge of the CUF property. These same residences are approximately 2,100 feet east of the coal stack. These residences, or receptors, are currently most affected by plant noise. There are numerous residences in proximity to the western CUF site boundary (some are within 100 feet) along Scotts Chapel Road (see Figures 1-1 and 2-3). The nearest church and cemetery are the United Methodist Church and cemetery in Cumberland City, approximately 0.4 mile east of the CUF coal stack.

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action Alternative

Under Alternative A, there would be no changes to CCR management operations at CUF. Therefore, no changes in the existing noise environment would occur under this alternative.

3.19.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.19.2.2.1 Construction Impacts

Construction-related noise would result from the construction of the Bottom Ash Dewatering facility, the closure of the ash impoundments and the new onsite landfill. There are no receptors within 500 feet of the proposed dewatering site and ash impoundments, therefore there would be no direct noise impact.

There is a potential for indirect noise impacts associated with an increase in construction related traffic associated with these activities. 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

Under the proposed closure of the Main Ash Impoundment and Stilling Impoundment , CCR from the Stilling Impoundment and a portion of the CCR from the Main Ash Impoundment would be removed and transported to an existing offsite landfill. The transport of CCR to an existing offsite facility would impact sensitive receptors along the haul route. However, the amount of CCR removed from the impoundments would be lower than what would be removed under the Closure-by-Removal option. Therefore, the duration and number of trucks needed to transport CCR to the offsite facility would be lower and accordingly, noise impacts would be less than described for the Closure-in-Place option.

The transport of borrow material to the impoundments could result in indirect noise impacts. TVA anticipates that if borrow is needed it would be obtained from existing borrow areas and onsite project areas. The borrow areas are located south of the main plant site. Environmental impacts associated with obtaining borrow from these sites have been previously assessed (TVA 2017b). If additional borrow materials are needed beyond what can be provided by onsite sources, borrow would be obtained from an offsite permitted borrow site within 30 miles of CUF. Although the exact haul route from this potential borrow site is not known, as noted in the PEIS (TVA 2016b) transport of borrow material may result in an increase in intermittent noise at residences or other sensitive receptors located along any local roads that may be utilized during the construction period. For borrow sites at greater distances from the plant site, trucks are expected to use larger arterial roadways for much of the travel to and from the borrow site. Noise impacts from the additional transport of borrow along these arterial roadways is expected to be minor relative to existing baseline traffic-related noise.

Under the Closure-by-Removal option, CCR from the impoundments would be transported offsite to the Bi-County Solid Waste Management Landfill. There are over 556 noise sensitive receptors within 500 feet of the project site, which includes the associated haul routes between CUF and the Bi-County Solid Waste Landfill. The haul route primarily utilizes SR 233 (also known as Cumberland City Road), SR 49 and US 79 (see Figure 2-4). Current traffic volumes on these roadways includes truck use. Sensitive receptors (such as churches and residences) located along the haul route in proximity to these roadways would be impacted by the noise generated by the transport of CCR from the impoundments to the Landfill. To determine potential impacts of traffic-related noise along this route, FHWA's Traffic Noise Model (TNM) was used to predict noise impacts to selected,

representative receptors located closest to the haul road. Based on anticipated generation rates, it is estimated that 100 truckloads of CCR would be transported to the Bi-County Solid Waste Landfill per day for a typical five-day work week. This would result in approximately 200 truck trips per day along the haul route or approximately 22 truck trips per hour over a typical nine-hour workday.

Predicted noise levels resulting from the transport of existing CCR along the haul route to the Bi-County Solid Waste Management Landfill are identified in Table 3-30.

Table 3-30. Predicted Noise Levels Associated with the Transport of Existing CCR Along the Haul Route from CUF to Bi-County Solid Waste Management Landfill

Roadway Noise Analysis	Estimated Modeled Noise Level (dBA)
SR 233 at just west of CUF	
Existing Peak	54.8
Peak during hauling	58.7
SR 233 just east of SR 49 at Carlisle	
Existing Peak	51.7
Peak during hauling	57.1
SR 49 just north of SR 233 at Carlisle	
Existing Peak	56.6
Peak during hauling	61.7
SR 49 just east of Dover at Lick Creek Bridge	
Existing Peak	53.2
Peak during hauling	58.5
US 79 just north of Cumberland River Bridge	
Existing Peak	54.7
Peak during hauling	57.9

Existing peak traffic noise levels along the haul route range from a low of 51.7 dBA to 56.6 dBA. Predicted noise levels from the transport of CCR from CUF increased from 3.2 to 5.4 dBA at the receptors modeled. The estimated modeled noise from hauling operations along the haul route (which also includes the existing local traffic) does not exceed the FHWA and TDOT criterion of 67 dBA for considering noise abatement due to traffic-related noise. However, at most of these receptors, noise levels would increase by more than 3 dBA which means the change in noise level would be perceptible at the adjacent land uses along the haul route. However, these impacts would be intermittent and occur during a normal workday. Given this, the noise impacts associated with the hauling of CCR from CUF to the Bi-County Solid Waste Landfill are expected to be minor.

Construction of the landfill would generate noise from compactors, front loaders, backhoes, graders, trucks, and blast devices. As illustrated in Table 3-31, typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the equipment. These types of noise levels would diminish with distance from the project site activity at a rate of approximately 6 dBA per each doubling of distance. Therefore, noise would be expected to attenuate to the recommended HUD noise guideline of 65 dBA at approximately 500 feet. However, this distance would be shorter in the field as objects and topography would cause further noise attenuation. Although construction noise would attenuate to meet the HUD guideline of 65 dBA during daytime hours, construction noise

could still remain above the EPA guideline of 55 dBA at 500 feet. However, these impacts would be intermittent and temporary. Given the temporary and intermittent nature of construction noise, the impact of noise generated from construction activities is expected to be minor.

Table 3-31. Typical Construction Equipment Noise Levels

Equipment	Noise Level (dBA) at 50 feet
Dump Truck	84
Bulldozer	85
Scraper	85
Grader	85
Excavator	85
Compactor	80
Concrete Truck	85
Boring-Jack Power Unit	80
Backhoe (trench)	80
Flatbed Truck	84
Crane (mobile)	85
Generator	82
Air Compressor	80
Pneumatic Tools	85
Welder/Torch	73

Source: FHWA 2016

3.19.2.2.2 Operation Impacts

Primarily, operation of the dewatering facility and the proposed landfill would occur during the day on weekdays. There are no receptors within 500 feet of the proposed dewatering site and, therefore, operation of this facility would not have an impact.

The transition from construction-period noise to operation-period noise at the proposed onsite landfill would be relatively indistinct since the same type of equipment would be used to operate the landfill as would be used during construction of the landfill. The construction of the dedicated onsite haul road would be temporary; however, the movement of dump trucks carrying CCR over the haul road would fall into operation of the landfill and would not be temporary. To assess the impact of noise from landfill operations, several potential noise receptors were identified near the proposed site and analyzed for noise impacts. The receptors closest to the proposed onsite landfill are along East Richview Road, which is west of the proposed landfill.

Noise level impacts from construction equipment used to construct and operate the landfill are listed in Table 3-32.

Table 3-32. Predicted Noise Levels Resulting from Operations at Onsite Landfill

Noise Generation Feature	Noise Level (dBA) at 50 feet	Receptor	Distance to receptor (feet)	Noise Level (dBA) at receptor
Dozer, Scraper, Grader, or Excavator	85	Home on east end of East Richview Road	536	64.40

Noise levels attenuate to below 65 dBA at the receptor located nearest to the proposed landfill site. The nearest receptor to the landfill boundary is a home on East Richview Road (536 feet from the proposed landfill). Based on straight line noise attenuation, it is estimated that noise levels from landfill operations would attenuate to approximately 64.4 dBA, however, the actual noise level would probably be lower in the field, where objects and topography would cause further noise attenuation. Noise from the operations of the landfill would attenuate to meet the HUD guideline of 65 dBA during daytime hours. However, operational noise could still remain above the EPA guideline of 55 dBA. However, operational noise impacts would be intermittent and usually occur during normal working hours. Consequently, noise impacts associated with the operation of the proposed onsite landfill are expected to have a minor, yet noticeable impact on the receptors located on East Richview Road.

3.19.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Noise-related impacts of Alternative C associated with implementation of the Bottom Ash Dewatering Facility, in-place closure of the impoundments and development of an onsite CCR landfill would be the same as Alternative B.

However, existing CCR from the impoundments at CUF would be transported to the onsite landfill. There are no receptors within 500 feet of the impoundments or the landfill, therefore there would be no impacts.

3.19.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Noise-related impacts of Alternative D associated with implementation of the Bottom Ash Dewatering Facility would be the same as Alternatives B and C, and the same as Alternative B for impoundment closures.

However, under this alternative and unlike Alternative B, future CCR generated at CUF would be transported to the Bi-County Solid Waste Management Landfill for long-term storage. The existing CCR in the ash impoundments and the future CCR generated at CUF would be transported to the Bi-County Solid Waste Landfill along the haul route described above for Alternative B. As discussed above, there are over 556 noise sensitive receptors within 500 feet of the project site, which includes the associated haul routes between CUF and Bi-County Solid Waste Landfill. Closure-by-Removal of the Bottom Ash and Main Ash Impoundments is expected to result in transporting 100 truckloads of CCR per day which would generate an increase in traffic volume of 200 truck trips per day that would occur daily for approximately 12 years. Future CCR would also be hauled in over-the-road dump trucks to the existing landfill site. Based on the estimate of CCR produced daily and the capacity of an over-the-road dump truck, 187 truckloads of CCR per day would be needed to transport CCR to the proposed landfill which would generate and increase in traffic volume of 374 truck trips per day for approximately 19 years. Together, these trips would result in approximately 574 truck trips per day along the haul route, or approximately 65 truck trips per hour over a typical nine-hour workday during the estimated duration of closure activities (12 years). Once closure of the ash impoundments is complete, transport

of future CCR would occur daily (during a typical five-day work week) for an additional 7 years to accommodate long-term disposal of CCR generated at this facility.

Predicted noise levels along the haul route as a result of transport of existing CCR and future CCR to the Bi-County Solid Landfill are identified in Table 3-33.

Table 3-33. Predicted Noise Levels Along the Haul Route from CUF to Bi-County Solid Waste Landfill

Roadway Noise Analysis	Estimated Modeled Noise Level (dBA)
SR 233 at just west of CUF	
Existing Peak	54.8
Peak during hauling	61.6
SR 233 just east of SR 49 at Carlisle	
Existing Peak	51.7
Peak during hauling	60.5
SR 49 just north of SR 233 at Carlisle	
Existing Peak	56.6
Peak during hauling	65.0
SR 49 just east of Dover at Lick Creek Bridge	
Existing Peak	53.2
Peak during hauling	61.9
US 79 just north of Cumberland River Bridge	
Existing Peak	54.7
Peak during hauling	60.6

Existing peak traffic noise levels along the haul route range from a low of 51.7 dBA to 56.6 dBA. Predicted noise levels from the transport of CCR from CUF increased from 5.9 to 8.8 dBA at the receptors modeled. The estimated modeled noise from hauling operations along the haul route (which also includes the existing local traffic) does not exceed the FHWA and TDOT criterion of 67 dBA for evaluating the need for noise abatement due to traffic-related noise. However, at most of these receptors, noise levels would increase by more than 3 dBA, which means the change in noise level would be perceptible to receptors along the haul route. However, these impacts would be intermittent and occur during a normal workday. Given this, the noise impacts associated with the hauling of CCR from CUF to the Bi-County Solid Waste Landfill are expected to be minor. Although these impacts are considered minor, they are greater than the noise impacts that would result from Alternative B.

3.19.2.5 Summary of Noise Impacts

There are no sensitive receptors within 500 feet of CUF, therefore there would be no direct noise impact associated with the proposed projects. Indirect noise impacts created by increased traffic resulting from hauling CCR to the offsite landfill would be minor and would occur each work day for approximately 12 and 19 years for Alternatives B and D, respectively. Noise impacts are summarized in Table 3-34.

Table 3-34. Summary of Noise Impacts

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary and localized noise emissions during construction, long-term and localized during operation.	Minor impact.
Ash Impoundment Closures		
Closure-in-Place	Temporary and localized noise emissions during construction. Indirect impact to receptors along the haul route to the offsite landfill.	Minor impact, yet less than the Closure-by-Removal option.
Closure-by-Removal	Temporary and localized noise emissions during construction, Indirect impact to receptors along the haul route from transport of CCR to the offsite landfill.	Minor impact.
Landfill		
Onsite Landfill	Construction and operation of onsite landfill (trucks transporting CCR to the onsite landfill as well as equipment used to manage the CCR at the landfill).	Minor impact. Noticeable increase in noise levels during landfill operation. Operational noise would be intermittent and generally occur during normal working hours. .
Offsite Landfill	Increased noise along the haul route resulting from transporting CCR to the offsite landfill.	Minor, but greater than that for Alternatives B and C.

3.20 Socioeconomics and Environmental Justice

3.20.1 Affected Environment

Socioeconomic characteristics of resident populations are assessed using 2010 Census and 2011-2015 American Community Survey (ACS) 5-year estimates provided by the U.S. Census Bureau (USCB 2017a; 2017b). Employment and housing data are provided by the 2011-2015 ACS.

For socioeconomic and Environmental Justice (EJ) analyses, TVA used data from a spatial extent and scale that provides the most accurate and up-to-date picture of socioeconomic characteristics near the proposed actions. The spatial extent for the analysis of socio-economic impacts is set as a 5-mile radius buffer around CUF property which encompasses the proposed onsite landfill, dewatering facility, and ash impoundment closures; and a 0.5-mile radius around the Bi-County Solid Waste Management Landfill and associated haul route (i.e., Alternatives B and D). A 5-mile buffer adequately considers effects from construction activities proposed by the alternatives. Conversely, a smaller 0.5-mile buffer for the haul route is more appropriate because of a lack of construction activities and this would incorporate those that would potentially be impacted by the transportation of CCR.

Socioeconomic data are assessed by block groups (i.e., the second smallest census geography unit). This spatial scale of analysis simultaneously provides fine detail while maintaining the greatest availability of data. Secondary geographic areas of reference

include Houston, Montgomery, and Stewart counties, and the state of Tennessee. A comparison at multiple spatial scales provides a more detailed picture of populations that may be affected by the proposed actions including any EJ populations (e.g., minority and low income).

3.20.1.1 Demographics

Demographic characteristics of the study area (including: population, race, and age,) are summarized in Table 3-35.

Table 3-35. Demographic Characteristics

	TVA Cumberland Fossil Plant (5-mile Radius)	Bi-County Solid Waste Management Landfill and Haul Route (0.5-mile Radius)	Houston County	Montgomery County	Stewart County	State of Tennessee[2]
Population[1]						
Population, 2015 estimate	10,388	14,731	8,290	185,980	13,286	6,499,615
Population, 2010	10,394	14,910	8,426	172,331	13,324	6,346,105
Percent Change 2010-2015	-0.1%	-1.2%	-1.6%	7.9%	-0.3%	2.4%
Persons under 18 years, 2015	22.5%	23.2%	23.3%	27.3%	22.2%	33.0%
Persons 65 years and over, 2015	15.5%	15.0%	18.9%	8.4%	18.6%	14.6%
Racial Characteristics[1]						
White alone, 2015 (a)	94.7%	92.3%	94.3%	71.7%	93.5%	77.8%
Black or African American, 2015 (a)	3.5%	2.6%	2.7%	19.2%	1.6%	16.8%
American Indian and Alaska Native, 2015 (a)	0.2%	0.1%	0.5%	0.6%	1.2%	0.3%
Asian, 2015 (a)	0.2%	1.1%	0.2%	2.1%	1.2%	1.6%
Native Hawaiian and Other Pacific Islander, 2015 (a)	0.0%	0.0%	0.0%	0.4%	0.0%	0.1%
Some Other Race, 2015 (a)	0.0%	1.5%	0.2%	1.7%	0.6%	1.5%
Two or More Races, 2015	1.4%	2.3%	2.1%	4.2%	1.9%	2.0%
Hispanic or Latino, 2015d (b)	1.6%	4.7%	2.1%	9.3%	2.4%	4.9%
Housing and Income[2]						
Housing units, 2015	4,592	6,902	4,173	75,280	6,763	2,854,542
Median household income, 2011-2015	$43,773	$46,444	$39,401	$50,344	$42,023	$45,219
Persons below poverty level, 2011-2015	17.7%	15.9%	23.1%	15.8%	19.5%	17.6%

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
Sources: [1]USCB 2017a; [2]USCB 2017b;

The communities surrounding CUF and the haul route to the Bi-County Solid Waste Management Landfill are rural and not densely populated (e.g., 65.6 people per square mile; USCB 2017a). The nearest population centers are the rural municipalities of Cumberland City, Erin, Dover, and Woodlawn, Tennessee. Overall, there are approximately 19,704 people living near the study boundaries, which breaks down to 10,388 people living within 5 miles of CUF and 14,731 living within 0.5 mile of the haul route to the Bi-County Solid Waste Management Landfill (with some overlap between the two study boundaries).

In comparison to the population of the surrounding counties (207,556 people), the area around CUF contains only 5.0 percent of the regional population and the area around the Bi-County Solid Waste Management Landfill contains only 7.1 percent. Since 2010, the population around CUF and the Bi-County Solid Waste Management Landfill have decreased by approximately 0.1 and 1.2 percent, respectively. During this same period populations similarly decreased in Stewart and Houston Counties by 0.3 and 1.6 percent, respectively. Conversely, populations increased in Montgomery County by 7.9 percent and in Tennessee by 2.4 percent. Overall, population losses in the project area are small, mostly in line with the surrounding counties, and are more indicative of the general area (as population growth in Montgomery County is attributable to growth in unaffected Clarksville, Tennessee).

The population around CUF and the Bi-County Solid Waste Management Landfill is primarily comprised of white people (94.7 and 92.3 percent, respectively). The state of Tennessee is 77.8 percent White in comparison. Correspondingly, minority populations in the two study areas are small. Black, or African American, is the largest racial minority group, comprising 3.5 and 2.6 percent of the population surrounding CUF and the Bi-County Solid Waste Management Landfill, respectively. Hispanic and Latino ethnic groups make up a slightly higher proportion of the population around the Bi-County Solid Waste Management Landfill (4.7 percent), which is comparable to all of Tennessee (4.9 percent).

Age demographics of the population around CUF and the Bi-County Solid Waste Management Landfill are variable compared to the surrounding counties and the state. Persons under the age of 18 make up 22.5 and 23.2 percent of the population around CUF and the Bi-County Solid Waste Management Landfill, respectively. Numbers of persons greater than 65 years old around CUF (15.5 percent) and the Bi-County Solid Waste Management Landfill (15.0 percent) are similar to numbers throughout Tennessee (14.6 percent). However, more people 65 years and older are found in Houston (18.9 percent) and Stewart (18.6 percent) Counties and fewer are found in Montgomery County (8.4 percent). Overall, the study areas contain approximately 10 percent fewer children than Tennessee overall and approximately 4 percent fewer retirees than the surrounding region, which implies that no vulnerable age groups are concentrated within the proposed study boundaries.

3.20.1.2 Economic Conditions

Economic characteristics (housing, income, and employment rates) are shown in Tables 3-36 and 3-37.

Housing and income characteristics of the study areas are similar to comparison geographies (see Table 3-37). For example, neighborhoods surrounding CUF and the Bi-County Solid Waste Management Landfill comprise only 5.3 and 8.0 percent of the total housing units found in the three surrounding counties. These numbers parallel population figures at the same scale (see above). Median household incomes for neighborhoods around CUF ($43,773) and the Bi-County Solid Waste Management Landfill ($46,444) are comparable to Tennessee ($45,219). Additionally, persons living below the poverty line around CUF (17.7 percent) and the Bi-County Solid Waste Management Landfill (15.9 percent) are at or below the state average of 17.6 percent. Conversely, Houston and Stewart Counties have higher poverty rates (23.1 and 19.5 percent, respectively) than the populations found in the study boundaries.

The top three industries for civilian employment in Houston, Montgomery, and Stewart counties are: (1) educational, health care, and social services at 23.2 percent, (2) retail trade at 13.1 percent, and (3) manufacturing at 11.8 percent. In Houston County, construction (10.5 percent) also employs a larger percentage of the civilian population than other occupations (USCB 2017a). Median household incomes for neighborhoods around CUF ($43,773) and the Bi-County Solid Waste Management Landfill ($46,444) are comparable to the state (median income of $45,219; Table 3-37).

Employment rates in the study areas and references geographies are similar (Table 3-36). The total employed civilians in the communities surrounding CUF and the haul route to the Bi-County Solid Waste Management Landfill is 3,880 and 5,673, respectively. The civilian unemployment rate around CUF is 11.2 percent. This rate is 2.8 percent higher than the state average (8.4 percent), but similar to Stewart County (10.1 percent). Additionally, unemployment for the total employable population around CUF is 5.9 percent or only 0.8 percent above the state rate of 5.1 percent. Civilian unemployment around the haul route and Bi-County Solid Waste Management Landfill is 9.1 percent, which is slightly higher than the state unemployment rate (8.4 percent), but below the average unemployment for the three-county area (9.7 percent).

Table 3-36. Employment Characteristics

	TVA Cumberland Fossil Plant (5-mile Radius)	Bi-County Landfill and Haul Route (0.5-mile Radius)	Houston County	Montgomery County	Stewart County	State of Tennessee
Population ≥16 years	8,293	11,687	6,578	140,281	10,701	5,174,955
Civilian Labor Force						
Employed	3,880	5,673	2,997	73,139	4,818	2,888,742
Unemployed	491	570	265	7,843	541	266,297
Subtotal	4,371	6,243	3,262	80,982	5,359	3,155,039
Unemployment						
% of Total Population	5.9%	4.9%	4.0%	5.6%	5.1%	5.1%
% of Civilian Labor Force	11.2%	9.1%	8.1%	9.7%	10.1%	8.4%

Source: USCB 2017a

3.20.1.3 Community Facilities and Services

Community facilities and services are public or publicly-funded facilities such as police protection, fire protection, schools, hospitals and other health care facilities, libraries, day-care centers, churches, and community centers. Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Indirect impacts can also occur when a proposed project results in a population increase that would generate greater demands for services and affect the delivery of such services. When applicable, the study area for the evaluation of impacts to community services is the service area of various providers, otherwise a secondary study area defined for the purposes of a socioeconomic analysis may be defined. In this case, the study areas for community impacts are the same as socioeconomic analyses described above.

Community services available to the communities surrounding CUF and the Bi-County Solid Waste Management Landfill include fire and emergency services, law enforcement, churches, cemeteries, and schools (see Figure 3-8). Specifically, there are 11 churches, six cemeteries, three government offices (i.e., one post office and two wastewater treatment buildings), two schools, one fire department, and one police department located within a 5-mile radius of CUF. In addition, there are numerous community facilities including churches, schools, emergency services, and a sheriff's office within the 0.5-mile radius of the 37-mile haul route. Many of these facilities are concentrated in and around Dover, Tennessee.

3.20.1.4 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates some federal-executive agencies to consider EJ as part of the NEPA. EJ has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (EPA 2016b) and ensures that minority and low income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. Although TVA is not one of the agencies subject to this order, TVA routinely considers EJ impacts as part of the project decision-making process.

Guidance for addressing EJ is provided by the CEQ's Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997). Low income populations are based on annual-statistical poverty thresholds also defined by the USCB.

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

Low-income populations are those with incomes that are less than the poverty level, which varies by the size of family and number of related children under 18 years (CEQ 1997). The 2015 USCB Poverty Thresholds states the poverty threshold as an annual household income of $24,257 for a family of four (USCB 2017c). For an individual, an annual income of $12,082 is the poverty threshold. A low-income population exists if either of the following two conditions is met:

- The low-income population exceeds 50 percent of the total number of households.
- The ratio of low income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic area of analysis.

For this assessment, three geographic areas of analysis (i.e., census block group, county, and state) were used to determine potential EJ populations. Potentially affected communities were defined as any census block group that intersected the 5-mile radius study boundary around CUF or the 0.5-mile radius boundary around the haul route to the Bi-County Solid Waste Management Landfill). Demographic data by block group were then compared to county and state-wide data.

Total minority population (i.e., all non-white racial groups and Hispanic or Latino, combined) comprise 27.1 percent of the population of the state of Tennessee. Of the three counties considered, Montgomery has the highest percentage minority population (37.6 percent), followed by Stewart (8.9 percent), and Houston (7.7 percent).

Minorities comprise between 2.9 to 16.3 percent of the population of block groups intersecting the study area around CUF (average of 6.9 percent). None of these block groups exceed EJ thresholds when compared to reference geographies. Conversely, minorities range from 0 to 63.3 percent of the population surrounding the study area corresponding to the transport of CCR to the Bi-County Solid Waste Management Landfill (average of 12.4 percent); however, only one block group (Block Group 1, Census Tract 9801) located along the haul route in Montgomery County is considered a sensitive population subject to EJ consideration. This block group is located within the Fort Campbell U.S. Army Installation.

The poverty rate in Tennessee is 17.6 percent. Of the three counties considered, Houston has the highest poverty rate (23.1 percent), followed by Stewart (19.5 percent), and Montgomery (15.8 percent). The average poverty rate of the populations around CUF is 17.7 percent and ranges from 5.3 to 29.9 percent between block groups. None of these block groups exceed the EJ threshold when compared to reference geographies. The average poverty rate around the Bi-County Solid Waste Management Landfill is15.9 percent and ranges from 0 to 34.9 percent among the block groups studied. None of these block groups exceeds thresholds for EJ populations.

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no new plant operations and no new construction would be undertaken that could affect local demographics, economic conditions, community services, or EJ populations.

3.20.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under Alternative B, demographic characteristics of the project area are not expected to change significantly in response to an increase in temporary construction workforce. The peak construction workforce is estimated to peak at 260 workers for all phases of the project (i.e., construction of dewatering facilities and the proposed landfill and closure of the impoundments). These workers could be drawn from the labor force that currently resides in the study area. No additional permanent workers would be employed for long-term operation of the landfill or dewatering facility. Additionally, the Bi-County Solid Waste Management Landfill is already constructed, so no new workforce would be needed at that location. Overall, no long-term impacts to local demographics are expected due to the small

and temporary increase in workers related to the Bottom Ash Dewatering Facility construction, landfill construction, or ash impoundment closure.

Potential economic impacts associated with the proposed projects relate to direct and indirect effects of construction as well as the long-term operation of the facilities. Construction of the Bottom Ash Dewatering Facility and proposed landfill and closure of the ash impoundments would cause a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services. New construction workers and truck drivers are expected to be residents, which would help temporarily reduce unemployment around CUF. Revenue generated from sales tax from any additional purchases would also benefit the local economy. Capital costs associated with the proposed action would have direct economic benefits to the local area and surrounding community. Some beneficial secondary impacts to the economy are also expected in conjunction with the multiplier effects of construction. For example, local food and service industries would benefit from the demands brought by the increased construction workforce. However, given the size of the anticipated workforce (peak of up to 260 workers) and the temporary nature of the work, overall primary and secondary economic impacts are considered minor.

Community facilities would not be directly affected by the construction and operation of the Bottom Ash Dewatering Facility, in-place closure of Bottom Ash Impoundment, or the construction and operation of the landfill. However, the Main Ash impoundment would be closed using a combination of Closure-in-Place and Closure-by-Removal which includes offsite transport of CCR from a portion of the impoundment to an existing offsite landfill for disposal. Transport of existing CCR offsite would require the use of public roadways and would therefore potentially affect traffic and LOS on local roads. There may be some impacts to ease of movement to and from community facilities along the proposed haul route to the existing offsite landfill due to the addition of trucks transporting CCR, especially around Dover, Tennessee (see Figure 3-8). This impact would be less than the under the Closure-by-Removal option as the volume of CCR transported offsite would be less. No significant worker relocations to the area are anticipated; therefore, community services including fire, police, medical, and schools can likely accommodate the local population and would not be affected by the action.

There would be no impacts to EJ communities under Alternative B. No EJ populations were identified near CUF and only a single EJ group was identified along the haul route at the Bi-County Solid Waste Management Landfill. However, this block group is part of the Fort Campbell U.S. Army Installation and there are no civilian buildings or occupied barracks within the haul route boundary. Additionally, any long-term indirect impacts to this community due to the additional traffic, noise, and dust from the trucks transporting CCR to the landfill would not disproportionately affect this community and would be consistent across all communities (i.e., EJ and non-EJ) along the haul route. Therefore, there would be no disproportionate effects to minority or low income populations under this alternative.

3.20.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Under Alternative C, socioeconomic impacts associated with construction of the Bottom Ash Dewatering Facility, in-place closure of the impoundments, and construction and operation of the proposed landfill would be the same as identified under Alternative B.

Potential economic impacts associated with the proposed closure of the Main Ash Impoundment and closure of the impoundments under the Closure-by-Removal option would be similar those described for Alternative B. However, additional workers may be hired to accommodate the increased rate of transport of CCR that can be achieved with the use of the onsite landfill. However, this increase would be somewhat offset as the duration of closure would be much shorter than transport of CCR to the existing Bi-County Landfill. All major construction costs would remain the same and all direct and indirect beneficial economic impacts from construction would be realized. However, given the size and the temporary nature of the anticipated new workforce, economic impacts are considered to be low.

Transport of CCR to the existing onsite landfill would have no effect on community facilities as all construction and hauling of CCR would be contained to TVA property.

There would be no impacts to EJ communities under Alternative C as no EJ populations were identified near CUF.

3.20.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Under Alternative D, socioeconomic impacts associated with construction and operation of the Bottom Ash Dewatering Facility would be the same as Alternative B and C and to the same as Alterative B for ash impoundment closure. However, under this alternative, future CCR generated at CUF would be transported to the offsite landfill (the Bi-County Solid Waste Management Landfill) for long-term storage.

Potential economic impacts associated with the proposed projects relate to direct and indirect effects of construction as well as the long-term operation of the facilities and hauling of future CCR for disposal. The positive economic impacts from construction would be slightly reduced with the exclusion of the new landfill. Transport of CCR generated at CUF to the Bi-County Solid Waste Management Landfill is expected to be carried out by local contractors so the realized positive impact would be minor. Small beneficial secondary impacts to the economy are expected in conjunction with the multiplier effects of construction, but are expected to be negligible for long-term hauling of CCR to the Bi-County Solid Waste Management Landfill. Overall, short-term and long-term economic impacts to the regional economy are considered minor.

Community facilities would not be directly affected by the construction and operation of a landfill, dewatering facilities, or in place impoundment closure, but may be indirectly affected by hauling of CCR to the existing Bi-County Solid Waste Management Landfill. Effects of long-term hauling of CCR to the Bi-County Solid Waste Management Landfill are similar to Alternative B, where there may be some impacts to ease of movement from community facilities along the proposed haul route. These impacts would be extended for over approximately 19 years, but would be dispersed throughout a normal workday to fit in with normal traffic patterns and would not change LOS along the roadways. Long-term effects of increased truck traffic to facility accessibility along the haul route are considered minor.

Similar to other alternatives, there would be no impacts to EJ communities under Alternative D.

3.20.3 Summary of Socioeconomic Impacts

Socioeconomic consequences related to implementation of the proposed CCR management projects are summarized in Table 3-37.

Table 3-37. Summary of Socioeconomic Impacts

Project	Impact	Severity
Bottom Ash Dewatering Facility	Effect to community from additional construction workforce and primary and secondary beneficial economic impacts due to the multiplier effect related to employment and capital expenditures.	Minor beneficial impact.
	No disproportionate negative impact to environmental justice communities.	No impact.
Ash Impoundment Closures		
Closure-in-Place	Effect to community from additional construction workforce and primary and secondary beneficial economic impacts due to the multiplier effect related to employment.	Minor beneficial impact.
	Indirect impact to community facilities due to increased traffic along the haul route resulting from the hauling of CCR to offsite landfill.	Minor adverse impact, yet less than the Closure-by-Removal option.
	No disproportionate negative impact to environmental justice communities.	
Closure-by- Removal	Effect to community from additional construction workforce and primary and secondary beneficial economic impacts due to the multiplier effect related to employment and capital expenditures.	Minor beneficial impact.
	Indirect impact to community facilities along the haul route due to increased traffic along the haul route resulting from the hauling of CCR to offsite landfill.	Minor adverse impact.
	No disproportionate negative impact to environmental justice communities.	
Landfill		

Project	Impact	Severity
Onsite Landfill	Effect to community from additional construction workforce and primary and secondary beneficial economic impacts due to the multiplier effect related to employment and capital expenditures. No disproportionate negative impact to environmental justice communities.	Minor beneficial impact.
Offsite Landfill	Indirect Impact to community facilities along the haul route due to Increased traffic along the haul route resulting from the hauling of CCR to offsite landfill.	Minor impact, but greater than that for Alternatives B and C.

3.21 Public Health and Safety

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. OSHA is the main statute protecting the health and safety of workers in the workplaces. The Tennessee Department of Labor and Workforce Development has adopted federal OSHA standards.

TVA's Safety Standard Programs and Processes would be strictly adhered to during the proposed actions. The safety programs and processes are designed to identify actions required for the control of hazards in all activities, operations and programs. It also establishes responsibilities for implementing OSHA and state requirements.

3.21.1 Affected Environment

The routine operations and maintenance activities at CUF reflect a safety-conscious culture and activities are performed consistent with OSHA and TCA standards and requirements and specific TVA guidance. Personnel at CUF are conscientious about health and safety having addressed and managed operations to reduce or eliminate occupational hazards through implementation of safety practices, training and control measures.

CUF has safety programs and BMPs in place to minimize the potential of safety incidences. These would include but are not limited to such programs as the following:

- Operations and Maintenance Plans
- Hazard Communication
- Housekeeping
- Contractor Evaluation and Acceptance
- Competent Person
- Standard Operating Procedures
- Project Safety Plans

- Ground Disturbance
- Lifting Operations
- Energy Isolation (Lockout/Tag out)
- Cutting, Burning, Welding and other “Hot Work”
- Incident Reporting and Investigations
- Personal Protective Equipment
- Hearing Conservation
- H&S Training
- Emergency Spill/Release Plans
- Emergency Response Plan
- Hazard Analysis
- Management of Change
- Safety Reviews
- Compliance Audits

It is TVA’s policy that contractors have a site-specific health and safety plan in place prior to conducting construction activities at TVA properties. The contractor site-specific health and safety plans address the hazards and controls as well as contractor coordination for various construction tasks. A health and safety plan would also be required for workers responsible for operations after construction is complete.

The potential offsite consequences and emergency response plan are discussed with local emergency management agencies. These programs are audited by TVA no less than once every three years and by EPA periodically.

Health hazards are also associated with emissions and discharges from the facility as well as accidental spills/releases at the plant and/or along the pipelines. Mitigative measures are used to ensure protection of human health which includes the workplace, public and the environment. Applicable regulations and attending administrative codes that prescribe monitoring requirements may include those associated with emergency management, environmental health, drinking water, water and sewage, pollution discharge, air pollution, hazardous waste management and remedial action.

Additionally, wastes generated by operation of the plant can pose a health hazard. Wastes including solid wastes, hazardous waste, liquid wastes, discharges and air emissions are managed in accordance with applicable federal, state and local laws and regulations and all applicable permit requirements. TVA is committed to complying with all applicable regulations, permitting and monitoring requirements. Furthermore, waste reduction practices are employed including recycling and waste minimization.

3.21.2 Environmental Consequences

3.21.2.1 Alternative A – No Action Alternative

The operations and maintenance activities at CUF would continue within the safety-conscious culture and activities currently performed in accordance with applicable standards or specific TVA guidance. TVA would continue to address and manage reduction or elimination of occupational hazards through implementation of safety practices, training and control measures. TVA's safety conscious efforts would continue such that no changes to current public and health and safety are anticipated under this alternative. Therefore, Alternative A would not have an impact on public health and safety.

3.21.2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

3.21.2.2.1 Construction Impacts

During construction of the Bottom Ash Dewatering Facility and onsite landfill, customary industrial safety standards as well as the establishment of applicable BMPs and job site safety plans would describe how job safety would be maintained. These BMPs and site safety plans address the implementation of procedures to ensure that equipment guards, housekeeping, and personal protective equipment are in place; the establishment of programs and procedures for lockout (to ensure machinery or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance) , right-to-know (correct labelling of materials), hearing conservation, equipment operations, excavations, grading, and other activities; the performance of employee safety orientations and regular safety inspections; and the development of a plan of action for the correction of any identified hazard. Construction debris and wastes would be managed in accordance with federal, state, and local requirements. Construction activities in support of the proposed projects would be performed consistent with standards as established by OSHA and TCA requirements. Worker and public health and safety during construction including material transportation would be maintained, and impacts to public health and safety would be minor.

Activities associated with Closure-in-Place of the impoundments would include dewatering, equipment removal, grading, compaction and stabilization of CCR, and transport and installation of an approved closure system geomembrane cap. The equipment required for the impoundment closures includes dozers, compactors, dump trucks, scrapers/pans, track hoes and diesel pumps. Customary industrial safety standards as well as the establishment of applicable BMPs and job site safety plans similar to what was described for the construction of the Bottom Ash Dewatering Facility would describe how job safety would be maintained.

Under the proposed closure of the Main Ash Impoundment and Stilling Impoundment and under the Closure-by-Removal option, CCR would be excavated from the impoundments and transported to an offsite permitted landfill. The equipment required for the impoundment excavation and closures includes dozers, compactors, dump trucks, scrapers/pans, track hoes and diesel pumps. Work including the excavation, loading and transport of the CCR would follow customary industrial safety standards as well as the establishment of applicable BMPs and job site safety plans to describe how job safety would be maintained. These same standards would be followed under the Closure-by-Removal options for all impoundments.

Closure activities including material transport in support of the proposed closure activities would be performed consistent with standards as established by OSHA and TCA requirements. Worker and public health and safety during project activities and material transportation would be maintained. However, as identified in the PEIS (TVA 2016b) offsite transport of CCR results in a higher risk to workforce health and safety as well as increased risk related to offsite transportation of CCR (crashes, derailments, road damage and other transportation-related effects). The risk is greater under the Closure-by-Removal option given the increased volume of CCR and associated increase in truck trips needed to transport CCR relative to the Closure-in-Place option.

3.21.2.2.2 Operation Impacts

Activities associated with operation of the Bottom Ash Dewatering Facility and maintenance of the closed impoundments (e.g., maintaining vegetation, monitoring, and reporting as necessary), would adhere to established health and safety practices. These practices would address and provide management procedures for the reduction or elimination of occupational and public health hazards.

Operation of the proposed landfill would require the use of earthmoving and compacting equipment as well as trucks for hauling materials. CCR generated at CUF would be transported by truck via onsite roads to the proposed onsite landfill. Onsite traffic would increase but not impact the local roadways and public traffic.

The operation of the proposed onsite landfill would comply with TVA guidance and be consistent with standards established by OSHA. Health and safety practices would be developed and implemented to address and manage the reduction or elimination of occupational and public health hazards through worker training and adherence to safety practices and control measures. There would be no increase in the use of public roads associated with the offsite transport of CCR which would reduce the possibility of traffic incidents and as such, lessen the potential for impacts to public health and safety.

All facility wastes would be managed in accordance with applicable federal, state and local laws and regulations and all applicable permit requirements. No hazardous materials that might affect human safety are expected to be utilized. Implementation of operational safety measures would manage and address monitoring and control; maintenance and integrity programs; performance of field surveys and inspections; right-of-way maintenance; and public awareness. Therefore, worker and public health and safety during operation including material transportation would be maintained and impacts would be minor.

3.21.2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Existing Onsite Landfill), Onsite Landfill for Future CCR Produced at CUF

Alternative C would have similar impacts to worker and public health and safety as Alternative B regarding the implementation of the dewatering facility, in-place impoundment closure, and the construction of the onsite landfill for future CCR.

However, CCR removed from the impoundments would be transported onsite to the existing landfill which is permitted to receive the material. TVA has determined that onsite transport of CCR could be accomplished with larger trucks and the shortened transport distance would allow for a greater number of truck trips per normal working shift. Worker safety during material transportation would be maintained through TVA's standard traffic management measures employed at all of TVA plant sites. There would be no increase in

the use of public roads that is associated with the offsite transport of CCR. This would reduce the possibility of traffic incidents and as such, the impact to public health and safety would be decreased. However, as identified in the PEIS, excavation activities have a greater risk of injury or fatality. Customary industrial safety standards including OSHA requirements for workers engaged in excavation activities would help reduce these risks.

Therefore, impacts to worker and public health and safety associated with this alternative, would be minor, and as offsite transport of CCR would not occur, impacts associated with the transport of CCR would be less than those described under Alternative B.

3.21.2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

Impacts to worker public health and safety under Alternative D would be the same as Alternatives B and C for the Bottom Ash Dewatering Facility, and to the same as Alternative B for the ash impoundment closure activities.

However, under Alternative D, an onsite landfill would not be constructed and future CCR generated at CUF would be transported by truck on existing roadways to the Bi-County Solid Waste Management Landfill for long-term disposal. Alternative D would increase the traffic on existing roadways associated with the offsite transport of CCR which would potentially increase the risk of injuries and fatalities associated with traffic incidents.

Implementation of Alternative D would require the use additional trucks to transport CCR. TVA would establish health and safety practices that would address and manage the reduction or elimination of occupational and public health hazards associated with the offsite hauling activities through implementation of safe operation practices, training and control measures.

All wastes generated by use of additional trucks would be managed in accordance with applicable federal, state and local laws and regulations, and all applicable permit requirements. TVA may decide to contract with outside vendors for these transportation services under Alternative D. TVA policy requires that contractors have in place a site-specific health and safety plan prior to operation on TVA properties. The contractor site-specific health and safety plan addresses the hazards and controls; spill and emergency response; as well as contractor coordination for operations.

Therefore, worker and public health and safety regarding offsite disposal of CCR in an existing permitted landfill would be maintained, and there would be minor impact to public health and safety. However, given the number of additional trucks estimated to be on the roadway, this impact would be greater than that under Alternatives B and C.

3.21.3 Summary of Impacts to Public Health and Safety

Impacts to public health and safety related to implementation of the proposed CCR management projects are summarized in Table 3-38.

Table 3-38. Summary of Impacts to Public Health and Safety

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary construction impacts related to construction activities and construction-related traffic.	Minor impact.
	No impact related to operation.	
Ash Impoundment Closures		
Closure-in-Place	Temporary construction impacts related to construction activities and construction-related traffic.	Minor impact.
	Excavation of CCR to support the Process Water Basins results in a higher risk to workforce health and safety.	Minor impact
	Transport of existing CCR to an offsite facility results in increased risk related to offsite transportation of CCR (crashes, road damage and other transportation-related effects).	Minor impact.
Closure-by- Removal	Closure-by-Removal to the onsite landfill results in higher risk to workforce health and safety related to excavation and transport of CCR. No risk to public safety associated with the use of public roads.	Minor impact.
	Closure-by-Removal to offsite landfill results in increased risk related to offsite transportation of CCR (crashes, road damage and other transportation-related effects).	Minor impact. But incrementally greater than Closure-in-Place or Closure-by-Removal to onsite stacks.
Landfill		
Onsite Landfill	Temporary construction impacts related to construction activities and construction-related traffic.	Minor impact.
	No impact related to operation.	
Offsite Landfill	Impacts to public health and safety related to transport of CCR on public roadways.	Minor impact, but greater than that for Alternatives B and C.

3.22 Unavoidable Adverse Impacts

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

The closure of impoundments at CUF has the potential to cause unavoidable adverse effects to existing open water habitats located within the ash impoundments. However, this

impact is considered minor as these areas are elements of a man-made permitted treatment system which do not provide high quality habitat. In addition, temporary impacts to water quality from runoff at the site and wastewater discharge during dewatering could impact nearby receiving water bodies during initial construction activities. BMPs to minimize runoff would be implemented, and water released by construction activities would meet established TDEC permit limits.

Under Alternatives B and C, the construction of a new onsite landfill would be on lands currently undeveloped and covered with forested vegetation. Clearing and grading of the site would result in long-term impacts to species composition and wildlife habitat. However, due to the abundant habitat of similar quality within a 5-mile radius of CUF, the overall impact to vegetation and wildlife is considered moderate. Adverse impacts would also occur to a small wetland area, one perennial stream, one intermittent stream, and four ephemeral streams located within the proposed onsite landfill. This impact would be mitigated through adherence to permit requirements. Operation of the landfill would impact to Wells Creek and or Scott Branch from leachate and storm water discharges. However, this impact would be mitigated by adherence to permit requirements.

Other impacts associated with Alternatives B and C primarily would be related to impacts that occur during construction activities. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, noise, and vibration that may potentially impact onsite workers. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the site. Emissions from construction activities and equipment are minimized through implementation of mitigation measures, including proper maintenance of construction equipment and vehicles. During operation of the dewatering facility, onsite handling and transportation of CCR to the CCR landfill may generate minor amounts of fugitive dust.

Under Alternatives B and D, the transport of CCR material from CUF to the Bi-County Solid Waste Management Landfill would increase truck traffic volumes on public roads which could compromise public safety. This additional operations-related traffic would also increase noise and fugitive dust in areas in proximity to these roads. Emissions from the haul trucks are minimized through implementation of BMPs including proper vehicle maintenance.

3.23 Relationship of Short-Term Uses to Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This EIS focuses on the analyses of environmental impacts associated with the various projects proposed to support management of CCR produced at CUF. For the purposes of this section, these activities are considered short-term uses of the environment and the long-term is considered to be initiated upon the cessation of management and storage of CCR at CUF. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project site.

Construction activities would have a negative effect on a limited amount of short-term uses of the environment such as air, noise, and transportation resources as described above. In addition, construction activities such as site preparation and noise may displace some wildlife during the construction period. Most environmental impacts during construction activities would be relatively short-term and would be addressed by BMPs and mitigation

measures. Construction activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction and support jobs and revenue.

The proposed Bottom Ash Dewatering facility would be constructed in an area that has been previously disturbed and supports industrial uses. Because CUF is dedicated to power production, no loss of productivity of other natural resources is anticipated. In the long-term, upon cessation of operations at CUF and after decommissioning, the lands could be reused and made available for other uses. Safety and security requirements as well as post-closure monitoring of the impoundments and landfill could impact future use of these areas. However, since these facilities are located on land presently dedicated for industrial uses, future land use would be limited to those uses that are compatible with industrial uses, until the CUF facilities are decommissioned.

Ash impoundment closure at CUF would have a beneficial effect on long-term productivity through the reduction or elimination of potential subsurface discharges of leachate to groundwater. Although there is adequate capacity to store CCR in the existing onsite landfill, at some point in the future capacity to store CCR onsite would become a limiting factor for CUF operations. Therefore, the development of the CCR Rule-compliant landfill would have a favorable short-term impact on productivity resulting from the operations at CUF in that the proposed landfill would meet the need for long-term storage of CCR so that CUF operations would not need to be curtailed.

If needed, the purchase of borrow material would have a short-term impact on the availability of this resource for other uses, however this impact is minimized as it is anticipated that borrow material primarily would be obtained from borrow areas on CUF property.

Use of the Bi-County Solid Waste Management Landfill would impact capacity and, therefore, have an impact on the users of the landfill. However, there are other landfills within the region that may be utilized for disposal of waste materials.

3.24 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used in the construction and operation of the proposed CCR management activities. An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be recovered or reversed. The term irreversible commitments of resources describe environmental resources that are potentially changed by the construction or operation of the proposed projects that could not be restored to their prior state by practical means at some later time. Irretrievable commitments of resources include materials that are used for the new facility in such a way that they could not be recycled or restored for a period of time. The opportunity to use a resource is foregone while it is committed to other uses. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road right of way as long as the road remains. Mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored.

The land used for the proposed dewatering facility is not irreversibly committed because once operations at CUF cease, the land supporting the facilities could be returned to other industrial uses. Nonrenewable fossil fuels and some process materials such as thickening agents would be irretrievably lost through the construction and operation of the dewatering facility. In addition, the materials used for the construction of the facility would be committed

for the life of the facility. While some of these building materials may be irreversibly committed, some metal components and structures could be recycled. The limited use of building materials for use in this project would not adversely affect the future availability of these resources.

Resources required by construction activities, including labor, fossil fuels and construction materials, would be irretrievably lost. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction. In addition, construction materials (such as liners and cover systems) would be consumed. However, it is unlikely that their limited use in these projects would adversely affect the overall future availability of these resources.

The land used for the in-place closure of the impoundments would be irreversibly committed as the CCR material would remain in place for the foreseeable future representing a permanent commitment of the land and precluding future use of the land. However, as these areas would be vegetated they would support some natural resources. The land used for the proposed landfill is irreversibly committed because the land would be permanently converted from an undeveloped use to a landfill; however, after closure and decommissioning of the plant, the project areas could be used as open space or some other industrial related use.

The Bi-County Solid Waste Management Landfill is an existing landfill, and there would be no changes to the committed materials and resources associated with landfill construction associated with the use of this facility. However, landfill capacity would be irretrievably lost and nonrenewable fossil fuels would be irretrievably lost through the use of fuel by trucks used to transport CCR to this landfill. Due to the higher number of trucks needed and the greater number of miles travelled, this impact would be greater for the Closure-by-Removal option under Alternatives B and D which would require a greater number of trucks (Alternative D) and vehicle miles travelled, than Alternative C. However, this impact would still be minor relative to existing supplies.

3.25 Cumulative Effects

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

- Flue Gas Desulfurization System on CUF Units 1 and 2
- Selective Catalytic Reduction Systems on CUF Units 1 and 2
- Sale of TVA property for development of a gypsum wallboard plant and gypsum processing plant
- Partial Closure of the Fly Ash and Gypsum stacks
- Development of onsite borrow areas and construction of an access road from the plant perimeter road to Old Scott Road to provide access to the borrow sites

As such, these actions are considered part of the baseline and are not addressed separately in the cumulative effects analysis.

TVA evaluated a full range of environmental resource issues for inclusion in the cumulative effects analysis. The proposed action and its connected actions identified under Alternatives B, C, and D would mostly occur on land that was previously disturbed and is used for industrial purposes. In addition, the surrounding landscape is already subject to environmental stressors associated with continuing industrial operations. Consequently, as has been described in prior subsections of this EIS, the existing quality of environmental resources with the potential to be directly or indirectly affected by project activities is generally low. The exception to this is the proposed onsite landfill, which would be constructed on land that is currently undeveloped and covered with forested vegetation. The proposed transportation of CCR material to an offsite landfill identified under Alternatives B and D would occur on land developed as a landfill and would utilize existing roadways for transport of CCR; accordingly, impacts associated with this action are confined to those associated with the transport of CCR from CUF to the Bi-County Solid Waste Management Landfill. All proposed actions under Alternative C would occur within the CUF property.

3.25.1 Geographic Area of Analysis

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

3.25.2 Identification of "Other Actions"

The only past, present, and reasonably foreseeable future action that is appropriate for consideration in this cumulative analysis is described in Table 3-39. This action was identified within the geographic area of analysis as having the potential to, in the aggregate, result in larger and potentially significant adverse impacts to the resources of concern.

Table 3-39. Summary of Other Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Project

Actions Description	Description	Timing and Reasonable Foreseeability
Waste Water Treatment Plant	A waste water treatment plant would be developed at CUF in support of dewatering facilities.	Reasonably Foreseeable Future

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.

Waste Water Treatment Plant

TVA is planning to construct and operate a new WWTP facility to treat wastewater streams from the Bottom Ash Dewatering Facility. Preliminary planning indicates that this facility would be located near the proposed Bottom Ash Dewatering Facility on a previously disturbed site.

3.25.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 3. These combined impacts are defined by the CEQ as “cumulative” in 40 CFR 1508.7 and may include individually minor, but collectively significant actions taking place over a period of time. As described in the resources analyzed above, the proposed projects would be located on a previously disturbed industrial site and would not substantially impact land use, geology, floodplains, surface water, groundwater, natural communities, cultural resources, visual resources, natural areas, parks or recreational facilities, and socioeconomic resources. The projects would result in some beneficial impacts during operation due to the increase in vegetated land cover at impoundment areas. In addition, dewatering would reduce discharge to surrounding water bodies. However, this benefit is minor and localized and would not be expected to contribute to a more significant cumulative effect. Overall risk related to groundwater and surface water quality would be improved with implementation of impoundment closures. As noted in the PEIS (TVA 2016a), this would contribute to a positive impact on a cumulative basis within the Tennessee Valley region and within river systems supporting multiple coal-fired power plants subject to CCR impoundment closures. However, there are no other TVA facilities within the 5-mile geographic area of analysis.

Primary adverse effects of the proposed action as described in the preceding sections of Chapter 3 are related to temporary and localized effects associated with air and noise emissions from construction vehicles, erosion and runoff from construction sites, and minor generation of solid and hazardous wastes. It is likely that the construction phase of the other reasonably foreseeable future actions identified within the region may overlap with the proposed action. However, due to the relatively minor and temporary nature of construction related impacts and the implementation of BMPs to minimize impacts, cumulative effects of the proposed action are considered negligible.

The potential for cumulative effects to the identified environmental resources of concern are analyzed below for Alternatives B, C, and D.

3.25.3.1 Air Quality and Climate Change

The reasonably foreseeable future action identified has the potential to impact air quality. Emissions from the operation of a dewatering facility and WWTP are subject to applicable operating permit and fugitive dust regulations. Emissions from these activities are expected to be minor and together with minor emissions associated with operation of the dewatering facilities and onsite landfill would not exceed significance levels. The ongoing transport of borrow from the onsite borrow areas to CUF would result in air emissions from combustion of gasoline and diesel fuels. These emissions, together with fugitive dust and emissions from equipment and vehicles during in-place impoundment closure activities would result in potential localized increase in air emissions. However, given the nature of these activities, exceedances of applicable ambient air quality standards are not expected and therefore cumulative impacts to air quality would be localized and minor.

Implementation of Alternatives B, C, or D would result in localized increase in GHG emissions and, therefore, there would be no cumulative effect to climate change.

3.25.3.2 Wetlands, Floodplains and Aquatic Ecology

The potential for cumulative effects to wetlands and the aquatic environment are largely driven by the loss of wetland area resulting from the implementation of Alternatives B and C. As described in Sections 3.7 (Surface Water) and 3.13 (Wetlands), impacts associated with the construction and operation of the onsite landfill would result in the permanent loss of 0.5 acre of wetlands and impact 8,896.8 linear feet of streams and wet weather conveyances. Excavation of the southern borrow site would have a direct impact to the 2,851 linear feet of wet weather conveyance and two small farm ponds. Approximately 110 feet of Wells Creek and approximately 90 linear feet of Scott Branch would be impacted due to placement of a culvert to complete the access road and construction of a bridge over Wells Creek to access the borrow sites. Impacts to surface waters would be minimized by the use of appropriate BMPs and adherence to appropriate permit conditions. Cumulatively approximately 1.34 acres of wetlands would be impacted by past and present actions. Permanent impacts to wetlands would be mitigated in accordance with requirements of Section 404 of the CWA. Given the industrial nature of CUF, wetland impacts associated with construction of the WWTP are not anticipated.

Floodplain impacts would be avoided by locating the WWTP (identified in Table 3-39) outside the floodplain of the Cumberland River and/or Wells Creek. However, floodplain impacts would be evaluated, and mitigation measures identified as needed, for reasonably foreseeable activities (i.e., construction of the WWTP) in future environmental reviews. By adhering to the requirements of EO 11988, as amended by EO 13690, and the National Flood Insurance Program, impacts of reasonably foreseeable actions on floodplains and floodplain resources would be minimized.

Construction of the onsite landfill would also impact aquatic habitat along the lower portion of the unnamed tributary near its confluence with Scott Branch. Direct impacts include stream alteration, culverting, and construction of a leachate pond and one of the sediment basins. These activities would be done in compliance with applicable TDEC and USACE 404/401 permits obtained for the proposed actions, which may require mitigation, such as contributing to a stream mitigation bank, per permit requirements. There would be an incremental increase in impacts to aquatic and wetland resources, however given the local abundance of similar aquatic resources and wetland areas within the region and the implementation of BMPs during construction for all identified projects, watershed level cumulative impacts to aquatic and wetland resources would not be notable under either alternative.

3.25.3.3 Transportation

The potential for cumulative effects to transportation from other identified actions would be related to the construction phase of the WWTP. No additional traffic on public roadways would result from concurrent borrow site operations as all truck movements would use the onsite access road. Traffic generated by these actions would consist of the construction workforce and the shipments of goods and equipment to the construction site. The construction phase traffic would occur in addition to the existing traffic generated by the operation of CUF. However, once construction is completed, maintenance phase traffic associated with the WWTP is anticipated to be negligible.

Closure-in-Place of the Bottom Ash impoundment as well as the Closure-by-Removal option under Alternative C would not utilize public roadways. CCR removed from the Main Ash and Stilling Impoundments under the Closure-in-Place Alternative may be transported to the existing onsite landfill. Long-term storage of CCR generated at CUF would be transported to the onsite landfill and would not use public roadways. There would be no cumulative effects associated with these actions.

Under Alternatives B and D, impoundment Closure-by-Removal, and the transportation of future CCR generated at CUF to the Bi-County Solid Waste Management Landfill (Alternative D) would utilize public roads throughout the closure period (up to 12 years for impoundment closure and during the operational phase, up to 18 years). The road network along this route is anticipated to have sufficient capacity remaining to handle the resulting increase in truck traffic. Therefore, there would be no cumulative effects.

Closure-in-Place of the Main Ash and Stilling Impoundments may require the use of public roadways to transport CCR removed from these facilities if it is taken to an offsite landfill rather than an onsite landfill. However, there would be no cumulative impact as the amount of CCR removed would be lower than under the Closure-by-Removal option and therefore the duration and increased truck traffic would less under Closure-by-Removal.

3.25.3.4 Noise

Construction and operation of WWTP is not anticipated to result in long term noise impacts as the facility would be located on CUF and there are no sensitive receptors within 500 feet of the facility. However, under the impoundment Closure-in-Place and Closure-by-Removal options and the transport of future CCR to the Bi-County Solid Waste Management Landfill under Alternative D, there would be an increase in noise emissions resulting from the transport of CCR along the haul route. The potential for cumulative noise impacts from WWTP construction would be associated with the increase in construction related traffic along the existing roads. This may increase noise levels at residences in proximity to the haul route. However, any impacts would be minor and limited to the construction phase of the proposed project. In addition, operation of the landfill together with noise from transport of borrow material would result in a localized increase in noise levels at noise receptors identified near the access road when these operations are occurring at the same time. The cumulative effect would be minor as the transport of borrow would only occur when needed to support plant operations and operations related noise would occur during normal working hours.

3.25.3.5 Landfill Capacity

Under Alternatives B and C, all future CCR produced at CUF would be disposed in an onsite landfill, therefore there would be no impact to capacity of other landfills in the region. Under Alternative D, future CCR from CUF would be transported to an existing offsite permitted landfill. In addition, CCR removed from the impoundments under the Closure-by-Removal option under Alternatives B and D and the Closure-in-Place option under all alternatives would also be transported to an existing offsite permitted landfill. Existing Subtitle D landfills that may be considered for receipt of CCR from CUF are typically sited, sized and permitted with expectations regarding total life span and capacity for disposal within their respective service areas. While the Bi-County Solid Waste Management Landfill has been considered in this analysis as the nearest receiving landfill with available capacity for the purposes of assessing impacts on environmental resources, TVA has not eliminated the possibility of transporting CCR under this alternative to one or more other offsite landfills

if needed. If such a decision were made in the future, it would be the subject of a separate NEPA review. Disposal of CCR from CUF at any offsite landfill may reasonably be expected to consume existing capacity and, therefore, shorten the lifespan of the receiving landfill. The need to expand a given receiving landfill, however, is dependent upon a range of factors that include the existing permitted capacity, volume of CCR material placed within a given landfill and other market factors that would result in the placement of other non-CCR materials within the landfill. Because of these factors and the fact that TVA has not determined with certainty whether CCR materials from CUF would be placed at Bi-County Solid Waste Management Landfill, or any other receiving landfill, potential cumulative effects on environmental resources associated with the expansion of landfill capacity are remote and speculative.

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CHAPTER 4 – LIST OF PREPARERS

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4.2 Other Contributors

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AMEC FOSTER WHEELER

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CHAPTER 5 – EIS RECIPIENTS

5.1 Federal Agencies

Environmental Protection Agency
U.S. Department of the Interior
U.S. Fish and Wildlife Service
U.S. Army Corp of Engineers

5.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma
Alabama-Quassarte Tribal Town
Cherokee Nation of Oklahoma
Chickasaw Nation
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Muscogee (Creek) Nation of Oklahoma
Shawnee Tribe
Thlopthlocco Tribal Town
United Keetoowah Band of Cherokee Indians in Oklahoma

5.3 State Agencies

Tennessee Department of Environment and Conservation
Tennessee Department of Transportation
Tennessee Wildlife Resources Agency

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CHAPTER 6 – LITERATURE CITED

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Appendix A – Scoping

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Document Type: EIS-Administrative Record
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Project Number: 2016-7

CUMBERLAND FOSSIL PLANT CCR DISPOSAL SCOPING REPORT

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

March 2017

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Abbreviations and Acronyms

CCR	Coal Combustions Residuals
CUF	Cumberland Fossil Plant
EIS	Environmental Impact Statement
ELG	Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	US Environmental Protection Agency
IRP	Integrated Resource Plan
NEPA	National Environmental Policy Act
PEIS	Programmatic Environmental Impact Statement
SELC	Southern Environmental Law Center
TDEC	Tennessee Department of Environment & Conservation
TVA	Tennessee Valley Authority

1.0 Introduction

The Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) to address the potential environmental effects associated with implementation of several projects to facilitate long-term management of Coal Combustion Residuals (CCR) produced at the Cumberland Fossil Plant (CUF) located near Cumberland City, Tennessee. Specifically, these projects are:

- *Bottom Ash Dewatering Facility*. Bottom ash is currently wet-sluiced to the Bottom Ash Impoundment. TVA is proposing to build and operate a bottom ash dewatering facility with options for using a continuous system where water left over from the dewatering process would be recirculated back into the plant for future sluicing operations, or once-through system where water would be treated as needed and then discharged through an existing permitted outfall.
- *Closure of the Bottom Ash Impoundment and Main Ash Impoundment.* At a programmatic level, TVA has previously considered two impoundment closure methods: Closure-in-Place or Closure-by-Removal. The alternative analysis for impoundment closure will rely on this programmatic closure evaluation as well as evaluating specific issues related to closing the Bottom Ash Impoundment and Main Ash Impoundment at CUF.
- *Landfill.* TVA will evaluate disposing of dry CCR at an offsite permitted landfill and/or constructing a new onsite landfill. A new landfill would be designed to provide sufficient storage capacity for long-term management of CCR generated at CUF.

The location of these projects is shown on Figure 1.

This proposal supports TVA's goal to eliminate all wet ash storage at its coal plants and will also help TVA comply with present and future regulatory requirements related to new CCR production and management, including those of the U.S. Environmental Protection Agency (EPA)'s final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule) and Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category (ELGs), and those of the State of Tennessee.

1.1 Background

CUF generates enough energy to supply about 1.1 million homes. The plant consumes an average of 5.6 million tons of coal annually and produces approximately 1.3 million tons of CCR a year. TVA sells approximately 75 percent of the CCR produced at CUF annually (725,000 tons of gypsum and 275,000 tons of fly ash) for beneficial reuse as raw manufacturing material. The CCRs that are not sold for reuse are currently stored onsite in dry stacks, wet stacks and impoundments.

In July 2009, the TVA Board of Directors passed a resolution for staff to review TVA practices for storing CCRs at its generating facilities, including CUF, which resulted in a recommendation to convert the wet ash management system at TVA Fossil Plants, including CUF, to a dry storage system. On April 17, 2015, the EPA released its final CCR Rule. The CCR Rule establishes a comprehensive set of requirements for disposal in surface impoundments and established closure requirements. Once closure is initiated, impoundments are potentially subject to a closure deadline of five years, with the possibility of an extension of the closure time period under certain circumstances.

The Tennessee Department of Environment & Conservation (TDEC) is overseeing TVA compliance with the CCR Rule of its plants in Tennessee as part of the TDEC Commissioner's Order.

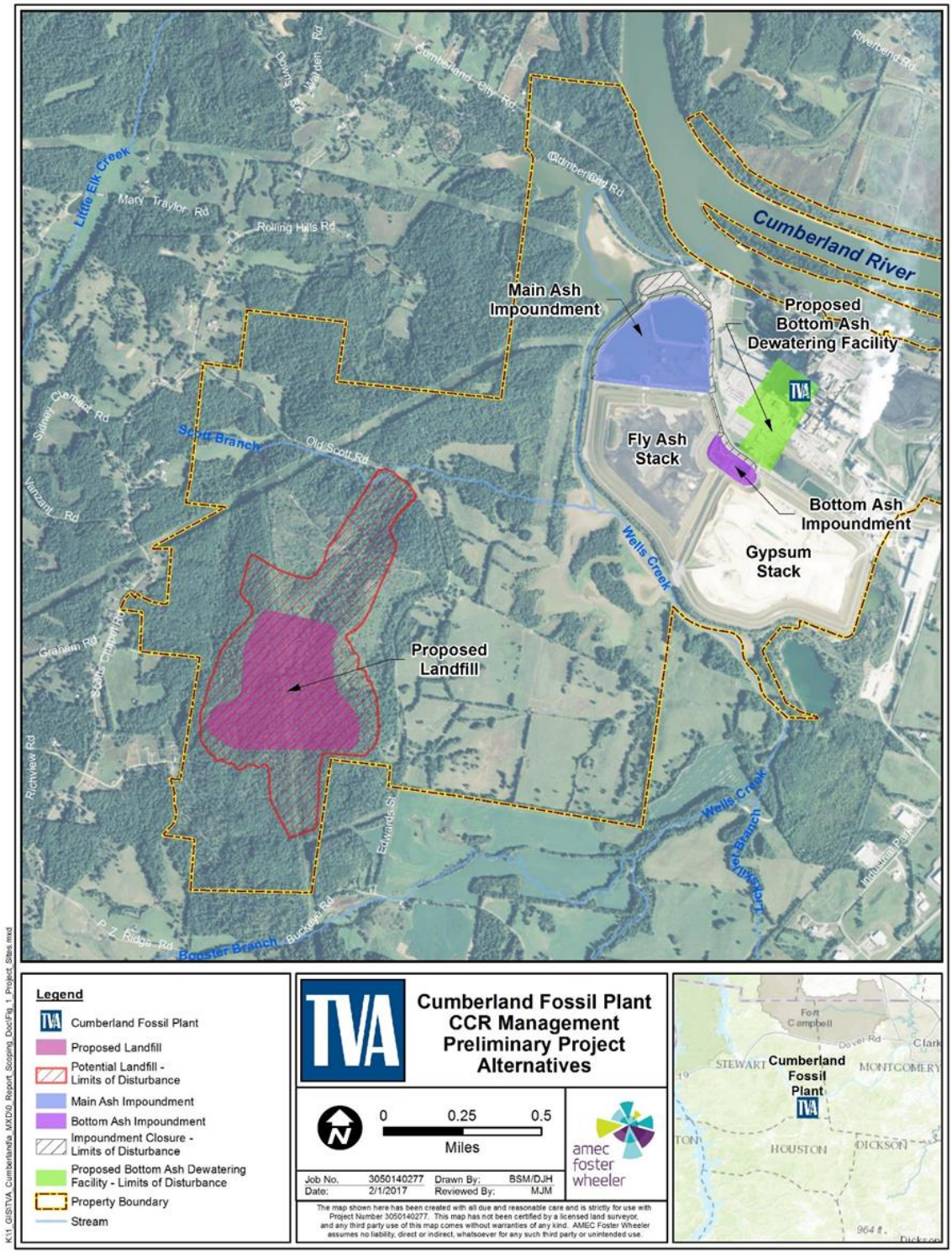

Figure 1. Proposed CCR Management Projects at CUF

On September 30, 2015, EPA finalized new ELGs. The final ELG rule sets new or additional requirements for wastewater streams from fossil-fueled power plants, including waste streams from fly ash and bottom ash operations.

In June 2016, TVA issued a Final Programmatic Environmental Impact Statement (PEIS) that analyzed methods for closing impoundments that hold CCR materials at its fossil plants and identified specific screening and evaluation factors to help frame the evaluation of closures at facilities system-wide. A Record of Decision was released in July 2016 that would allow future environmental reviews of CCR impoundment closures to tier from the PEIS.

The National Environmental Policy Act (NEPA) evaluation of closure alternatives for the Main Ash Impoundment and Bottom Ash Impoundment at CUF would tier off of the 2016 PEIS.

1.2 TVA's Objectives

The approximately 2,470 megawatts of generating capacity provided by CUF is important in maintaining an adequate and reliable power supply to the north-central portion of TVA's service area. Accordingly, CUF was identified in TVA's 2015 Integrated Resource Plan (IRP) as one of the coal plants that TVA plans to continue operating in the future. The purpose of the proposed action is to convert the management of CCRs produced at CUF from a wet to dry system. The project is needed to support the goal established by the TVA Board of Directors to handle CCR on a dry basis and to eliminate all wet CCR storage at its coal plants. The dewatering facilities would also foster TVA's compliance with present and future regulatory requirements related to new CCR production and management, including the requirements of the EPA's CCR and ELG rules, and Tennessee's requirements.

TVA must decide whether to construct a dewatering facility, whether and how to close the Bottom Ash and Main Ash Impoundments at CUF, and whether to construct a new dry onsite CCR landfill or dispose of dry CCR at an offsite permitted landfill. TVA's decision will consider factors such as potential environmental impacts, economic issues, availability of resources and TVA's long-term goals.

2.0 Proposed Alternatives

As a result of internal review and scoping comments, TVA has proposed the following alternatives to be evaluated in the EIS.

2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and not construct a bottom ash dewatering facility to manage CCR produced at CUF in a dry manner. It would not close the ash impoundments nor would it seek disposal options for long-term storage of CCR generated there. Rather, CCR would continue to be managed in the current impoundments and stacks for as long as storage capacity was available. This alternative does not satisfy the project purpose and need and, therefore, is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts of alternatives retained for detailed study.

2.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place and By-Removal to Offsite Landfill), Onsite Landfill for Future CCR

Under this alternative, TVA would. :

1. Construct and operate a bottom ash dewatering facility.

    a. Continuous or “once through” system – Excess water would be discharged through a permitted outfall.

    b. Construct a recirculation system in a subsequent phase where excess water would be routed back to the plant.

2. Closure of the Bottom Ash Impoundment and Main Ash Impoundment:

    a. Closure-in-Place.

    b. Closure-by-Removal. CCR transported and managed in an existing offsite permitted landfill.

3. Long-term management of new CCR produced at CUF:

    a. Construct and operate an onsite landfill for future CCR generated at CUF.

2.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place and By-Removal to Onsite Stacks), Onsite Landfill for Future CCR

Under this alternative, TVA would. :

1. Construct and operate a bottom ash dewatering facility.

    a. Continuous or “once through” system – Excess water would be discharged through a permitted outfall.

    b. Construct a recirculation system in a subsequent phase where excess water would be routed back to the plant.

2. Closure of the Bottom Ash Impoundment and Main Ash Impoundment:

    a. Closure-in-Place.

    b. Closure–by-Removal. CCR transported and managed in the existing Dry Fly Ash Stack and Gypsum Stack.

3. Long-term management of new CCR produced at CUF:

    a. Construct and operate an onsite landfill for future CCR generated at CUF

2.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place and By-Removal to Offsite Landfill), Offsite Landfill for Future CCR

Under this alternative, TVA would:

1. Construct and operate a bottom ash dewatering facility.

    a. Continuous or “once through” system – Excess water would be discharged through a permitted outfall.

    b. Construct a recirculation system in a subsequent phase where excess water would be routed back to the plant.

2. Closure of the Bottom Ash Impoundment and Main Ash Impoundment options are:

    a. Closure-in-Place

    b. Closure-by-Removal. CCR transported and managed in an existing off-site permitted landfill

3. Long-term management new CCR produced at CUF

    a. Future CCR would be transported and managed in an existing offsite permitted landfill (Bi-County Solid Waste Management Landfill).

No decision has been made about CCR management at CUF. TVA is preparing the EIS to inform decision makers, other agencies, and the public about the potential for environmental impacts associated with a decision regarding management of CCRs generated at CUF.

3.0 Environmental Review Process

NEPA regulations require an early and open process for deciding what should be discussed in an EIS (i.e., the scope of the document). The NEPA review process is intended to help federal agencies make decisions that are based on an understanding of the action’s impacts and, if necessary, to take actions that protect, restore, and enhance the natural and human environment. NEPA also requires that federal agencies provide opportunities for public involvement in the decision-making process.

TVA intends to prepare an EIS, the most intensive level of NEPA review, to consider options for management of CCR at CUF. During the development of the EIS, the public and environmental and permitting agencies have two opportunities to provide input on the development of the environmental study. The first opportunity is the scoping process followed next at the draft document stage.

After considering input from the public scoping period, TVA will develop and publish a draft EIS. The draft EIS will be available for public review and comment for 45 days. During the public comment period on the draft EIS, TVA will conduct a public meeting. Once the public and other agencies have reviewed the document, TVA will consider all comments and make revisions, if necessary, and publish a final EIS. After at least 30 days later, TVA will make a final decision captured in a Record of Decision.

During the initial public scoping period, TVA estimated that the Draft EIS would be published in the summer of 2017, the Final EIS would be published in inter 2017, and a final decision would be made in Spring 2018.

3.1 Public Outreach During the Scoping Period

Public scoping for this project was initiated with the publication of the Notice of Intent (NOI) to prepare an EIS in the Federal Register on December 5, 2016 (Appendix A). The NOI initiated a 30-day public scoping period, which concluded on January 6, 2017. In addition to the NOI in the Federal Register, TVA published notices regarding this effort in regional and local newspapers; issued a news release to media; and posted the news release on the TVA Web site to solicit public input.

TVA also developed an initial project mailing list that included local and regional stakeholders, governments and other interested parties, and sent letters to notify those on the list of the project. Approximately 350 postcards were also mailed to nearby residents.

TVA held a public scoping meeting on December 12, 2015, in Clarksville, Tennessee. Approximately 10 people attended the scoping meeting. Attendees included members of the general public, media representatives, and other special interest groups.

3.2 Scoping Feedback

TVA received a total of six comment submissions. Of the six submissions, three were from members of the public and two were from environmental advocacy organizations. These organizations are:

- Sierra Club (583 individuals signed a form letter, 134 of these commenters also submitted individual comments). The majority of the comments expressed concern that water quality be protected.

- The Southern Environmental Law Center (SELC) and nine other environmental advocacy groups submitted a 13-page letter with 12 attachments. Unless otherwise indicated, these commenters are collectively referred to as SELC.

Comment submissions are included in Appendix B. TVA also received one request from an individual wishing to be added to the mailing list for future information about the project.

Comments were received in relation to the project alternatives, impact analysis, groundwater, and surface water, aquatic ecology, tiering from the PEIS, and general topics. The comments related to TVA's proposed actions are addressed in the sections that follow.

In addition, TVA received a copy of four comment submissions which had been previously submitted in relation to the Ash Impoundment Closure PEIS process. Those four sets of comments have been previously addressed in Appendix A of the PEIS and are not addressed further in this document. The Final Ash Impoundment Closure Environmental Impact Statement, Part I – Programmatic NEPA Review is available on the TVA Web site at: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews.

3.3 Public Scoping Comments and Responses

3.3.1 Impact Analysis

Comment 1: The EIS must discuss the full extent of existing contamination and current and ongoing groundwater and surface water pollution at CUF (*Commenter: SELC*).

Response 1: In the EIS, TVA will fully describe the existing baseline conditions at CUF in the No Action Alternative, and will fully examine the environmental impacts associated with each alternative, including the No Action Alternative.

3.3.2 Groundwater and Surface Water

Comment 2: CCR is submerged in at least 20 feet of groundwater and groundwater is hydrologically connected to Wells Creek. TVA's monitoring reports found exceedances of boron, iron, manganese, molybdenum, chloride, sulfate and total dissolved solids in at least one test well location (Commenter: SELC).

Response 2: See response to Comment 1.

Comment 3: The EIS should address the hydrogeology of the proposed landfill site and whether the site is situated atop rock that is cracked (the Wells Creek Structure), which is characterized by highly unpredictable fractured bedrock. Existing impoundments are over original streambed of Wells Creek in an area with fractured bedrock which increases the potential for groundwater contamination (*Commenters: Deanna Bowden, Sierra Club*).

Response 3: In the EIS, TVA will describe existing baseline conditions, including a description of the geology, including the Wells Creek Structure and groundwater quality at CUF. These baseline conditions will form the foundation from which impacts associated with the proposed project alternatives will be evaluated. Risks to human health and the environment, including groundwater, will be addressed in the EIS analysis for both the No Action alternative (current conditions) and all proposed project alternatives.

Comment 4: Proposed actions would impact water quality and affect drinking water and aquatic life (*Commenter: Sierra Club*).

Response 4: In the EIS, TVA will characterize surface water resources, and will analyze the extent to which each proposed project might affect water quality directly or indirectly (i.e., through infiltration or runoff). The No Action Alternative will set out baseline conditions that will form the foundation from which impacts associated with the proposed project alternatives will be evaluated.

3.3.3 Ash Impoundment Closure

Comment 5: SELC opposes TVA tiering analysis from PIES (*Commenter: SELC*).

Response 5: As noted in the response to Comment 2 in the Final PEIS, a programmatic environmental review is appropriate to use in the evaluation of a proposal to proceed with multiple projects that are temporally or spatially connected and that will have a series of associated concurrent or subsequent decisions. Programmatic NEPA reviews address the general environmental issues relating to a suite of projects, and can effectively frame the scope of subsequent site and project-specific actions. CEQ regulations provide for programmatic reviews and the tiering process that allows more site-specific actions to rely on programmatic analyses and avoid recreating or redoing relevant analyses.

While TVA performed a programmatic review of impoundment closure in Part I of the PEIS, this analysis in no way obscures or biases/predetermines the completeness or accuracy of the site-specific environmental analyses performed for the proposed closure of other CCR facilities. The tiered NEPA analyses will appropriately rely upon and integrate the over-arching and bounding analyses performed in the PEIS, but will integrate site-specific details and analyses.

Comment 6: PEIS Fails to Discuss Reasonable Range of Closure-by-Removal Alternatives including excavation and recycling, excavation and disposal in the proposed new onsite landfill, excavation and removal by rail, and excavation and removal by barge. For this and other reasons, TVA should provide site-specific analysis and demonstrate the closure alternative satisfies minimum CCR Rule performance standards (*Commenter: SELC*).

Response 6: As noted in the response to Comment 5, site-specific conditions will be evaluated in the CUF EIS; however, this tiered analysis will integrate the bounding analyses performed in the PEIS, while also integrating site specific details to fully evaluate the impacts of the proposed closure methods. These methods include Closure-by-Removal and Closure-in-Place. All modes of transport of CCR will be addressed. One element of the purpose and need for this project is to comply with the CCR Rule, and to fulfill that purpose and need, closure methods will comply with all applicable requirements.

Comment 7: The analysis of closure options should consider site-specific conditions and how they will affect issues such as releases to ground and surface water, the potential impoundment of water, and stability and compliance with all regulations that apply to coal ash ponds and disposal areas *(Commenter: SELC*).

Response 7: The EIS will evaluate the impact of closure of the Bottom Ash Impoundment and Main Ash Impoundment on surface water and groundwater. As noted in the responses to Comment 1 and Comment 6, TVA will fully describe the existing baseline conditions and will fully examine the environmental impacts associated with each alternative. An element of the purpose and need for this project is to comply with the CCR Rule, and to fulfill that purpose and need, closure methods will comply with all applicable requirements, including stability.

Comment 8: TVA's preferred alternative to cap and close in place does not comply with the minimum requirements outlined in the federal Coal Ash Rule *(Commenter: SELC*).

Response 8: TVA has not selected a preferred alternative at this time. The EIS will evaluate Closure-by-Removal as well as Closure-in-Place of the Bottom Ash and Main Ash Impoundment. An element of the purpose and need for this project is to comply with the CCR Rule; thus, the alternative selected will necessarily comply with all requirements of that rule.

Comment 9: TVA must select a closure alternative that complies with all of the laws and regulations that apply to its coal ash ponds and disposal areas (*Commenter: SELC*).

Response 9: See responses to comments 6, 7 and 8.

Comment 10: TVA's closure plans do not provide adequate technical analysis to support TVA's selection of Closure-in-Place of any of the ash impoundments and disposal areas at the Plant. The plans contain no discussion of site-specific conditions (*Commenter: SELC*).

Response 10: This comment is premature as Closure-by-Removal and Closure-in Place of the Bottom Ash Impoundment and Main Ash Impoundment are potential actions that are being evaluated in the EIS. Accordingly, technical analyses of site-specific conditions relevant to this evaluation are currently underway. As noted in the response to comments 5, 6, and 7, those site-specific conditions and analyses at the CUF impoundments will be considered in the evaluation of closure alternatives.

Comment 11: For the Bottom Ash Impoundment and the Main Ash Impoundment, Closure-by-Removal should be preferred alternative *(Commenters: Sierra Club, Deanna Bowden, Kathleen Dougherty, Elizabeth Garber, SELC*).

Response 11: Comment noted. TVA has not selected a preferred alternative at this time. The EIS will evaluate Closure-by-Removal as well as Closure-in-Place, of the Bottom Ash and Main Ash Impoundment.

3.3.4 Management and Disposal of Dry Ash

Comment 12: TVA should move towards best practices for coal ash storage and store dry ash in lined storage areas (*Commenter: Deanna Bowden*).

Response 12: Comment noted.

Comment 13: Dry and wet ash should be stored in a lined area away from rivers and creeks (*Commenter: Elizabeth Garber*).

Response 13: Comment noted.

Comment 14: TVA should consider using the proposed onsite landfill for disposal of the Plant's legacy coal ash currently stored in the Bottom Ash and Main Ash Impoundments (*Commenter: SELC*).

Response 14: The proposed onsite landfill would be planned to only receive new CCR produced at CUF and as such, capacity to accommodate the existing CCR from the impoundments is not available. Under the Closure-by-Removal option, TVA will evaluate management of legacy ash in the onsite Fly Ash and Gypsum Stacks (Alternative C) as well as transport to an offsite third party permitted landfill (Alternative B and D).

Comment 15: Gypsum Stack and Fly Ash Stack – TVA should immediately close the Gypsum Stack and Fly Ash Stack (*Commenter: SELC*).

Response 15: Closure of the Gypsum Stack and Fly Ash Stack are not included within the scope of this EIS. Current operations at the Gypsum and Fly Ash stacks are part of the existing baseline conditions at CUF which are evaluated in the No Action Alternative, and are subject to existing permits by TDEC. TVA will consider all reasonable consequences of the No Action Alternative in the EIS impacts analysis.

Comment 16: TVA should address hydrogeology of the proposed on-site landfill site (*Commenter: SELC*).

Response 16: TVA will consider the hydrogeologic conditions of all of the proposed project sites when assessing potential impacts to groundwater in the EIS.

Comment 17: The proposed landfill must be permitted to comply with requirements of the federal CCR Rule and requirements of the Tennessee Solid Waste Disposal Act and its implementing requirements (*Commenter SELC*).

Response 17: TVA agrees and will continue to work with state and federal regulatory authorities to appropriately permit new landfills under applicable regulatory programs.

3.3.5 OffSite Transportation of Coal Ash

Comment 18: TVA should consider a reasonable range of options with respect to hauling coal ash offsite to an existing permitted landfill. These options should include use of rail or barge to transport CCR, varying distances to potential landfills and opportunities for additional coal ash recycling (*Commenter: SELC*).

Response 18: TVA will assess the reasonableness of using barge and rail transport in the EIS. TVA selected a representative nearby landfill that was permitted to receive CCR under Subtitle D for use in its analysis of potential impact of offsite transport of CCR. This analysis constitutes a reasonable basis for assessing impacts of offsite transport and disposal of CCR from CUF.

Comment 19: TVA must consider environmental justice implications of transporting CCR to an off-site permitted landfill (*Commenter: SELC*).

Response 19: The EIS will analyze the potential for disproportionately high and adverse human health or environmental effects of all alternatives on minority and low-income populations.

3.3.6 Bottom Ash Dewatering Facility

Comment 20: TVA is considering options for using a continuous or once-through system where left over water is treated and discharged through an existing permitted outfall or recirculated back to the plant for future use. TVA's once-through option would violate ELGs and not meet purpose and need (*Commenter: SELC).*

Response 20*:* The EIS will consider the impact of implementing both options for bottom ash dewatering in the EIS: once-through and recirculation system, as well as a phased approach where initially a once-through dewatering system will be constructed, with the recirculation system added in a subsequent phase. TVA will adhere to the standards in the ELG rule.

Comment 21: TVA should consider dry handling of bottom ash to avoid need for the dewatering facility *(Commenter: SELC).*

Response 21*:* TVA has evaluated the use of various different dry bottom ash systems; however due to the boiler bottoms being located in the confines of the facilities basements, there is not enough headspace to install the needed equipment. In addition to the infeasibility of the technologies to fit in the required space, the dry option is also cost prohibited.

3.3.7 Retirement of CUF

Comment 22: TVA should consider an analysis of an alternative in which TVA retires the Cumberland Plant *(Commenter SELC).*

Response 22: The purpose and need for the proposed action evaluated in this EIS is to help TVA meet its commitment to convert CCR storage from wet to dry, complement compliance with the CCR Rule, and enhance compliance with the ELG rule. TVA is considering in depth, four alternatives (listed in Section 2.0) to fulfill this purpose and need.

While the 2015 IRP did recommend continuing with the announced unit retirements at Allen, Colbert, Johnsonville, Paradise and Widows Creek, it did not include Cumberland in this unit retirement group. Instead, the IRP recommended that Cumberland continue to operate in the future. Because the retirement of CUF would not align with the recommended direction of the 2015 IRP, it is not considered a reasonable option for TVA.

Comment 23: The best way to deal with coal ash is to close or retire all TVA coal fired plants as soon as possible and replace them with wind, solar and natural gas plants (*Commenter: Jack Gaw*).

Response 23: See response to Comment 22.

3.4 Issues to be Addressed

Based on TVA's internal scoping and input gathered from the public scoping process, TVA anticipates the major issues to be addressed in this EIS include:

- *Water Resources* – TVA will characterize surface water and groundwater resources, and will analyze the extent to which each closure alternative would affect water quality directly or indirectly (i.e., through infiltration or runoff).

- *Biological Resources* (vegetation, wildlife and aquatic life) – Community types within the project areas will be described. Significant natural features, including rare species habitat, important wildlife habitat, or locally uncommon natural community types will be identified. TVA will evaluate the effect of each alternative on terrestrial and aquatic ecosystems.

- *Threatened and Endangered Species* – Federally or state-listed as threatened or endangered plants and animals known to exist in the vicinity of CUF or any of the proposed project areas will be identified. The effects of each closure alternative on endangered, threatened, and rare species in need of management will be evaluated.

- *Floodplains and Wetlands* – Wetlands and floodplains within the proposed project areas will be identified and impacts will be quantified. The effects of each of the alternatives on jurisdictional wetlands and floodplains will be evaluated.

- *Geology and Soils* – Regional geology and soils at proposed project sites will be identified and any limitations related to construction and operation will be evaluated. Impacts to prime farmland soils will be quantified.

- *Land Use* – Land uses within the proposed project sites and within the vicinity (5-mile radius) will be identified. Permanent and temporary direct and indirect impacts to land use associated with each of the alternatives will be evaluated.

- *Transportation* – The existing roadway network in the vicinity of CUF and the Bi-County Solid Waste Management Landfill, including physical road characteristics (number of lanes, shoulders, and posted speed limit) and existing traffic characteristics will be identified. The effect of construction and operation of each alternative on the nearby roadway network will be evaluated,

- *Recreational and Managed Areas* – Natural areas, parks, and other managed areas within the vicinity of the alternatives (5-mile radius) will be identified and potential impacts associated with the proposed alternatives will be addressed.

- *Visual Resource* – The aesthetic setting of each project site will be described and an analysis of changes to scenic attractiveness and scenic integrity associated with each of the alternatives will be completed.

- *Cultural Resources* – TVA will characterize archaeological and historic resources within the Area of Potential Effect of each project site. TVA also will discuss any known National Register sites. The potential effects of each alternative on historic and archaeological resources will be evaluated. Results of the analysis will be reviewed by the Tennessee State Historic Preservation Officer.

- *Noise* – Baseline noise conditions will be characterized and noise emissions associated with the construction phase equipment use and truck traffic during operations will be assessed to determine the potential noise impact of each alternative on sensitive receptors.

- *Air Quality and Climate Change* – Air quality considerations including attainment status, and regional air quality information will be presented. Impacts to air quality from activities associated with each of the alternatives will be evaluated. The impact of emissions from each of the alternatives on climate change will be addressed.

- *Socioeconomics and Environmental Justice* – Demographic and community characteristics associated with the proposed project sites and along the haul route to the Bi-County Solid Waste Management Landfill will be evaluated. Special attention will be given to identification of potential low income and minority populations to evaluate the potential for disproportionate adverse impacts in accordance with Executive Order 12898. Economic effects associated with construction and operation of the proposed projects under each alternative will also be evaluated.

- *Solid and Hazardous Waste* – CCR will be characterized based upon existing CUF operations. Current practices regarding hazardous materials/waste management at CUF will also be identified. In addition, TVA will identify any impacts from waste generation during construction and operation of the proposed projects for each alternative. Operational measures (waste management practices) will be incorporated into the assessment of impacts.

- *Public Health and Safety* – Potential effects of each alternative on public health and safety will be evaluated. The evaluation will include potential effects of transportation of CCR along public roadways.

The potential direct and indirect impacts of each resource will be assessed in the EIS. Mitigative measures designed to minimize impacts, as appropriate, will be identified. In addition, the EIS will include an analysis of the cumulative impacts of the preferred alternative. A cumulative impact analysis considers the potential impact to the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations § 1508.7). The methodology for performing such analyses is set forth in Considering Cumulative Effects under NEPA (Council on Environmental Quality 1997).

Appendix A

Federal Register Notice

2. The proceedings in Docket No. EP 724 and Docket No. EP 724 (Sub-No. 3) will be discontinued as described above, effective February 2, 2017.

3. Notice of the Board's action will be published in the **Federal Register**.

Decided: November 29, 2016.

By the Board, Chairman Elliott, Vice Chairman Miller, and Commissioner Begeman.

Kenyatta Clay,

Clearance Clerk.

[FR Doc. 2016–29132 Filed 12–2–16; 8:45 am]

BILLING CODE 4915–01–P

TENNESSEE VALLEY AUTHORITY

Environmental Impact Statement for Cumberland Fossil Plant Coal Combustion Residual Management

AGENCY: Tennessee Valley Authority.

ACTION: Notice of intent.

SUMMARY: The Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) to address the potential environmental effects associated with management of coal combustion residual (CCR) material produced at the Cumberland Fossil Plant (CUF) located near Cumberland City, Stewart County, Tennessee. The purpose of the proposed EIS is to address long-term management of CCR produced at CUF. The project will help TVA comply with state and federal regulatory requirements related to CCR production and management, including the requirements of U.S. Environmental Protection Agency (EPA's) CCR Rule and Effluent Limitations Guidelines.

TVA will evaluate the potential environmental impacts of construction and operation of a new bottom ash dewatering facility and options for management and disposal of dry CCR produced at CUF. TVA will also evaluate closure of the Bottom Ash and the Main Ash Impoundments. TVA will develop and evaluate various alternatives to these actions, including the No Action Alternative. Public comments are invited concerning both the scope of the review and environmental issues that should be addressed.

DATES: Comments on the scope of the EIS must be received on or before January 6, 2017.

ADDRESSES: Written comments should be sent to Ashley Pilakowski, NEPA Compliance Specialist, 400 West Summit Hill Dr., WT 11D, Knoxville, TN 37902–1499. Comments also may be submitted online at: *www.tva.gov/nepa.*

FOR FURTHER INFORMATION CONTACT: Other related questions should be sent to Ashley A. Pilakowski, NEPA Compliance Specialist, Tennessee Valley Authority, at 865–632–2256 or *aapilakowski@tva.gov.*

SUPPLEMENTARY INFORMATION: This notice is provided in accordance with the regulations promulgated by the Council on Environmental Quality (40 CFR parts 1500 to 1508) and TVA's procedures implementing the National Environmental Policy Act (*http://www.tva.com/environment/reports/pdf/tvanepa_procedures.pdf.*)

TVA Power System and CCR Management

TVA is a corporate agency and instrumentality of the United States created by and existing pursuant to the TVA Act of 1933 that provides electricity for business customers and local power distributors. TVA serves more than 9 million people in parts of seven southeastern states. TVA receives no taxpayer funding, deriving virtually all of its revenues from sales of electricity. In addition to operating and investing its revenues in its electric system, TVA provides flood control, navigation and land management for the Tennessee River system and assists local power companies and state and local governments with economic development and job creation.

Historically, TVA has managed its CCRs in wet impoundments or dry landfills. Currently, CUF consumes an average of 5.6 million tons of coal per year, generates approximately 16 billion kilowatt-hours of electricity a year (enough to supply 1.1 million homes), and produces approximately 1.3 million tons of CCR a year which are managed in an existing fly ash stack, gypsum ash stack, Bottom Ash Impoundment and Main Ash Impoundment. CUF sells approximately 75% of the CCRs produced (725,000 tons gypsum and 275,000 tons of fly ash) annually for beneficial reuse as raw manufacturing material.

In July 2009, the TVA Board of Directors passed a resolution for staff to review TVA practices for storing CCRs at its generating facilities, including CUF, which resulted in a recommendation to convert the wet ash management system at CUF to a dry storage system. On April 17, 2015, the EPA published the final Disposal of CCRs from Electric Utilities rule, also known as the CCR Rule.

In June 2016, TVA issued a Final Programmatic Environmental Impact Statement (PEIS) that analyzed methods for closing CCR impoundments TVA fossil plants and identified specific screening and evaluation factors to help frame its evaluation of closures at its other facilities. A Record of Decision was released in July 2016 that would allow future environmental reviews of qualifying CCR impoundment closures to tier from the PEIS.

This EIS is intended to tier from the 2016 PEIS to evaluate the closure alternatives for the existing CCR Bottom Ash Impoundment and Main Ash Impoundment. The EIS will also evaluate construction and operation of a new bottom ash dewatering facility and management of dry CCR in a new lined CCR landfill meeting Tennessee Department of Environment and Conservation criteria. This project supports TVA's Board of Directors July 2009 resolution and subsequent recommendation to convert the wet ash management system at CUF to dry storage.

Alternatives

In addition to a No Action Alternative, this EIS will address alternatives that have reasonable prospects of providing a solution to the management and disposal of CCRs generated at CUF. TVA has determined that either the construction of a new on-site landfill or hauling CCR to an existing offsite permitted landfill are the most reasonable alternatives to address the need for dry CCR disposal. A new dewatering facility would dry bottom ash prior to disposal. TVA will consider closure alternatives for the Bottom Ash Impoundment and the Main Ash Impoundment in accordance with and consistent with TVA's PEIS and EPA's CCR Rule.

No decision has been made about CCR management at CUF beyond the current operations. TVA is preparing this EIS to inform decision makers, other agencies and the public about the potential for environmental impacts associated with the long-term management of CCR generated at CUF.

Proposed Resources and Issues To Be Considered

This EIS will identify the purpose and need of the project and will contain descriptions of the existing environmental and socioeconomic resources within the area that could be affected by management of CCR at CUF. Evaluation of potential environmental impacts to these resources will include, but not be limited to, water quality, aquatic and terrestrial ecology, threatened and endangered species, wetlands, land use, historic and archaeological resources, as well as solid and hazardous waste, safety, socioeconomic and environmental

justice issues. The final range of issues to be addressed in the environmental review will be determined, in part, from scoping comments received. The preliminary identification of reasonable alternatives and environmental issues in this notice is not meant to be exhaustive or final.

Public Participation

TVA is interested in an open process and wants to hear from the community, interested agencies and special interest groups about the scope of resources and issues they would like to be considered in this EIS.

The public is invited to submit comments on the scope of this EIS no later than the date identified in the **DATES** section of this notice. Federal, state and local agencies such as the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Tennessee Department of Environmental Conservation and the Tennessee State Historic Preservation Officer also are invited to provide comments.

After consideration of comments received during the scoping period, TVA will develop and distribute a document that will summarize public and agency comments that were received and identify the schedule for completing the EIS process. Following analysis of the issues, TVA will prepare a draft EIS for public review and comment. In making its final decision, TVA will consider the analyses in this EIS and substantive comments that it receives. A final decision on proceeding with construction and operation of a bottom ash dewatering facility, management and final disposal of CCR and closure of the Bottom Ash Impoundment and Main Ash Impoundment will depend on a number of factors. These include results of the EIS, requirements of the CCR Rule, engineering and risk evaluations and financial considerations.

TVA anticipates holding a community meeting near the plant after releasing the Draft EIS. Meeting details will be posted on TVA's Web site. TVA expects to release the Draft EIS in summer of 2017.

Dated: November 28, 2016.

M. Susan Smelley,

Director, Environmental Permitting and Compliance.

[FR Doc. 2016–29082 Filed 12–2–16; 8:45 am]

BILLING CODE 8120–08–P

DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

[Safety Advisory 2016–03]

Mitigation and Investigation of Passenger Rail Human Factor Related Accidents and Operations in Terminals and Stations With Stub End Tracks

AGENCY: Federal Railroad Administration (FRA), U.S. Department of Transportation (DOT).

ACTION: Notice of Safety Advisory.

SUMMARY: FRA is issuing Safety Advisory 2016–03 to stress to passenger and commuter railroads the importance of taking action to help mitigate human factor accidents, assist in the investigation of such accidents, and enhance the safety of operations in stations and terminals with stub end tracks. This safety advisory contains various recommendations to passenger and commuter railroads related to inward- and outward-facing cameras, sleep apnea, and operating practices to potentially mitigate the occurrence and assist in the investigation of human factor related accidents and to enhance the safety of operations in terminals and stations with stub end tracks.

FOR FURTHER INFORMATION CONTACT: Christian Holt, Operating Practices Specialist, Office of Railroad Safety, FRA, 1200 New Jersey Avenue SE., Washington, DC 20590, telephone (202) 493–0978.

SUPPLEMENTARY INFORMATION:

I. New Jersey Transit Incident

On September 29, 2016, at approximately 8:38 a.m., New Jersey Transit (NJT) Train 1614 travelling at 21 miles per hour (mph) impacted the bumping block at the end of the track No. 5 Depot, at Hoboken Terminal, in Hoboken, New Jersey. The cab car overrode the bumping block and struck the wall of the terminal building, near the ticket office in the corner of the building. NJT Train 1614 was occupied by three crew members and approximately 331 passengers. The accident resulted in the three crewmembers and 108 passengers being transported to four area hospitals. One individual who was standing on the pedestrian walkway between the tracks and the station was fatally injured from falling debris.

The National Transportation Safety Board (NTSB) has taken the lead role in conducting the investigation of this accident under its legal authority. *See* 49 U.S.C. 1101 *et seq.;* 49 CFR 831.2(b). As is customary, FRA is participating in the NTSB's investigation and also investigating the accident under its own authority. NTSB has not issued its formal findings. Although the NTSB has not concluded its investigation of this accident, FRA believes railroads should take more robust action to address human factors that may cause accidents and to enhance protection of railroad employees and the public.

II. Other Railroad Accidents

Amtrak Accident at Philadelphia, PA

On Tuesday, May 12, 2015, National Railroad Passenger Corporation (Amtrak) passenger train 188 (Train 188) was traveling from Washington, DC, to New York City. Aboard the train were five crew members and approximately 238 passengers. Shortly after 9:20 p.m., the train derailed while traveling through a curve in the track at Frankford Junction in Philadelphia, Pennsylvania. As a result of the accident, eight persons were killed and a significant number of persons were seriously injured.

NTSB conducted an investigation of this accident under its legal authority and issued its findings on May 17, 2016.[1] As Train 188 approached the curve from the west, it traveled over a straightaway with a maximum authorized passenger train speed of 80 mph. The maximum authorized passenger train speed for the curve was 50 mph. NTSB determined the train was traveling approximately 106 mph within the curve's 50-mph speed restriction, exceeding the maximum authorized speed on the straightaway by 26 mph, and 56 mph over railroad's maximum authorized speed for the curve.[2] NTSB concluded the locomotive engineer operating the train made an emergency application of Train 188's air brake system, and the train slowed to approximately 102 mph before derailing in the curve.[3] NTSB concluded that the probable cause of the engineer accelerating to this speed was due to his loss of situational awareness likely because his attention was diverted to an emergency situation with another train.[4]

On July 8, 2015, NTSB sent a letter to FRA reiterating NTSB recommendations

[1] 49 U.S.C. 1101 *et seq.;* 49 CFR 831.2(b); and NTSB, Railroad Accident Report, RAR–16/02, Derailment of Amtrak Passenger Train 188, Philadelphia, Pennsylvania, May 12, 2015, *http://www.ntsb.gov/investigations/AccidentReports/Reports/RAR1602.pdf.*

[2] RAR–16/02 at 1. FRA regulations provide, in part, that it is unlawful to ''[o]perate a train or locomotive at a speed which exceeds the maximum authorized limit by at least 10 miles per hour.'' 49 CFR 240.305(a)(2).

[3] RAR–16/02 at 4–5.

[4] Id. at 44.

Appendix B

Public and Agency Comments Submitted During the Scoping Period

(December 5, 2016 through January 6, 2017)

Name: Amanda Garcia

Comments: Please find attached the comments of the Southern Environmental Law Center, Environmental Integrity Project, Southern Alliance for Clean Energy, Sierra Club Beyond Coal Campaign, Tennessee Clean Water Network, and Tennessee Chapter Sierra Club on TVA's notice of intent to prepare an environmental impact statement for coal combustion residual management at the Cumberland Fossil Plant in Cumberland City, Tennessee. I have also emailed these comments to Ashley Pilakowski at aapilakowski@tva.gov.

Attachments to our comments, including (1) three previous sets of comments explaining the inadequacies of the programmatic EIS to which TVA proposes to tier its analysis; (2) a 60-day notice of intent to sue for violations of the Clean Water Act at the Cumberland Fossil Plant sent to TVA by the Southern Environmental Law Center on behalf of the Sierra Club in January 2016; and (3) a letter from EPA Region 4 explaining that TVA must comply with the federal Coal Ash Rule and state law, are available at the following link: https://southernenvironment.sharefile.com/d-sa47b5b2b2774b838

close window

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 615-921-9470 | 2 VICTORY AVENUE SOUTH, SUITE 500 NASHVILLE, TN 37213 | Facsimile 615-921-8011

January 6, 2017

Ashley Pilakowski
NEPA Compliance Specialist
400 West Summit Hill Drive
WT 11D
Knoxville, TN 37902-1499

Submitted online at www.tva.gov/nepa and via electronic mail to aapilakowski@tva.gov

Re: TVA's notice of intent to prepare an environmental impact statement for Cumberland Fossil Plant coal combustion residuals management

Dear Ms. Pilakowski:

The Southern Environmental Law Center, Environmental Integrity Project, Southern Alliance for Clean Energy, Sierra Club Beyond Coal Campaign, Tennessee Clean Water Network, and Tennessee Chapter Sierra Club (collectively, "Environmental Groups") write to provide comments regarding the scope of TVA's proposed environmental impact statement ("EIS") for coal combustion residuals ("CCR" or "coal ash") management at the Cumberland Fossil Plant ("Cumberland Plant" or "Plant"). The notice of intent published in the Federal Register ("Scoping Notice") explains that TVA intends in the EIS to analyze three connected actions: (1) closure of the Bottom Ash and Main Ash Impoundments; (2) options for management and disposal of dry CCR; and (3) construction of a bottom ash dewatering facility.[1] We first describe some key aspects of the existing environment at and near the Cumberland Plant relevant to water-related impacts associated with these three proposed actions. We then briefly identify some issues that must be considered by TVA in the NEPA analysis for each of these three proposed actions.[2]

[1] Tennessee Valley Authority, Environmental Impact Statement for Cumberland Fossil Plant Coal Combustion Residual Management, Notice of Intent, 81 Fed. Reg. 87648 (December 5, 2016) [hereinafter "Scoping Notice"].
[2] These brief scoping comments are not intended to be comprehensive; rather, we highlight some of the issues that TVA's past coal ash-related environmental analyses have failed to adequately address. The burden remains TVA's to prepare a comprehensive analysis of the impacts associated with a reasonable range of alternatives. *See Friends of the Clearwater v. Dombeck*, 222 F.3d 552, 559 (9th Cir. 2000) ("It is the agency, not an environmental plaintiff,

I. The Cumberland Fossil Plant has been polluting and continues to pollute groundwater and surface water with toxic wastewater and coal ash, and its description of the affected environment must include this pollution.

With 2,470 MW generating capacity, the Cumberland Plant is the largest coal-fired power plant in TVA's fleet.[3] The Cumberland Plant is located in Cumberland City, Tennessee, at the confluence of Wells Creek and a stretch of the Cumberland River known as Lake Barkley. The Cumberland Plant is upstream from several highly valued recreation and wildlife areas in Tennessee, including Barkley Wildlife Management Area, Cross Creeks National Wildlife Refuge, and Land Between the Lakes National Recreation Area.[4] The Cumberland River/Lake Barkley, miles 90.3-108, are included on Tennessee's list of Known Exceptional Tennessee Waters and Outstanding National Resource Waters, due to the Cross Creeks National Wildlife Refuge and the presence of state endangered lake sturgeon.[5] Several drinking water intakes are also located downstream from the Cumberland Plant.[6]

The Cumberland Plant burns thousands of tons of coal daily, resulting in hundreds of thousands of tons of coal combustion residuals ("coal ash") waste generated annually and an average of 2,097 million gallons of wastewater each day.[7] As described below, the Cumberland Plant has caused and continues to cause significant water pollution in the Cumberland River, Wells Creek, and groundwater that flows into these surface waters.

A recently-published report identifies the Cumberland Plant as the worst mercury polluter among coal plants nationwide.[8] Mercury is a neurotoxin that bioaccumulates in fish and can cause damage to a person's nervous, digestive, and immune systems.[9] The report, based on information provided by TVA to the federal EPA and available to the public in the Toxics

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that has a 'continuing duty to gather and evaluate new information relevant to the environmental impact of its actions.'")

[3] Tennessee Valley Authority. "Cumberland Fossil Plant." https://www.tva.gov/Energy/Our-Power-System/Coal/Cumberland-Fossil-Plant (accessed 5 Dec 2016).

[4] SELC, Map, Cumberland Fossil Plant, Managed Natural Resource Areas Downstream, May 22, 2015.

[5] TDEC, Exceptional Tennessee Waters & Outstanding National Resource Waters, http://tdec.tn.gov:8080/pls/enf_reports/f?p=9034:34304:::::: (visited December 10, 2016).

[6] SELC, Map, Tennessee Valley Authority Coal Ash Sites and Downstream Drinking Water Intakes, June 30, 2016.

[7] *See* Scoping Notice, 81 Fed. Reg. 87648 (Cumberland Plant produces 1.3 million tons of coal ash per year); TVA, Cumberland Fossil Plant (CUF)—NPDES Permit No. TN0005789—Updated Permit Renewal Application (August 1, 2016) [hereinafter NDPES Renewal Application] (reporting an average flow of 2,096.987 mgd from Outfall 2, which includes discharge from internal outfall 001).

[8] Environmental Integrity Project, Toxic Wastewater from Coal Plants, 16 (August 2, 2016), http://environmentalintegrity.org/wp-content/uploads/Toxic-Wastewater-from-Coal-Plants-2016.08.11-1.pdf [hereinafter EIP]; *see also* Mark Hicks, *Cumberland City Plant Rated Worst Mercury Polluter*, Clarksville Leaf-Chronicle, August 11, 2016, http://www.theleafchronicle.com/story/news/2016/08/11/cumberland-fossil-plant-rated-worst-mercury-polluter-us/88559336/.

[9] EIP, 8.

Release Inventory, found that TVA dumped 120 pounds of mercury generated at the Cumberland Plant into the Cumberland River in 2015.[10] The same report identifies the Cumberland Plant as the second-worst selenium polluter among coal plants nationwide.[11] Like mercury, selenium also bioaccumulates in fish. Selenium can cause damage to a person's circulatory system.[12] In 2015, TVA dumped 6,000 pounds of selenium generated at the Cumberland Plant into the Cumberland River.[13] TVA's current state-issued NPDES permit at the Cumberland Plant places no numeric limits on the amount of mercury, selenium, or other toxic pollutants TVA can dump into the river through its permitted outfalls.[14]

In addition to the toxic wastewater TVA dumps into the Cumberland River under its permit, the ash ponds and disposal areas at the Cumberland Plant also illegally leak toxic coal ash pollution into Wells Creek and the Cumberland River.

After the catastrophic coal ash spill at its Kingston plant, TVA committed to transition to dry coal ash storage at all of its coal plants. Yet eight years later, TVA is still storing coal ash in leaking, unlined pits next to the Cumberland River and Wells Creek at the Cumberland Plant.

In January 2016, on behalf of the Sierra Club, the Southern Environmental Law Center filed a notice of intent ("Sierra Club NOI") to sue Tennessee Valley Authority (TVA) in federal court for violating the Clean Water Act at the Cumberland Plant by illegally polluting the Cumberland River and Wells Creek with coal ash contamination leaking from unlined coal ash pits at the Plant.[15] The Sierra Club NOI is provided as an attachment to this letter and the facts set forth therein are incorporated by reference. The Sierra Club NOI explains that the ash ponds and disposal areas at Cumberland are constructed atop the original streambed of Wells Creek and fragile bedrock fractured by a meteor hundreds of millions of years ago. These unique features of the site, coupled with TVA's decision to build primitive dams to contain the coal ash—in some cases on top of unstable, porous layers of ash—have resulted in persistent leaks of coal ash pollutants both through groundwater and directly through seeps into Wells Creek and the Cumberland River. Independent surface water sampling reported in the Sierra Club NOI

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[10] *Id.*, 16.
[11] *Id.*
[12] *Id.*, 8.
[13] *Id.*, 16.
[14] Tenn. Dep't of Envtl. & Conservation, Cumberland Fossil Plant, NPDES Permit No. TN0005789 Part A, page 2 (effective date January 1, 2008) [hereinafter NPDES Permit].
[15] Letter from Delta Anne Davis, et al., on behalf of the Sierra Club, to TVA, re: 60-Day Notice of Intent to Sue, 33 U.S.C. § 1365, for Violations of the Clean Water Act by Tennessee Valley Authority–TVA Cumberland Fossil Plant (CUF), NPDES No. TN0005789 16-20 (January 14, 2016) [hereinafter Sierra Club NOI].

demonstrates the presence of coal ash contaminants in seep flows and elsewhere along the perimeter of the ash ponds and disposal areas at the Plant.[16]

In addition, TVA's own groundwater monitoring reports show that its coal ash is polluting the groundwater at the Plant, which flows into nearby Wells Creek and the Cumberland River. In every report over a ten year period from 2003 to 2013, TVA found exceedances of boron, iron, manganese, molybdenum, chloride, sulfate and total dissolved solids in at least one test well location.[17]

Because TVA built the ash ponds over the original stream channel of Wells Creek and atop fractured bedrock that is prone to unpredictable and unknown fractures, this contaminated groundwater flows into the nearby surface waters. TVA's current permit only authorizes it to discharge CCR wastewater into surface water through a single outfall, not through countless leaks and seeps. Moreover, the permit requires TVA to dispose of coal ash and coal ash constituents not discharged through the outfall "in a manner, [sic] which prevents [their] entrance into or pollution of any surface or subsurface waters."[18] TVA therefore has been and continues to illegally pollute groundwater, the Cumberland River, and Wells Creek with coal ash and coal ash constituents.

The proposed EIS must discuss the full extent of existing contamination and current and ongoing groundwater and surface water pollution at the Cumberland Plant.

II. The proposed EIS must thoroughly address water-related impacts associated with the proposed actions and a reasonable range of alternatives.

NEPA is "our basic national charter for protection of the environment."[19] Other environmental statutes focus on particular media (like air, water or land), specific natural resources (such as wilderness areas, or endangered plants and animals), or discrete activities (such as mining, introducing new chemicals, or generating, handling or disposing of hazardous substances). In contrast, NEPA applies broadly "to promote efforts which will prevent or eliminate damage to the environment."[20]

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[16] *Id.* 19-20; *see also* Harkness, J., Sulkin, B., and Vengosh, A., *Evidence for Coal Ash Ponds Leaking in the Southeastern United States*, Environ. Sci. Technol., 2016, 50 (12), pp 6583–6592 (strontium isotopes in seep and surface water samples at the Cumberland Plant "consistent with the ratios expected for CCRs and were distinctly higher than the ration in the upstream sample").
[17] Sierra Club NOI, 11-16.
[18] NPDES Permit, Part I.A, page 4.
[19] 40 C.F.R. § 1500.1(a).
[20] National Environmental Policy Act § 2, 42 U.S.C. § 4321.

> [NEPA] has 'twin aims. First, it places upon [a federal] agency the obligation to consider every significant aspect of the environmental impact of a proposed action. Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decisionmaking process.[21]

To accomplish its goal of informed decision-making, NEPA requires the agency proposing the action to provide a full and fair analysis of the environmental impacts of a proposed action and its alternatives.[22] In order to engage in this analysis, the agency must (1) define the purpose of its action; (2) identify alternatives that might help it achieve that purpose; and (3) describe an accurate environmental baseline against which to evaluate the impacts of the proposed action and its alternatives.[23] To the extent an agency proposes to "tier" its analysis from a programmatic EIS, such tiering is not intended to allow the agency to obscure the extent of site-specific environmental impacts or to narrow artificially the alternatives available during site-specific analysis.[24]

NEPA "emphasizes the importance of coherent and comprehensive up-front environmental analysis to ensure informed decisionmaking to the end that 'the agency will not act on incomplete information, only to regret its decision after it is too late to correct.'"[25] Only after fully evaluating a reasonable range of alternatives and the environmental impacts associated with each in compliance with NEPA may an agency determine its preferred course of action.

Environmental Groups, together with others, have previously commented extensively on the fundamental inadequacy of the programmatic and site-specific analyses in the Ash Impoundment Closure EIS, the final version of which was published in June 2016 ("PEIS"). The three sets of comments we provided on the draft and final versions of the PEIS are attached to this letter and are incorporated by reference.[26] Below we discuss some issues that must be

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[21] *Kern v. Bureau of Land Mgmt.*, 284 F.3d 1062, 1066 (9th Cir. 2002) (quoting *Balt. Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983)) (internal quotations and citations omitted, alteration in original).
[22] 40 C.F.R. § 1502.14.
[23] 40 C.F.R. §§ 1502.13–.16.
[24] *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982). ("The critical inquiry in considering the adequacy of an EIS prepared for a large scale, multi-step project is not whether the project's site-specific impact should be evaluated in detail, but when such detailed evaluation should occur."); *id.* at 763 ("The promise of site-specific EIS's [sic] in the future is meaningless if later analysis cannot consider wilderness preservation as an alternative to development.").
[25] *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1216 (9th Cir. 1998).
[26] *See generally* SELC et al., Comments on Draft Ash Impoundment Closure Environmental Impact Statement (Mar. 9, 2016); Letter from SELC, et al., to Ashley Farless, TVA, re: TVA's Obligation to Prepare a Supplemental Environmental Impact Statement for Draft Ash Impoundment Closure Environmental Impact Statement, Part I-Programmatic NEPA Review, and Part II, Site-Specific NEPA Review ("DEIS") (Originally published December 2015); TVA's Continuing Refusal to Disclose and Properly Analyze Key Environmental Impacts in the DEIS (May 23, 2016) ; SELC, et al., Comments on Final Ash Impoundment Closure Environmental Impact Statement (June 8, 2016).

addressed by TVA in its analysis of each of the proposed actions identified in the Scoping Notice.

A. Closure of the Bottom Ash and Main Ash Impoundments

In the Scoping Notice, TVA states that the purpose of the EIS is "to address the long-term management of CCR produced at CUF."[27] TVA further states that "[t]he project will help TVA comply with state and federal requirements related to CCR production and management, including the requirements of U.S. Environmental Protection Agency (EPA's) CCR Rule…."[28] As Environmental Groups discussed in comments on the PEIS, TVA must select an alternative that complies with all of the laws and regulations that apply to its coal ash ponds and disposal areas. Yet TVA's preferred alternative to cap the Bottom Ash and Main Ash Ponds in place, as identified in closure plans it has posted on its federal Coal Ash Rule compliance website, does not comply even with the minimum requirements established by the federal Coal Ash Rule.

Under the federal Coal Ash Rule, a closure plan proposing to cap a coal ash unit in place must, among other requirements, "discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section."[29] Paragraph (d), in turn, includes three sets of performance standards relevant to closure in place: (1) environmental and public health standards; (2) drainage and stabilization standards; and (3) final cover standards.[30] If a unit cannot satisfy the performance standards, the operator must "clean close" the unit, which means removing the coal ash and decontaminating the area.[31]

With respect to environmental and public health standards, an owner/operator must demonstrate that the CCR unit is closed in a manner that will:

(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;

(ii) Preclude the probability of future impoundment of water, sediment, or slurry;

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[27] Scoping Notice, 81 Fed. Reg. 87648.
[28] *Id.*
[29] 40 C.F.R. § 257.102(b).
[30] *Id.* § 257.102(d).
[31] EPA, Relationship Between the Resource Conservation and Recovery Act's Coal Combustion Residuals Rule and the Clean Water Act's National Pollutant Discharge Elimination System Permit Requirements, "Closure Requirements," https://www.epa.gov/coalash/relationship-between-resource-conservation-and-recovery-acts-coal-combustion-residuals-rule#Closure (accessed January 5, 2017) [hereinafter EPA Closure Requirements]; *see also* 40 C.F.R. § 257.102(c) (describing performance standard for closure by removal of coal ash).

(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;

(iv) Minimize the need for further maintenance of the CCR unit; and

(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.[32]

With respect to drainage and stabilization standards, an owner/operator must demonstrate the following:

(i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.

(ii) Remaining wastes must be stabilized sufficient to support the final cover system.[33]

With respect to the final cover standards, an owner/operator must demonstrate, among other things, that the final cover system is "designed to minimize infiltration and erosion."[34]

A discussion of how the closure of a particular impoundment will meet these standards must necessarily be site-specific. Indeed, EPA counsels:

> Whether any particular unit or facility can meet the performance standards for closure with waste in place is a site-specific determination that will depend on a number of factual and engineering considerations, such as the hydrogeology of the site, the engineering of the unit, and the kinds of engineering measures available.[35]

Such a discussion must be site-specific because the conditions at each impoundment vary, in terms of the underlying geology and hydrogeology, the history of construction of the dikes, and other features of the impoundment. The closure plan should reference and incorporate the site-specific information provided in the accompanying stability assessments and history of construction, along with any other site-specific technical analyses required to define the features of the site and demonstrate how the closure will meet the performance standards in light of those features. A technically thorough discussion of these site-specific conditions, and how they will affect issues such as releases to ground and surface water, the potential impoundment of water,

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[32] *Id.* § 257.102(d)(1).
[33] *Id.* § 257.102(d)(2).
[34] *Id.* § 257.102(d)(3).
[35] EPA Closure Requirements, https://www.epa.gov/coalash/relationship-between-resource-conservation-and-recovery-acts-coal-combustion-residuals-rule#Closure.

and stability, is crucial to enable citizens and decisionmakers to evaluate whether an owner/operator's plan satisfies the performance standards in the Rule, and therefore, whether the alternative is reasonable for purposes of NEPA compliance.

In a letter dated October 18, 2016, EPA informed TVA of the utility's obligation to provide the site-specific analysis required by the Coal Ash Rule in order to comply with NEPA:

> If the TVA is unable to meet the requirements of the CCR Rule or any requirements from the states for the preferred alternative [closure in place], the EPA recommends that the TVA consider re-opening the NEPA process and potentially re-evaluating its preferred and selected alternatives for any of the specific impoundments that may be in question.[36]

The closure plans posted by TVA for the Cumberland Plant fall far short of providing the site-specific technical analysis required to support TVA's selection of closure in place for any of the ash ponds and disposal areas at the Plant. The plans contain no discussion of site-specific conditions. Yet, as we have pointed out elsewhere, documents in the possession of TVA and provided to TDEC demonstrate that coal ash waste is submerged in at least 20 feet of groundwater, and that groundwater is hydrologically connected to Wells Creek and the Cumberland River. These documents further reveal that TVA constructed some of the starter dikes for the impoundments with gravel, creating constant and rapid connectivity to Wells Creek.

To give a specific example, as applied to the closure plan for the Stilling Pond at Cumberland (which is part of the Main Ash Pond), these site-specific conditions at the Cumberland Plant have several implications for compliance with the performance standards in the Coal Ash Rule. In the closure plan, TVA blandly proposes that it will minimize releases to groundwater and surface water and preclude the impoundment of water by developing a site grading plan, cap system and stormwater management system.[37] This proposal will not control or minimize releases "to the maximum extent feasible,"[38] as required by the Rule, because the waste will be left perpetually submerged in groundwater that is hydrologically connected to the

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[36] Letter from G. Alan Farmer, Director, Resource Conservation and Recovery Division, EPA Region 4, to Amy Henry, TVA, re: Letter of Clarification on Ash Impoundment Closures (October 18, 2016) (attached to this letter via Sharefile).

[37] Stantec, Closure and Post-Closure Plan, Bottom Ash Pond and Stilling Pond (including Retention Pond), EPA Final Coal Combustion Residuals (CCR) Rule, TVA Cumberland Fossil Plant, Cumberland City, Tennessee, prepared for TVA 5-6 (October 12, 2016), https://ccr.tva.gov/Plants/CUF/Surface%20Impoundment%20-%20Stilling%20Pond%20(including%20Retention%20Pond)/Closure%20-%20Post-Closure%20Plan/Closure%20Plan/257-102(b)_Written%20Closure%20Plan_CUF_Stilling%20Pond%20(including%20Retention%20Pond).pdf [hereinafter TVA Cumberland Closure Plan].

[38] 40 C.F.R. § 257.102(d)(i).

nearby creek and Cumberland River. Nor will the proposal minimize or eliminate "the infiltration of liquids into the waste."[39] In fact, it is obvious that water will constantly enter and exit the saturated ash, leaching contaminants into the environment, indefinitely. Similarly, the proposal will not preclude the probability of future impoundment of water, sediment or slurry because the waste remains submerged in groundwater and the dikes are constructed in part with lower permeability soil that results in pore water remaining in an impounded state.

Nor does TVA explain how it will comply with the drainage and stabilization and final cover requirements. The closure plan states conclusorily that TVA will remove the free water and pore water and stabilize the remaining waste.[40] The closure plan does not explain how TVA will accomplish this when the ash is perpetually submerged in groundwater. The closure plan further does not address how the cover system will minimize infiltration and erosion given the condition of the dikes and the saturated ash. The closure plan cannot meet the performance standards in light of these conditions, and it makes no attempt to do so.[41]

TVA also provides no explanation regarding why it is not planning to immediately close the Fly Ash Stack and the Gypsum Disposal Area. Both of those units began their lives as surface impoundments, contain ash submerged in groundwater, and are polluting groundwater and surface water as described in the Sierra Club NOI. Accordingly, the EIS should analyze a reasonable range of alternatives for clean closing and removing ash from the Fly Ash Stack and the Gypsum Disposal Area in addition to the Main Ash Pond and Bottom Ash Pond.

TVA asserts that its analysis of closure alternative in the EIS will "tier" from the analysis in the PEIS. As Environmental Groups explained at length in comments on the PEIS, that document provides no site-specific analysis of groundwater and surface water impacts. Moreover, contrary to the requirements of the federal Coal Ash Rule, the PEIS concludes that capping a coal ash unit in place is a reasonable alternative where coal ash is buried in groundwater.[42] The PEIS also fails to include meaningful, site-specific analysis of a reasonable range of clean closure alternatives, such as:

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[39] 40 C.F.R. § 257.102(d)(i).
[40] TVA Cumberland Closure Plan, 8.
[41] Indeed, EPA has counseled that clean closure is necessary where ash is submerged in groundwater. *See* EPA Closure Requirements, https://www.epa.gov/coalash/relationship-between-resource-conservation-and-recovery-acts-coal-combustion-residuals-rule#Closure (explaining that where small corner of unit is submerged in underlying aquifer, facility should clean close the submerged portion of the unit).
[42] TVA, Final Ash Impoundment Closure EIS Part I-Programmatic NEPA Review 65 (June 2016); *see also id.* at Part I, Chapter A.2 Response to Comments at 27 (admitting coal ash is submerged in groundwater at seven of the ten impoundments considered in Part II of the PEIS); TVA, Record of Decision, Ash Impoundment Closure Final Environmental Impact Statement Part I Programmatic Review and Part II Site Specific Review of 10 Impoundments 10 (July 28, 2016) (selecting closure in place at all ten impoundments notwithstanding having admitted ash is buried in groundwater at seven of them).

- Excavation and recycling;
- Excavation and disposal in the new on-site landfill TVA is proposing to build;
- Excavation and removal by rail; and
- Excavation and removal by barge.

For all of these reasons, in addition to the reasons set forth in Environmental Groups' comments on the PEIS, TVA cannot permissibly tier to the PEIS to comply with its NEPA obligations.

TVA must start fresh and provide the site-specific analysis required by NEPA, including an analysis of whether the proposed alternatives will satisfy the minimum performance standards set forth in the federal Coal Ash Rule. It is imperative that TVA perform a robust analysis now to avoid having to reopen the NEPA process later, as EPA has indicated TVA will be required to do, if its preferred alternative cannot satisfy the requirements of the Coal Ash Rule or state law.[43]

B. Options for Management and Disposal of Dry CCR

In the Scoping Notice, TVA asserts that for newly-generated "dry" coal ash, disposal in "a new on-site landfill or hauling CCR to an existing offsite permitted landfill are the most reasonable alternatives…."[44] This assertion begs the larger question: The retirement of the Cumberland Plant would eliminate the generation of new, "dry" coal ash and therefore eliminate any purported need for additional coal ash disposal facilities. Thus, ceasing to burn coal at the Cumberland Plant is an alternative that should be considered in the EIS.

Moreover, to the extent TVA intends to construct a new on-site landfill for disposal of coal ash, it should first consider using such a landfill for the disposal of the Plant's legacy coal ash, which is stored in the unlined pits described in Section I and II.A above and is currently contaminating groundwater and surface water at and near the Plant. In TVA's Public Scoping Information Packet, TVA suggests that it may continue to use the Fly Ash Stack for disposal.[45] Assuming TVA intends this proposal to be part of a "no action" alternative, it must consider the logical consequences of continuing to dispose of ash in an unlined, leaking pit that is polluting groundwater and surface water in violation of the Clean Water Act and other laws. Excavating coal ash from the Fly Ash Stack and other impoundments, recycling the ash to the extent feasible, and disposing of any remaining ash in the proposed on-site, lined landfill is an alternative that should be considered in the EIS.

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[43] Letter from G. Alan Farmer, Director, Resource Conservation and Recovery Division, EPA Region 4, to Amy Henry, TVA, re: Letter of Clarification on Ash Impoundment Closures (October 18, 2016).
[44] Scoping Notice, 81 Fed. Reg. 87648.
[45] TVA, Public Scoping Information Packet, Cumberland Fossil Plant CCR Management Environmental Impact Statement 2 (December 2016)(obtained at the open house held by TVA in Clarksville, Tennessee on December 12, 2016)[hereinafter Information Packet].

Any new on-site landfill will need to comply with all of the requirements of the federal Coal Ash Rule, including the location restrictions set forth in 40 C.F.R. §§ 257.60-64. A new on-site landfill must also comply with the requirements of the Tennessee Solid Waste Disposal Act and its implementing regulations. The EIS should address how its proposed on-site landfill will comply with these laws and regulations. In particular, the EIS should address the hydrogeology of the proposed landfill site and whether the site is situated atop the Wells Creek Structure, which is characterized by highly unpredictable, fractured bedrock.

With respect to hauling coal ash off site to an existing permitted landfill, TVA should consider a reasonable range of options, including: (1) transportation by rail and barge; (2) varying distances to potential landfills; and (3) opportunities for additional coal ash recycling.

TVA must also consider the environmental justice implications of the selection of a particular site for coal ash disposal. In the aftermath of the Kingston coal ash spill, TVA transported ash to the Arrowhead Landfill in Perry County, Alabama, a landfill in an environmental justice community with repeated violations of pollution laws.[46] In September 2016, the United States Commission on Civil Rights issued a report finding that the decision to move coal ash to the Arrowhead Landfill was primarily based on technical considerations, including cost, and did not properly take into account environmental justice concerns.[47] This must not happen again. TVA must ensure that any disposal location for its coal ash complies with laws designed to protect people from pollution, and takes into account disproportionate impacts on communities that are already burdened.

C. Construction of a Bottom Ash Dewatering Facility

Finally, TVA proposes to construct and operate a new bottom ash dewatering facility.[48] TVA's Public Scoping Information Packet explains that TVA is considering "options for using a continuous or once-through system where water left over from the dewatering process would be

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[46] Kristen Lombardi, *Welcome to Uniontown: Arrowhead Landfill Battle a Modern Civil Rights Struggle*, NBC News (Aug. 5, 2015), http://www.nbcnews.com/news/nbcblk/epa-environmental-injustice-uniontown-n402836. Arrowhead Landfill is listed on the 2015 Public Notice of Significant Non-Compliance for Significant Industrial Users. *See* ADEM, Public Notice of Significant Non-Compliance for Significant Industrial Users (Feb. 2016), http://www.adem.state.al.us/newsEvents/notices/feb16/2snc.htm.

[47] U.S. Commission on Civil Rights, Environmental Justice: Examining the Environmental Protection Agency's Compliance and Enforcement of Title VI and Executive Order 12,898, 65-69 (September 2016), http://www.usccr.gov/pubs/Statutory_Enforcement_Report2016.pdf.

[48] Scoping Notice, 81 Fed. Reg. 87648.

treated and then discharged through an existing permitted outfall or recirculated back into the plant for future sluicing operations."[49]

TVA identifies compliance with the Effluent Limitation Guidelines as one of the purposes of its proposed project.[50] The Effluent Limitation Guidelines require zero discharge from bottom ash transport water beginning in 2018.[51] TVA's proposed "once-through" option would result in continued discharges of toxic wastewater pollution into the Cumberland River. Because it would violate the Effluent Limitation Guidelines, TVA's proposed "once-through" option does not satisfy the purpose and need for the proposed project.

Other alternatives not discussed by TVA in the Scoping Notice should be included in the EIS. First, as discussed above, TVA should include analysis of an alternative in which TVA retires the Cumberland Plant.[52] By retiring the Plant, TVA would cease production of toxic bottom ash and bottom ash wastewater and eliminate the need for a bottom ash dewatering facility. Second, in addition to recirculating systems that require dewatering facilities, EPA identifies dry handling of bottom ash as an alternative to comply with the zero discharge limit.[53] The EIS should evaluate dry handling in addition to dewatering.

Any alternative in which TVA will continue to generate bottom ash must include an analysis of how TVA will dispose of the ash, the impacts associated with such disposal, and whether such disposal will comply with all applicable laws and regulations. See Sections I and II.A and B above.

In sum, the Cumberland Plant contributes a significant amount of water pollution to a watershed that serves as a highly-valued recreational resource and a drinking water source for citizens of the State of Tennessee. The federal Clean Water Act, Coal Ash Rule, Effluent Limitation Guidelines, and state water quality and solid waste disposal laws must form the basis for determining the range of alternatives available to TVA for "long term management of CCR produced at CUF."[54] TVA must take these laws and regulations fully into account. Moreover, to comply with these laws and regulations and with NEPA, TVA must prepare an EIS that

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[49] Information Packet, 3.
[50] Scoping Notice, 81 Fed. Reg. 87648.
[51] EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY, 80 Fed. Reg. 67,838, 67,896 (Nov. 3, 2015) (codified at 40 C.F.R. §§ 423)(hereinafter Final Rule)(requiring compliance "as soon as possible" beginning November 1, 2018).
[52] In the Information Packet, TVA mentions briefly that it "will evaluate stopping operations," but it is unclear whether it intends to analyze retirement of the Plant. Information Packet, 2.
[53] EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY, 80 Fed. Reg. 67,838, 67852-853 (Nov. 3, 2015) (codified at 40 C.F.R. §§ 423)(hereinafter Final Rule).
[54] Scoping Notice, 81 Fed. Reg. 87648.

discloses and analyzes the site-specific impacts, including impacts to groundwater and surface water, associated with its proposed actions and a reasonable range of alternatives.

Sincerely,

/s
Amanda Garcia
Staff Attorney
Southern Environmental Law Center

/s with permission
Abel Russ
Staff Attorney
Environmental Integrity Project

/s with permission
Angela Garrone
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Southern Alliance for Clean Energy

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Attachments provided via Sharefile

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From:	Jonathan Levenshus
To:	Pilakowski, Ashley Anne
Cc:	Levenshus, Jonathan
Subject:	Sierra Club Comments on Proposed EIS for TVA Cumberland CCR Management
Date:	Friday, January 06, 2017 3:29:36 PM
Attachments:	TVA coal ash plan Cumberland comments TN 4 Jan 2017.xlsx

TVA External Message. Please use caution when opening.

Ms. Pilakowski, I am writing to share comments from members of the TN Chapter of the Sierra Club on the proposed EIS for CCR management at the Cumberland coal plant.

I have enclosed a copy of the form letter and an Excel spreadsheet with the 583 contacts that signed on to our state-wide petition/form letter. The spreadsheet also includes some additional comments from our members that also should be considered.

Please confirm that you have received this message at your earliest convenience, and also please let me know if you have any questions or problems opening the attached Excel document.

Thank you in advance and have a nice (and warm) weekend.

Jonathan

SCOPING COMMENT FORM LETTER

As TVA drafts its plans for storage of coal ash from the Cumberland coal plant, I respectfully urge that you move the waste to dry, lined storage away from water resources like Wells Creek and the Cumberland River. This site is not suitable for disposing coal ash waste. The Cumberland Plant and its unlined, leaking coal ash waste pits were constructed

_____

Jonathan Levenshus
Senior Campaign Representative
Sierra Club Beyond Coal Campaign
jonathan.levenshus@sierraclub.org
(202) 590-0893

Advocacy Action: Advocacy Action Id	Contact	First Name	Last Name
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ADVOC-35807309	Jeri Burgdorf	Jeri	Burgdorf
ADVOC-35803494	Edward Mc Eleney	Edward	Mc Eleney
ADVOC-35786563	Lynn Bowman	Lynn	Bowman
ADVOC-35784718	Patrick Watermeier	Patrick	Watermeier
ADVOC-35818816	Gay Lanier	Gay	Lanier
ADVOC-35785216	Ben Sweeton	Ben	Sweeton
ADVOC-35796209	Terri Carney	Terri	Carney
ADVOC-35785200	Pamela Footit	Pamela	Footit
ADVOC-35788524	Toya Hibbs	Toya	Hibbs
ADVOC-35785312	Mary Moore	Mary	Moore
ADVOC-35788597	Donald Keyser	Donald	Keyser
ADVOC-35798417	Sandra Carroll	Sandra	Carroll
ADVOC-35805966	Sandra Mckinney	Sandra	McKinney
ADVOC-35813701	Dolly Carlisle	Dolly	Carlisle
ADVOC-35811067	Karen Scott	Karen	Scott

ADVOC-35799242	Tabatha Leath	Tabatha	Leath
ADVOC-35870227	Karen Weinman	Karen	Weinman
ADVOC-35793154	Sue Williams	Sue	Williams
ADVOC-35801302	Eric Clauson	Eric	Clauson
ADVOC-35832252	Dale Mettler	Dale	Mettler
ADVOC-35835182	Mary Vrailas	Mary	Vrailas
ADVOC-35801886	Sarah Henderson	Sarah	Henderson
ADVOC-35800265	Tom Willliams	Tom	Willliams
ADVOC-35885495	Jean Finney	Jean	Finney
ADVOC-35818389	Elizabeth Malayter	Elizabeth	Malayter
ADVOC-35804929	Cynthia Rasnic	Cynthia	Rasnic
ADVOC-35793305	Winifred Silvers	Winifred	Silvers
ADVOC-35803831	Roger Meyer	Roger	Meyer
ADVOC-35796813	Kim Young	Kim	Young

ADVOC-35815649	Tommi Stephenson	Tommi	Stephenson
ADVOC-35823904	Gail Perion	Gail	Perion
ADVOC-35804947	Abigail Tylor	Abigail	Tylor
ADVOC-35784766	Geneva Andrews	Geneva	Andrews
ADVOC-35802196	Shirley Bryant	Shirley	Bryant
ADVOC-35812989	Sue Gibson	Sue	Gibson
ADVOC-35807132	Deborah Narrigan	Deborah	Narrigan
ADVOC-35810452	Rosa Thompson	Rosa	Thompson
ADVOC-35813129	Diane Jones	Diane	Jones
ADVOC-35841183	Matthew Trotsky	Matthew	Trotsky
ADVOC-35788920	Fred Vaslow	Fred	Vaslow

ADVOC-35823234	Martin Holsinger	Martin	Holsinger
ADVOC-35797504	Sue Cook	sue	cook
ADVOC-35804177	Margaret Mock	Margaret	Mock
ADVOC-35797934	Cata Folks	Cathalin	Folks
ADVOC-35820590	Ed Shannon	Ed	Shannon
ADVOC-35818262	John Lambert	John	Lambert
ADVOC-35814870	Mona Hudgins	Mona	Hudgins
ADVOC-35796687	Corey Chatis	Corey	Chatis
ADVOC-35805391	Cheryl Ward	Cheryl	Ward
ADVOC-35835744	Paul Sanderson	Paul	Sanderson
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ADVOC-35796371	Lynne White	Lynne	White
ADVOC-35811398	Sarah Rowe	Sarah	Rowe

ADVOC-35832392	Lisa Schaeffer	Lisa	Schaeffer
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ADVOC-35796434	Charles & Dinah Crow	Charles & Dinah	Crow
ADVOC-35795597	Camille Matlock	Camille	Matlock
ADVOC-35786251	Jeanne Buckman	Jeanne	Buckman
ADVOC-35800043	Cher Miller	Cher	Miller
ADVOC-35793710	Mary Hutchings	Mary	Hutchings
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ADVOC-35883030	Karen Johnson	Karen	Johnson
ADVOC-35807701	Joe Jernigan	Joe	Jernigan
ADVOC-35802412	Lee Hogan	Lee	Hogan
ADVOC-35784786	Mary Nell Billings	Mary Nell	Billings
ADVOC-35792071	Wanda Couey	Wanda	Couey
ADVOC-35810297	Nancy Neilsen	Nancy	Neilsen
ADVOC-35784687	Rick Merical	Rick	Merical
ADVOC-35784902	Michael Bernard	Michael	Bernard
ADVOC-35817252		Tom	Cullen
ADVOC-35785579	Matt Cutts	Matt	Cutts
ADVOC-35812192	Jerry Sims	Jerry	Sims

ADVOC-35798348	Shelley Stahlman	Shelley	Stahlman
ADVOC-35805641	Joyce Coombs	Joyce	Coombs
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ADVOC-35791353	Steven Morris	Steven	Morris
ADVOC-35807911	Charles Belenky	Charles	Belenky
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ADVOC-35861394	Paul Ainsworth	Paul	Ainsworth
ADVOC-35798785	Robin Sanders	Robin	Sanders
ADVOC-35798698	Adonys Gebauer	Adonys	Gebauer
ADVOC-35812857	Dixie Race	Dixie	Race
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ADVOC-35830391	Wayne Williams	Wayne	Williams
ADVOC-35859795	Elizabeth Stein	Elizabeth	Stein
ADVOC-35785637	Rebecca Brehmer	Rebecca	Brehmer
ADVOC-35786160	Judith Homan	Judith	Homan
ADVOC-35811486	Carol Rasmussen	Carol	Rasmussen
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ADVOC-35805609	Debra Howard	Debra	Howard
ADVOC-35785771	Nancy Mcfadden	Nancy	McFadden
ADVOC-35793207	Jo Anne Boyd	Jo Anne	Boyd
ADVOC-35805856	Sonja Hunter	Sonja	Hunter
ADVOC-35798218	Michael Pardee	Michael	Pardee
ADVOC-35800562	Rosalind Andrews	Rosalind	Andrews
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ADVOC-35796839	William Franks	William	Franks
ADVOC-35784619	Michelle Haverland	Michelle	Haverland
ADVOC-35784615	Debra Prince	Debra	Prince

ADVOC-35786333	Marsha Smith	Marsha	Smith
ADVOC-35795219	Patricia Green	Patricia	Green
ADVOC-35795218	Patricia Green	Patricia	Green
ADVOC-35795220	Patricia Green	Patricia	Green
ADVOC-35785758	Genie And Bob Mccombs	Genie And Bob	Mccombs
ADVOC-35786387	Larry Voyta	Larry	Voyta
ADVOC-35785799	David And Carol Marsh	David And Carol	Marsh
ADVOC-35784497	Tina Tine	Tina	Tine
ADVOC-35784503	Chris Drumright	Chris	Drumright
ADVOC-35784507	Hunter Sellari	Hunter	Sellari
ADVOC-35784513	Heather James	Heather	James
ADVOC-35784521	Debra Travers	Debra	Travers
ADVOC-35784525	Brett Anderson	Brett	Anderson
ADVOC-35784532	Gregory Newsome	Gregory	Newsome
ADVOC-35784536	Bryan Owings	Bryan	Owings
ADVOC-35784538	David Cotton	David	Cotton
ADVOC-35784617	Thomas Burrington	Thomas	Burrington
ADVOC-35784550	Sharon Holmes	Sharon	Holmes
ADVOC-35784572	David Riall	David	Riall
ADVOC-35784599	Mary Nell Bryan	Mary Nell	Bryan
ADVOC-35784605	Barbara Mathieson	Barbara	Mathieson
ADVOC-35784607	Darrahl Stanford	Billy	Stanford
ADVOC-35784618	Joseph Rizzo	Joseph	Rizzo
ADVOC-35784632	Heather O'Malley	Heather	O'Malley
ADVOC-35784635	Nancy Hellsten	Nancy	Hellsten
ADVOC-35784647	Janice Everett	Janice	Everett
ADVOC-35784650	Matt King	Matt	King
ADVOC-35784790	Lindsay Hager	Lindsay	Hager
ADVOC-35784658	Teresa Iovino	Teresa	Iovino
ADVOC-35784661	Lisa Gordon	Lisa	Gordon
ADVOC-35784662	Kelsey Mccathie	Kelsey	Mccathie

ADVOC-35784732	William Thompson	William	Thompson
ADVOC-35784757	Nicholas Davidson	Nicholas	Davidson
ADVOC-35784762	Stacey Nebel	Stacey	Nebel
ADVOC-35784764	Steven Scheer	Steven	Scheer
ADVOC-35784765	Margaret Evans	Margaret	Evans
ADVOC-35784770	DeWayne Fulton	DeWayne	Fulton
ADVOC-35784785	Amy Deyoung	Amy	Deyoung
ADVOC-35784803	Montana Chambers	Montana	Chambers
ADVOC-35784804	Kelsey Boring	Kelsey	Boring
ADVOC-35784816	C O'Brien	C	O'Brien
ADVOC-35784819	Spencer Kaaz	Spencer	Kaaz
ADVOC-35784903	Nancy Taylor	Nancy	Taylor
ADVOC-35784913	Sarah Raymer	Sarah	Raymer
ADVOC-35784915	Sangeetha Kandan	Sangeetha	Kandan
ADVOC-35784933	Brent Manley	Brent	Manley
ADVOC-35784944	David Walker	David	Walker
ADVOC-35784949	Wanda Shrum	Wanda	Shrum
ADVOC-35784979	Elena Williams	Elena	Williams
ADVOC-35785013	Rita Warner	Rita	Warner
ADVOC-35785014	Christina Gerdes	Christina	Gerdes
ADVOC-35785076	Jenine Kerr	Jenine	Kerr
ADVOC-35785082	Michael Hazelton	Michael	Hazelton
ADVOC-35785121	Marcia Woodcock	Marcia	Woodcock
ADVOC-35785269	Thomas Word	Thomas	Word
ADVOC-35785220	Taz Bedwetter	Taz	Bedwetter
ADVOC-35785356	Rachael Cantrell	Rachael	Cantrell
ADVOC-35785353	Carolyn Crabtree	Carolyn	Crabtree
ADVOC-35785328	J. Steinberg	J.	Steinberg
ADVOC-35785296	C Orr	C	Orr
ADVOC-35785304	Nigel Berridge	Nigel	Berridge
ADVOC-35785324	K Morris	K	Morris
ADVOC-35785365	Rob Brill	Rob	Brill
ADVOC-35785378	Rickey Westbrooks	Rickey	Westbrooks
ADVOC-35785399	Aaron Jones	Aaron	Jones
ADVOC-35785444	Violet Edelman	Violet	Edelman
ADVOC-35785457	Tara Duchyns	Tara	Duchyns
ADVOC-35785466	Michael Lippard	Michael	Lippard
ADVOC-35785486	Shelby Hood	Shelby	Hood
ADVOC-35785503	Kimberly Coble	Kimberly	Coble
ADVOC-35785517	Carole Caprio	Carole	Caprio
ADVOC-35785550	Charlene Nash	Charlene	Nash
ADVOC-35785635	Taylor Hixson	Taylor	Hixson
ADVOC-35785680	Michael Maza	Michael	Maza
ADVOC-35785721	Scott Banbury	Scott	Banbury

ADVOC-35785780	Marlene Shaner	Marlene	Shaner
ADVOC-35785775	Karen Chaffin	Karen	Chaffin
ADVOC-35785827	Annie Powell	Annie	Powell
ADVOC-35785828	David Davidson	David	Davidson
ADVOC-35785837	Sara Ryder	Sara	Ryder
ADVOC-35785844	Marcella Feathers	Marcella	Feathers
ADVOC-35785890	Robert Earls	Robert	Earls
ADVOC-35785913	John Reid	John	Reid
ADVOC-35785971	Logan Burkhart	Logan	Burkhart
ADVOC-35785990	Hector Bertin	Hector	Bertin
ADVOC-35786021	Kathryn Mckinney	Kathryn	Mckinney
ADVOC-35786033	Barbara Lesch	Barbara	Lesch
ADVOC-35786045	Skeet Cutshall	Skeet	Cutshall
ADVOC-35786070	Deb Tuck	Deb	Tuck
ADVOC-35786081	Robert Dornfeld	Robert	Dornfeld
ADVOC-35786096	Robert Sindler	Robert	Sindler
ADVOC-35786101	Brenda Miller	Brenda	Miller
ADVOC-35786153	Adriana Crews	Adriana	Crews
ADVOC-35786200	Annette Dekanich	Annette	Dekanich
ADVOC-35786206	Kathie Martin	Kathie	Martin
ADVOC-35786207	Kathie Martin	Kathie	Martin
ADVOC-35786225	Joyce Wheaton	Joyce	Wheaton
ADVOC-35786358	Lisa Murphy	Lisa	Murphy
ADVOC-35786373	Kathleen Mohning	Kathleen	Mohning
ADVOC-35786473	Mervin Paulson	Mervin	Paulson
ADVOC-35786696	Greg Reaves	Greg	Reaves
ADVOC-35786914	Jessica Young	Jessica	Young
ADVOC-35786677	Marianne Bentley	Marianne	Bentley
ADVOC-35787055	Vickie Corvin	Vickie	Corvin
ADVOC-35787101	York Quillen	York	Quillen
ADVOC-35787033	Rachel Levine	Rachel	Levine
ADVOC-35787332	William Yeager	William	Yeager
ADVOC-35787348	Jerold Bauch	Jerold	Bauch
ADVOC-35787597	Pam Kirk	Pam	Kirk
ADVOC-35787954	Morgan Caraway	Morgan	Caraway
ADVOC-35788180	Christy Baioni	Christy	Baioni
ADVOC-35788507	Dorothy Gabriel	Dorothy	Gabriel
ADVOC-35788586	Ben Nakdimen	Ben	Nakdimen
ADVOC-35788587	Roger Guth	Roger	Guth
ADVOC-35788606	Jonathan Meade	Jonathan	Meade
ADVOC-35788918	Patsy Westberry	Patsy	Westberry
ADVOC-35789035	Veronica Bourassa	Veronica	Bourassa
ADVOC-35789488	Ann Sensenstein	Ann	Sensenstein
ADVOC-35789581	David Ernst	David	Ernst

ADVOC-35789699	Susan Moffatt	Susan	Moffatt
ADVOC-35789881	Cheryl Dare	Cheryl	Dare
ADVOC-35790063	Jeffry Stein	Jeffry	Stein
ADVOC-35790453	Betty Weber	Betty	Weber
ADVOC-35790715	Todd Weise	Todd	Weise
ADVOC-35790795	Alan And Andree Lequire	Alan And Andree	Lequire
ADVOC-35790847	Vanessa Hardy	Vanessa	Hardy
ADVOC-35790868	Wendy Hinson	Wendy	Hinson
ADVOC-35790927	Angie Knight	Angie	Knight
ADVOC-35790973	Hiasaura Rubenstein	Hiasaura	Rubenstein
ADVOC-35791040	Wade Wilson	Wade	Wilson
ADVOC-35791084	Michael Darby	Michael	Darby
ADVOC-35791439	Jesse Gore	Jesse	Gore
ADVOC-35791425	Manuel Menendez	Manuel	Menendez
ADVOC-35791862	Charels Meelks	Charels	Meelks
ADVOC-35791953	Eric Robinson	Eric	Robinson
ADVOC-35792082	Kathie Martin	Kathie	Martin
ADVOC-35792061	Mary Bristow	Mary	Bristow
ADVOC-35791985	Karen Mcconkey	Karen	Mcconkey
ADVOC-35792308	Matthew Garner	Matthew	Garner
ADVOC-35792345	Lane Kinkead	Lane	Kinkead
ADVOC-35792372	Christine Eardley	Christine	Eardley
ADVOC-35792351	Edward Clebsch	Edward	Clebsch
ADVOC-35792398	Barry Medlin	Barry	Medlin
ADVOC-35792440	Linda Pearce	Linda	Pearce
ADVOC-35792500	Linda Pearce	Linda	Pearce
ADVOC-35792524	Pam Rumble	Pam	Rumble
ADVOC-35792742	Laura Howes	Laura	Howes
ADVOC-35792758	Laura Howes	Laura	Howes
ADVOC-35792833	Chris Bennett	Chris	Bennett
ADVOC-35792847	Thomas Pabst	Thomas	Pabst
ADVOC-35792977	Bettina Bowers	Bettina	Bowers
ADVOC-35793126	Jan Jamison	Jan	Jamison
ADVOC-35793142	Gayle Price	Gayle	Price
ADVOC-35793241	John Nelson	John	Nelson
ADVOC-35793242	John Nelson	John	Nelson
ADVOC-35793246	Gary Sturgill	Gary	Sturgill
ADVOC-35793500	David Waggoner	David	Waggoner
ADVOC-35793516	Charlie Palmgren	Charlie	Palmgren
ADVOC-35793534	Lentora Parker	Lentora	Parker
ADVOC-35793864	William Davis	William	Davis
ADVOC-35793901	Julie Card	Julie	Card
ADVOC-35794220	B Hall	B	Hall
ADVOC-35794229	Danita Zelinski	Danita	Zelinski

ADVOC-35794269	Diana Moyers	Diana	Moyers
ADVOC-35794386	Judith Mogul	Judith	Mogul
ADVOC-35794335	Meredith Bogott	Meredith	Bogott
ADVOC-35794455	Freya Sachs	Freya	Sachs
ADVOC-35794421	Chris Dortch	Chris	Dortch
ADVOC-35794414	Steven Minier	Steven	Minier
ADVOC-35794504	David Jacques	David	Jacques
ADVOC-35794613	Phyllis Mikula	Phyllis	Mikula
ADVOC-35794873	Kermit Easterling	Kermit	Easterling
ADVOC-35794916	Sue Johnson	Sue	Johnson
ADVOC-35795092	Eugene Howard	Eugene	Howard
ADVOC-35795178	Chuck Comstock	Chuck	Comstock
ADVOC-35795212	Barbara Snell	Barbara	Snell
ADVOC-35795400	Mike Couch	Mike	Couch
ADVOC-35795409	John Guenst	John	Guenst
ADVOC-35795518	Kathy Tobey	Kathy	Tobey
ADVOC-35795572	Stacy Boydston	STACY	BOYDSTON
ADVOC-35795583	Julian Kmiec	Julian	Kmiec
ADVOC-35795640	Anita Phillips	Anita	Phillips
ADVOC-35795734	Karen Anderson	Karen	Anderson
ADVOC-35795897	Marianne Bentley	Marianne	Bentley
ADVOC-35796093	Danny Balog	Daniel	Balog
ADVOC-35796163	Marilyn Bacon	Marilyn	Bacon
ADVOC-35796400	Ae Lyon	AE	Lyon
ADVOC-35796471	Steve Kanies	Steve	Kanies
ADVOC-35796577	E Petrilla	E	Petrilla
ADVOC-35796728	S Hopper	S	Hopper
ADVOC-35796743	Pamela Osborne	Pamela	Osborne
ADVOC-35796882	Kathryn Dodd	Kathryn	Dodd
ADVOC-35796962	Melanie Moody	Melanie	Moody
ADVOC-35797201	John Wyatt	John	Wyatt
ADVOC-35797434	David And Carol Butler	David And Carol	Butler
ADVOC-35797508	Susan O'Connor	Susan	O'Connor
ADVOC-35797520	Lindsay Hanley	Lindsay	Hanley
ADVOC-35797599	Kevin Vaught	Kevin	Vaught
ADVOC-35797621	Reva Kriegel	Reva	Kriegel
ADVOC-35797622	Rachel Lynch	Rachel	Lynch
ADVOC-35797698	Rachel Buckner	Rachel	Buckner
ADVOC-35797709	Sharon Lyons	Sharon	Lyons
ADVOC-35797732	Lucy Brugnoletti	Lucy	Brugnoletti
ADVOC-35798001	Raymond Cruze	Raymond	Cruze
ADVOC-35798272	Frances Burns	Frances	Burns
ADVOC-35798547	Margaret Franklin	Margaret	Franklin
ADVOC-35798572	Rey Mora	Rey	Mora

ADVOC-35798635	Julie MacNamara	Julie	MacNamara
ADVOC-35798639	Craig Drew	Craig	Drew
ADVOC-35798663	Justin Wesche	Justin	Wesche
ADVOC-35798782	Gerald Dooley	Gerald	Dooley
ADVOC-35798834	Linda Tomlinson	Linda	Tomlinson
ADVOC-35798857	Thomas Phillips	Thomas	Phillips
ADVOC-35798945	Ann Shoup	Ann	Shoup
ADVOC-35798974	Bob Carlough	Bob	Carlough
ADVOC-35799052	Kathy Knudson	Kathy	Knudson
ADVOC-35799060	Phyllis Golden	Phyllis	Golden
ADVOC-35799189	Thomas Franck	Thomas	Franck
ADVOC-35799134	Jane Herron	Jane	Herron
ADVOC-35799194	James Judge	James	Judge
ADVOC-35799205	Beth Wallace	Beth	Wallace
ADVOC-35799277	James Scott Gilchrist	James Scott	Gilchrist
ADVOC-35799372	Nigel Bowen	Nigel	Bowen
ADVOC-35799729	Marielens Komons	Marielens	Komons
ADVOC-35799857	Nellie Medlin	Nellie	Medlin
ADVOC-35800086	Marlea Whitton	Marlea	Whitton
ADVOC-35800252	Donna Darnell	Donna	Darnell
ADVOC-35800312	Heather Andrews	Heather	Andrews
ADVOC-35800492	Darrel Easter	Darrel	Easter
ADVOC-35800496	Mark Barnes	Mark	Barnes
ADVOC-35800836	Adam Parks	Adam	Parks
ADVOC-35800926	Dale Geno	Dale	Geno
ADVOC-35801018	Harry Debaufer Iii	Harry	Debaufer Iii
ADVOC-35801156	Judith Hall	Judith	Hall
ADVOC-35801300	Willard Leon Leon	Willard Leon	Leon
ADVOC-35801564	Heather Brown	Heather	Brown
ADVOC-35801526	Mary Reed	Mary	Reed
ADVOC-35801811	Dave Pohl	Dave	Pohl
ADVOC-35801836	Christine Coons	Christine	Coons
ADVOC-35802130	Nanette King	Nanette	King
ADVOC-35802493	Paul Rucker	Paul	Rucker
ADVOC-35802486	Anne Falcone	Anne	Falcone
ADVOC-35802508	John Esposito	John	Esposito
ADVOC-35802555	Lori Murphree	Lori	Murphree
ADVOC-35802586	Maureen Brady	Maureen	Brady
ADVOC-35802647	Ben Fowler	Ben	Fowler
ADVOC-35802805	Mark Heald	Mark	Heald
ADVOC-35802846	Donna Duncan	Donna	Duncan
ADVOC-35802867	Sherry Gish	Sherry	Gish
ADVOC-35803088	Kevin Morris	Kevin	Morris
ADVOC-35803091	Susan Schuchard	Susan	Schuchard

ADVOC-35803368	Felicity Shelton	Felicity	Shelton
ADVOC-35803495	Judy Gibson	Judy	Gibson
ADVOC-35803497	Barbara Allen	Barbara	Allen
ADVOC-35803535	Jada Carpenter	Jada	Carpenter
ADVOC-35803744	Sarah Pippin	Sarah	Pippin
ADVOC-35804011	Jim Barritt	Jim	Barritt
ADVOC-35804048	Lorinda Nelson	Lorinda	Nelson
ADVOC-35804218	Justin Brown	Justin	Brown
ADVOC-35804231	Cyndi Chester	Cyndi	Chester
ADVOC-35804236	Don Kaller	Don	Kaller
ADVOC-35804366	Cathy Mccathie	Cathy	McCathie
ADVOC-35804449	Diane Bouska	Diane	Bouska
ADVOC-35804619	Charles Mace	Charles	Mace
ADVOC-35804648	Yafu Lee	Yafu	Lee
ADVOC-35804765	Margaret King	Margaret	King
ADVOC-35804910	Connie Mcphrson	Connie	Mcphrson
ADVOC-35805225	Gloria Griffith	Gloria	Griffith
ADVOC-35805273	Mayme Siders	Mayme	Siders
ADVOC-35805314	Perry Chapdelaine	Perry	Chapdelaine
ADVOC-35805436	Jason Marcum	Jason	Marcum
ADVOC-35805559	Carol Tenaglia	Carol	Tenaglia
ADVOC-35805697	Bettye Bright	Bettye	Bright
ADVOC-35805772	Mary Saums	Mary	Saums
ADVOC-35805811	John Binkley	John	Binkley
ADVOC-35805786	Priscilla Tine	Priscilla	Tine
ADVOC-35805834	Kathy Mcginnis-Craft	Kathy	Mcginnis-Craft
ADVOC-35805853	James Harrell Jr	James	Harrell Jr
ADVOC-35806086	Robert Fingerman	Robert	Fingerman
ADVOC-35806222	Thomas Goff	Thomas	Goff
ADVOC-35806348	Lorraine Martinez	Lorraine	Martinez
ADVOC-35806353	Steven Brooks	Steven	Brooks
ADVOC-35806532	Teresa Shelton	Teresa	Shelton
ADVOC-35806608	Joan Mitchell	Joan	Mitchell
ADVOC-35806759	Mary Walton	Mary	Walton
ADVOC-35807018	Joseph Lewis	Joseph	Lewis
ADVOC-35807272	Rachel Schlafer-Parton	Rachel	Schlafer-Parton
ADVOC-35807359	Carol Griffith	Carol	Griffith
ADVOC-35807405	Joan Keuper	Joan	Keuper
ADVOC-35807603	James Nelson	James	Nelson
ADVOC-35807658	Jennifer Cartwright	Jennifer	Cartwright
ADVOC-35807666	Marylou Ogle	Marylou	Ogle
ADVOC-35807675	Kristy Ray	Kristy	Ray
ADVOC-35807748	M. Nour Naciri, Phd	M. Nour	Naciri, Phd
ADVOC-35807856	Ronald Holder	Ronald	Holder

ADVOC-35807861	James Johnson	James	Johnson
ADVOC-35807870	Jacki Masar	Jacki	Masar
ADVOC-35808213	Patricia Dishman	Patricia	Dishman
ADVOC-35808516	Murray Hudson	Murray	Hudson
ADVOC-35808536	Timothy Shaw	Timothy	Shaw
ADVOC-35808594	Sandra Kilgore	Sandra	Kilgore
ADVOC-35808805	Missy Wilcox	Missy	Wilcox
ADVOC-35808879	Kelly Zachary	Kelly	Zachary
ADVOC-35809120	Mary Livesay	Mary	Livesay
ADVOC-35809139	Dhana Schaal	Dhana	Schaal
ADVOC-35809155	Steven Lipson	Steven	Lipson
ADVOC-35809275	Nicole Berkheimer	Nicole	Berkheimer
ADVOC-35809294	Darrell Ehmke	Darrell	Ehmke
ADVOC-35809318	Elizabeth Simpson	Elizabeth	Simpson
ADVOC-35809409	Cj Corrigan	Cj	Corrigan
ADVOC-35809527	Lori Link	Lori	Link
ADVOC-35809567	Tom Moor	Tom	Moor
ADVOC-35809624	Mike Morrison	Mike	Morrison
ADVOC-35809674	Holly Vonarx	holly	vonarx
ADVOC-35809710	Nick Watson	Nick	Watson
ADVOC-35809838	Susan Vanacore	Susan	Vanacore
ADVOC-35810040	Kathleen Emmke	Kathleen	Emmke
ADVOC-35810288	Lea VanMerkestyn	Lea	VanMerkestyn
ADVOC-35810421	Howell Sherrod	Howell	Sherrod
ADVOC-35810422	Jane Gulley	Jane	Gulley
ADVOC-35810544	Larry Olivier	Larry	Olivier
ADVOC-35810515	Robert Viall	Robert	Viall
ADVOC-35810790	Arline Boyce	Arline	Boyce
ADVOC-35810818	Joy Mayfield	Joy	Mayfield
ADVOC-35810824	William White	William	White
ADVOC-35810947	Cheryl Schlecht	Cheryl	Schlecht
ADVOC-35810959	Van Bunch	Van	Bunch
ADVOC-35811127	Hillary Haley	Hillary	Haley
ADVOC-35811149	Grace Graves	Grace	Graves
ADVOC-35811224	Melissa Rodgers	Melissa	Rodgers
ADVOC-35811405	Hunter Oppenheimer	Hunter	Oppenheimer
ADVOC-35811840	Crystal Hart	Crystal	Hart
ADVOC-35811851	Michael Broderick	Michael	Broderick
ADVOC-35811864	Kara Lanham	Kara	Lanham
ADVOC-35811891	Edward Baker	Edward	Baker
ADVOC-35811927	Maureen May	Maureen	May
ADVOC-35812015	Mary Kay Johnson	Mary Kay	Johnson
ADVOC-35812123	Edward Chapman	Edward	Chapman
ADVOC-35812216	Jeff Gerdes	Jeff	Gerdes

ADVOC-35812299	Kristi Gray	Kristi	Gray
ADVOC-35812418	Roman Weber	Roman	Weber
ADVOC-35812461	Debi Darnell	Debi	Darnell
ADVOC-35812523	Kenneth Reece	Kenneth	Reece
ADVOC-35812548	Paul Threlkeld	Paul	Threlkeld
ADVOC-35812659	Jamie Young	Jamie	Young
ADVOC-35812954	Allan Miller	Allan	Miller
ADVOC-35813580	Sarah Moss	Sarah	Moss
ADVOC-35813942	James Hobbs	James	Hobbs
ADVOC-35814118	Alexander Whittle	Alexander	Whittle
ADVOC-35814422	Linnea Howie	Linnea	Howie
ADVOC-35814646	Paula Roach	Paula	Roach
ADVOC-35814832	Elisabeth Zachau	Elisabeth	Zachau
ADVOC-35814836	Rebeka Hawkins	Rebeka	Hawkins
ADVOC-35814992	Janet Wilson	Janet	Wilson
ADVOC-35815078	Amy M	Amy	M
ADVOC-35815084	Frances M	Frances	M
ADVOC-35815207	Shannon Little	Shannon	Little
ADVOC-35815222	Tia Uphoff	Tia	Uphoff
ADVOC-35815223	Tia Uphoff	Tia	Uphoff
ADVOC-35815275	Leanne Hildebrandt	Leanne	Hildebrandt
ADVOC-35815547	Jan lyons	Jan	lyons
ADVOC-35815798	Ann Smith	Ann	Smith
ADVOC-35815806	Gerard J. Billmeier, Jr., Md	Gerard J.	Billmeier, Jr., Md
ADVOC-35815877	Dorothy Shelton	Dorothy	Shelton
ADVOC-35815878	Dorothy Shelton	Dorothy	Shelton
ADVOC-35816400	Teresa Rhodes	Teresa	Rhodes
ADVOC-35816485	Rachel Murray	Rachel	Murray
ADVOC-35816544	Craig Williams	Craig	Williams
ADVOC-35816555	Charlotte Mcgoldrick	Charlotte	Mcgoldrick
ADVOC-35816720	Ceci Sachs	Ceci	Sachs
ADVOC-35817029	John Hammel	John	Hammel
ADVOC-35817184	Leigh Wiener	Leigh	Wiener
ADVOC-35817245	Susan Buck	Susan	Buck
ADVOC-35817631	Eric Nielsen	Eric	Nielsen
ADVOC-35818069	Rev. Dr. & Mrs. R.S. Thomas I	Rev. Dr. & Mrs. R.S.	Thomas I
ADVOC-35818298	Elaine Vowell	Elaine	Vowell
ADVOC-35818343	Ruth Mccarver	Ruth	Mccarver
ADVOC-35818857	Nancy Beavers	Nancy	Beavers
ADVOC-35818977	James Koonce	James	Koonce
ADVOC-35819070	Ron Harris	Ron	Harris
ADVOC-35819148	Sheila Isaacs	Sheila	Isaacs
ADVOC-35819409	Kristy Barham	Kristy	Barham
ADVOC-35819512	Susan Kohn	Susan	Kohn

ADVOC-35820018	Rhonda Bradley	Rhonda	Bradley
ADVOC-35820118	Terry Risner	Terry	Risner
ADVOC-35820250	Gregory Grant	Gregory	Grant
ADVOC-35820389	Richard Phelps	Richard	Phelps
ADVOC-35820391	Richard Phelps	Richard	Phelps
ADVOC-35820980	Jon Kaas	Jon	Kaas
ADVOC-35821367	Wendell And Kay Norman	Wendell And Kay	Norman
ADVOC-35821406	Noel Emswiler	Noel	Emswiler
ADVOC-35822074	Vance Sterling	Vance	Sterling
ADVOC-35822103	Sabine Sedall	Sabine	Sedall
ADVOC-35822674	Phil Huss	Phil	Huss
ADVOC-35822837	Susan Johnston	Susan	Johnston
ADVOC-35823475	J V	J	V
ADVOC-35824127	Kim Wheetley	Kim	Wheetley
ADVOC-35824685	Monica Latka Black	Monica	Latka Black
ADVOC-35825429	Julia Cohen	Julia	Cohen
ADVOC-35825667	Phyllis Nokes	Phyllis	Nokes
ADVOC-35825773	Erica Mcdonald	Erica	Mcdonald
ADVOC-35826201	Charleen Shelton	Charleen	Shelton
ADVOC-35827066	Bob Butters	Bob	Butters
ADVOC-35828201	Carolyn Pendergast	Carolyn	Pendergast
ADVOC-35828590	Theresa McGarry	Theresa	McGarry
ADVOC-35829043	Jeffery Myers	Jeffery	Myers
ADVOC-35829381	Sarah Richey	Sarah	Richey
ADVOC-35829529	Victoria Brooks	Victoria	Brooks
ADVOC-35831017	Shannon W.	Shannon	W.
ADVOC-35831536	Linda Inness	Linda	Inness
ADVOC-35831662	Shirley Brown	Shirley	Brown
ADVOC-35831970	Lowry Farmer	Lowry	Farmer
ADVOC-35832125	Elizabeth Floersch	Elizabeth	Floersch
ADVOC-35834445	Dave Bordenkircher	Dave	Bordenkircher
ADVOC-35835418	Gf Wade Jr	Gf	Wade Jr
ADVOC-35836871	Lona Bieter	Lona	Bieter
ADVOC-35837133	Judy Fisher	Judy	Fisher
ADVOC-35837433	Mari T. Echevarria	Mari T.	Echevarria
ADVOC-35837754	Noah Moot	Noah	Moot
ADVOC-35839371	Suzanne Rogers	Suzanne	Rogers
ADVOC-35840034	Peter Mcneilly	Peter	Mcneilly
ADVOC-35841777	Heather Bennett	Heather	Bennett
ADVOC-35845556	Patricia Davenport	Patricia	Davenport
ADVOC-35848776	Chris Dacus	Chris	Dacus
ADVOC-35853589	Janice Richie	Janice	Richie
ADVOC-35857528	Josh Severns	Josh	Severns
ADVOC-35858632	Lorraine Price	Lorraine	Price

ADVOC-35860218	Gregory Arnold	Gregory	Arnold
ADVOC-35860822	Hannah Seage	Hannah	Seage
ADVOC-35861515	Seth Giles	Seth	Giles
ADVOC-35864606	Alaina St. Pierre	Alaina	St. Pierre
ADVOC-35865593	Axel Ringe	Axel	Ringe
ADVOC-35865638	Joe Wilferth	Joe	Wilferth
ADVOC-35866993	Virginia Casalone	Virginia	Casalone
ADVOC-35867095	Robert Benson	Robert	Benson
ADVOC-35868280	Richard Casalone	Richard	Casalone
ADVOC-35871516	Grace Stranch	Grace	Stranch
ADVOC-35874188	James Cotham	James	Cotham
ADVOC-35875957	Alexandria Rando	Alexandria	Rando
ADVOC-35876662	Sharon Beatty	Sharon	Beatty
ADVOC-35880453	Lori Gasser	Lori	Gasser
ADVOC-35880635	Jessica Thompson	Jessica	Thompson
ADVOC-35881733	Troy Bidwell	Troy	Bidwell
ADVOC-35882557		Orion	Douglas
ADVOC-35882977	Mara Nicks	Mara	Nicks
ADVOC-35885677	Teresa Donegan	Teresa	Donegan
ADVOC-35868400	Connie Toohey	Connie	Toohey
ADVOC-35838533	Jamie Butler	Jamie	Butler
ADVOC-35824611	Jamie Butler	Jamie	Butler
ADVOC-35822206	Jamie Butler	Jamie	Butler
ADVOC-35818434	Jamie Butler	Jamie	Butler
ADVOC-35795129	Janet Pollock	Janet	Pollock
ADVOC-35832097	Jamie Butler	Jamie	Butler
ADVOC-35807229	Jamie Butler	Jamie	Butler
ADVOC-35788602	Dominic Van Horn	Dominic	Van Horn
ADVOC-35808772	Katherine Kiely	Katherine	Kiely
ADVOC-35810454	Allyn Richardson	Allyn	Richardson
ADVOC-35814039	Jennifer Westerholm	Jennifer	Westerholm
ADVOC-35816764	Lisa Phillips	Lisa	Phillips
ADVOC-35818877	James Small	James	Small

ADVOC-35823829	Karen Robbins	Karen	Robbins
ADVOC-35835163	York Quillen	York	Quillen
ADVOC-35868633	Harry Bryant	Harry	Bryant

Actions Taken

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Sierra Club

Email	Personal Message
katedoughertypr@gmail.com	You need to clean up your mess!!!
coachburgdorf@gmail.com	You must move and secure the coal ash away from any water resource. If you do not, you will knowingly be creating poison water for everyone downstream with a resulting massive loss of innocent lives. You cannot knowingly do such a thing!
edwardmceleney@comcast.net	You messed up enough in Kingston; now it is time to get this fixed!
lonelybow@yahoo.com	Yes,for sure,PROTECT THE WATER from CUMBERLAND's COAL ASH
pjwatermeier@gmail.com	Would you drink the contaminated water? Please consider cleaning up the mess TVA has made and be responsible earth stewards.
h_lanier@hotmail.com	Without water, there is no life.
bensweeton32@hotmail.com	Why have you not done anything about this!? Isn't that what your job is for? To protect our best interests!!??
llexxes@yahoo.com	We want clean water. What if you used well water like we do?
pfootit@mtsu.edu	We must be very careful to protect our water ways & ground water for the health and safety of Americans
toyasnow@yahoo.com	We have to have clean water to. Drink.
bgm37043@ymail.com	We have already had a very serious incident in Tennessee with coal ash, and we need to take care this does not happen again. Please take care with this waste. Our water supplies are too valuable to spoil.
keyserdonald@yahoo.com	We desperately need clean potable water, don't pollute it.
ccarroll@cafes.net	We are all well aware of the catastrophic damage done by the last deluge of coal ash waste. We must not have another. Move the coal ash waste to a safe storage area.
2jewells@netzero.net	We all need clean water. We should have learned from Flint that we need to take measures to protect our health and water, as well as including the places where we live and spend time in recreation. We expect companies to do the right thing for the good of everyone.
dollycarlisle@comcast.net	We all deserve the assurance of having clean drinking water. Do what's right for your fellow citizens.
hmsyota@yahoo.com	Water is Tennessee's most precious resource. TVA has the resources and the power (and a moral obligation) to do what's right for the people and the state of Tennessee. Please put people and our precious environment ahead of profit. Do the right thing!

tabatha.leath@yahoo.com	Water is life! Clean drinking is what and we pay our water Bills for!
weinmankarenann@gmail.com	Water is life
bluffwalker1@gmail.com	Wasn't the coal ash spill in East TN enough for us to realize how bad leaving ash near creeks and rivers? Let's learn from past incidents and avoid potential problems.
tokyoyogi@yahoo.com	TVA is supposed to be a public utility and they need to act responsibly not like they are in a 3rd world country where environmental issues don't matter.
dale.mettler09@comcast.net	TVA Directors, Do you care about future generations? We only have this planet to live on! I wish you and other Big Business (Greedy) Polluters would get your act together before it's too late! You have already done too much damage! Submitted by a very concerned citizen.
mv1569@cpws.net	Too much damage has been done.Please no more.We must protect our water
sarahsavvy@hotmail.com	to help protect fish species!!!!!
titantowntom@comcast.net	This means so much to so many - many who may not yet even realize it. Thank you, Tom Williams
jeanfinney@hotmail.com	This is simply unacceptable!
emalayter@gmail.com	Think of your children and grand children. Have you learned nothing from the Kingston spill?
blondec1001@yahoo.com	Think and protect our water. We can do without things but NO life is sustainable without water!!!
winifredsilvers@yahoo.com	The world has enough to worry about without having to worry about our drinking water. Do the right thing--not the easy thing.
consultroger@hotmail.com	The Tennessee Valley region depends on clean water for drinking, but also for fishing (which brings many people to tournaments) as well as other tourists who come for the beauty of our mountains and streams. Coal ash ruins the streams and polutes our lives with toxic substantes.
kimsings3@yahoo.com	The storage of toxic coal ash, whenever or wherever it's done, should be done with the utmost safety in mind, always! Past storage has been quite horrible with disastrous results. NO ONE can afford to deal with future spills, especially into waterways. To store coal ash near ANY waterway is extremely short sighted, and I would go so far as to call it completely stupid. PLEASE NO MORE UNSAFE STORAGE!!!!!!!!!!

tommi.stephenson@comcast.net	The so-called externalities, the actual price to be paid for burning fossil fuels is coming home to roost. You knew of the dangers, but TVA is coal and oil's bitch and you have let them have their way with you at the expense of humanity. Pay the piper and fix this problem the right way, then change tacks and move us toward solar and wind like a good public servant should. Thank you for your time.
ghayes28@comcast.net	There isn't that great of health insurance in this state to risk health issues. IF you really are doing this I HOPE YOU are drinking this water as well. This is so sad. Why do we get increases in our water bill AFTER the fact. No excuses, you see it happening from the passed practices.
abigail.tylor@yahoo.com	There are are myriad of other options for how to handle the coal ash waste that don't involve letting it continue to sit and seep into our water. I beg you, don't continue to ignore this problem. It won't go away. Water is a finite, precious resource that we cannot afford to pollute.
geneva.andrews@icloud.com	The people of Tennessee might consider those sky high salaries and bonuses to be justified IF the TVA acts responsibly to protect our air and water. Otherwise, it's just one more example of fraud and corruption. Please do the right thing by your citizens who apparently have no say about the quality of the water we drink.
bcanoe5@bellsouth.net	The most precious commodity we have on this earth is our water. I respectfully ask that you not pollute the water supply that we and future generations will be dependent on. Please clean up your pollution and protect our water sources.
suewag@charter.net	The citizens of Tennessee have a right to have safe water for consumption.
deborahnarrigan@mac.com	The bottom line is coal ash waste must be moved way from our water supplies. Thank you for your attention to my views.
hrfjean@aol.com	The ash threatens not only our water supply but it would affect water for the animals in the area as well.
daroses3@yahoo.com	Take a look at the news, please. A lot of our water is already contaminated. Please do not add more to an already bad situation. Be part of making Tennessee green and clean again. Thank you.
mattr1245@gmail.com	Storing coal ash in unlined pits is a dangerous practice that will contaminate our waters.
fvaamv@att.net	Send the ash to Washington and pile it on the white house lawn. After the inauguration of course.

martinholsinger@nashville.net	Really, we should be moving away from coal entirely--and not to nuclear power, which has its own waste problems, nor to oil or gas, which have theirs! Reducing demand is key.
sue.suecook@gmail.com	Pleas move coal ash to lined pits away from water! Thank you for your consideration
mockmt@embarqmail.com	PLEASE TAKE THE APPROPRIATE MEASURES TO INSURE THAT FUTURE "FLINT MICHIGAN" TRAGEDIES WILL NOT OCCUR IN OUR DRINKING WATER. THANK YOU FOR YOUR CONSIDERATION. MARGARET MOCK
cfolks@pstcc.edu	Please stop poisoning Tennesee's beautiful rivers, lakes & land with horribly toxic coal ash! Hasn't TVA learned ANYTHING from the Kinston coal ash spill & its sad & expensive aftermath? As a citizen & ratepayer, I feel that TVA executives should be held accountable if they continue to store & dispose of highly toxic coal ash in ways that risk the health of nearby & downstream residents. Do not think people have forgotten TVA 's past negligence & will tolerate more contamination, whether through slowly-leaking storage pits or massive spills!
edwinashannon@gmail.com	Please responsible to take care of the people and the earth that they live on. Life is not all about profit.
tnksl@aol.com	Please protest our water from these hazards. Storage of coal ash in unlined pits where toxins can leach into or drinking water, lakes, and the waters of Wells Creek and the Cumberland Rivers is unacceptable.
mona.ellen@hotmail.com	Please protect the people who live in Tennessee from contaminated water and provide us with safe drinking water. Thank you. M. Hudgins
chatisct@gmail.com	Please protect Tennessee's waterways and drinking water sources. Do the right thing for residents and the environment.
mmwcmw84@comcast.net	Please protect human, animal and plant life!
paul@sandersonmcleod.com	please move the ash to a lined area away from the river. thanks Paul
cvduley@yahoo.com	Please make our drinking water safe.
lmw1954@yahoo.com	Please keep our waters safe.
rowes@pop.belmont.edu	Please keep our water safe! Lining your pits and repairing leaks, plus moving the worst pits away from waterways, should not be that difficult, and would be cheaper than an enormous violation fine!

leandersol@hotmail.com	Please ensure that we will have safe drinking water now and for our children and future. The cost of health problems from polluted water is much greater than the immediate cost of clean up now.
ronshrieves@gmail.com	Please do this right! Our water is too important.
chickchuck@mac.com	Please do the right thing and correct this problem now.
csmatlock@comcast.net	Please do not run the risk of creating another Flint Michigan fiasco because of poor administrative choices, such as leaving the coal ash near our water sources.
hisprincess7@gmail.com	Please don't let our water continue to be poisoned. Think of the toll this will take on human health, not just the bottom line. Protect TN citizens from further poisoning.
lostamongmillers@gmail.com	Please don't allow further pollution of our drinking water. Our water isn't in very good condition as it is and we believe the citizens of Middle Tennessee deserve decent water. Remember, TVA, it's your water too.
hutchings.mary@gmail.com	Please do all you can to protect our water!!!
dman333@bellsouth.net	Please deal with this the proper way and don't take risks, it's not worth it in the long run
johnson.k@comcast.net	Please. We canNOT live without clean water. We can live without coal. Please STOP the pollution
jdjernigan@tds.net	Please...this is important to me and my family.
hogalee7@gmail.com	Please, protect our water!
billmnt@aol.com	Our water is a precious commodity and needs to be protected. Thank you.
wfcovey@hotmail.com	Our drinking water is primary to life and health for everyone!
nrn48@yahoo.com	Our clean water sources must be your priority. There must never be another disaster in our state like the last coal ash pit failure. That is unacceptable.
rickmerical@yahoo.com	Our children and grandchildren deserve your very best environmental stewardship, make the responsible environmental choice for a legacy that will make your children and grandchildren proud by eliminating the risk of ground and waterways contamination.
mbdirt@aol.com	Next to the air, our water is our singlemost important vital resource. Please consider it's importance to LIFE on this planet.
tvcullen3@yahoo.com	Look at what happened at Kingston, TN
gardenmaster60@yahoo.com	LET US NOT BE LIKE FLINT, MICHIGAN. THANK YOU.
jersim1@yahoo.com	Keep Mitch McConnell and his hoodlums out of our water systems...its one of only a few natural resources left...don't ruin it with coal sludge or fracking....please!!!!

shellstahl@hotmail.com	It is unconscionable for the TVA to leave such contaminants at any site where they can pollute our precious water supplies!
jcoombs@utk.edu	It is TVA's responsibility to make sure that they don't pollute our water!!
greenmomx7@yahoo.com	It is so important to protect our water. Thank you for reading my letter.
speedracer1@mail.com	It is far easier and economical to do this right the first time than to come behind and do it a second time.
lalaradio@hotmail.com	I thought fly ash was being blended into concrete. That was the justification for creating so much of it in the first place.
foxfyreutk@gmail.com	I think we in Tennessee are the perfect example of why there is no such thing as "clean" coal. It, to say the least, is environmentally destructive on so many levels and, now, it is too expensive as a electricity generating source to even use. The cost of cleanup, environmental damage inherent in the mining and use, and the high cost to consumers make coal obsolete. Please, act to get the coal ash contained and then just abandon coal as a generating source for our energy in Tennessee. We have abundant wind and plenty of sun to switch entirely to them as our main, if not only, source of energy. This beautiful state deserves all the care and consideration we can give it.
cheryl619@peoplepc.com	It's time to move away from coal and use more solar and Keshe plasma technology to produce power.
paulv_ainsworth@yahoo.com	It's important we remember safety first with anything that might endanger the health of the people of the Valley and to continue to show TVA as a leader in the valley particularly in the area of safety.
rjsanders93@gmail.com	It's a no brainer clean up your act tva.
donyhgebauer@gmail.com	I stand 100% with Sierra club statement. I do not consent or agree to intoxicating Tennessee waters. Thus For immediately I will the spread word to our leaders, community, and state of current matters involving TVA and Tennessee waters.
d.lee.race@gmail.com	I respect the efforts of TVA but an concerned about thus local issue.
kmum4030@hotmail.com	I love Tennessee and want water protected for future generations. Please dispose of this waste in the safest manner possible.
englishsunset@englandmail.com	I live in the Tennessee Valley and want clean water. We have had polluted water here before. Please do the right thing and move the coal ash.

bntwagner@aol.com	I live in Tennessee and frequent the Cumberland Mountains, Cumberland River areas often. We don't need another coal ash spill to contaminate the water and kill fish and animals again.
mcwilliamscynthia@gmail.com	I live in Clarksville, and I don't want my water to be poisoned by coal residue. Please make every effect to get out of this area and away from our drinking water.
gjgibson@juno.com	I know that there are hazards in moving this waste, but the hazards are greater to leave it in place.
amberbmills@gmail.com	I hope that those in charge of these decisions will choose what is right, not what is easy. America proudly claims to be the best and strongest in the world. How will that continue to be the case if continue to poison our children and our planet?
buffalotn@comcast.net	I have seen the devastation of Kingston. Please be environmentally responsible.
2elizabethstein@gmail.com	I have lived in Nashville for most of my life, and it is so important to protect the quality of our water. Drinking water for Nashville comes from the Cumberland River!
rebecca.brehmer@gmail.com	I have land in Kingston, I don't want another spill or anyway the coal ash can get into our water!! Water is LIFE ??
tnhoman@bellsouth.net	I have always been an admirer of what the TVA has done for the standard of living in its service area; not so much the bloated salaries of its top administrators or its surprising lack of concern for the very health and safety of its area of responsibility. The leaking of the dangerous coal ash is an environmental disaster and I would expect you, in all good conscience, to act appropriately by moving this waste awayfrom our waterways and drinking supplies, using leak-proof methods of protecting ground water wherever the final destination.
gcras15@gmail.com	If you don't help protect our beautiful countryside and waterways -- who will? Please help the people of Tennessee -- not the coal companies. Thank you.
meganrosenorris2015@gmail.com	If we don't put air and water quality first above all other things in the state of TN we can kiss our economy goodbye because there won't be anyone living here to actually keep things going. Please take action and protect our water!!

ktbugg07@gmail.com	I filter my water, but I know these filters don't get 100% of pollutants or toxins out of the water. Furthermore, many residents either don't have the privilege to afford to filter their water or do not take the time to do so. We live in a country where clean drinking water is expected. This leaves many unaware of any potential harm by these pollutants and toxins. I believe it is the TVA's job to ensure Tennesseeans get the purest water possible. Moving this waste is a step to continue to provide clean water for this generation and future generations.
darkangel71125@yahoo.com	I do not want coal ash in my drinking water, find a proper way to dispose of it, if not, you will be putting the health of Tennesseans at risk.
howardoleme@gmail.com	I consider TVA to be one of the most respected entitys in existence. Do not disappoint us. We depend on you and your integrity.
nmcfadden9@gmail.com	I can't believe that after Kingston, you want unlined pits Shame, shame!
joanneboyd@comcast.net	I beg you to use all of your resources to protect our water. We all know that the planet is already suffering from a lack of good, clean drinking water. The area we live is beautiful and your company has helped keep it that way. I beg you to do the right thing.
sgschmidt@hotmail.com	I am extremely concerned about coal ash is contained and about contamination of ground and drinking water!! I have a young daughter and I don't want her to be poisoned from the water she drinks. I know that it is expensive to move the coal ash to a lined, more suitable site, but trying to clean up after a disastrous spill is also expensive and the damage can never truly be undone. Please take the long view and protect our children! My family's drinking water comes from the Cumberland River. I'm concerned about another spill like in Kingston. Please protect us!!!
pardee3730@comcast.net	I am a resident of Knoxville and this directly concerns me.
rozyandrewsms@bellsouth.net	Haven't you caught on yet?? Coal ash poisons our drinking water when greed drives companies.
natty4bumpo@gmail.com	Fracking and oil pipelines are doing damage to our water already. This is the only planet we have.
fotogator@comcast.net	For too many years the health and safety of the public has been disregarded. Projects from big/government need to be thought through before they are implemented. This is just another case where that did not happen. Does the coal ash cause a problem for water supplies? If "Yes" than you need to get rid of it!

neptoon15@gmail.com	Do what is right. Not what is cheap.
gloria.gullatte@comcast.net	Do the right thing.
dougherty_b@comcast.net	Do the right thing.
cbadrian1@gmail.com	Do not take our drinking water from the aquifer in Memphis for your plant. Take it from the Mississippi River or cancel the plant.
powersb51@gmail.com	Don't wait for another Kingston Steam Plant-like release to then clean up.
pckaner@hotmail.com	Don't let it happen again!
diana.page@comcast.net	Considering the cost of cleanup, TVA should move quickly to safely store coal ash. It is so disappointing that TVA is not moving towards substantially further reducing the reliance on coal, especially given past errors in judgement.
emilyctaylor@hotmail.com	Coal Combustion Products can also be "recycled" into concrete building products and asphalt (which better retain the toxic components of coal ash than leaving it in an unlined reservoir), thereby being both environmentally and economically advantageous when compared to simply storing it in an unlined reservoir. Thank you, Emily Graves, M.D.
bach2468@yahoo.com	Clean water is our birth right. We mustn't externalize coal costs in either time or money. If coal is cheap enough to use (which I question) it is cheap enough to use right. Please use lined ash pits in th future.
sr.madeleine.mary@gmail.com	Clean up the mess and put it in lined pits to protect the population!
wmtfranks@gmail.com	As president of the Cumberland-Harpeth Audubon Society (Nashville) we have a great interest in improving the water quality of the Cumberland River watershed. We strongly support the measures outlined above. Please do everything possible to improve the sequestration of coal ash from our waterways and drinking water sources. Thanks, Bill Franks
mmmercurio@hotmail.com	As many are beginning to realize, Water is Life. I urge you to be a leader in protecting this vital resource for this and all the generations to come.
princecastledlp@gmail.com	As a Tennessean, I want the ash moved out of those potentially leaky unlined pits and away from our waterways. Common sense says use dry lined pits away from waterways. Sometimes it's just not about saving money but keeping people and the environment safe.

mercretroms@att.net	A price can not be put on the value of Tennessee's citizens and it's environment. It is your duty to protect them using the best technology available so the process doesn't need to be repeated in the near future due to dangerous, outdated methods used to save money..
greenest@bellsouth.net	Air and water quality are precious to everone. I am hoping TVA will become a better steward of our resources.
greenest@bellsouth.net	Air and water quality are precious to everone. I am hoping TVA will become a better steward of our resources.
greenest@bellsouth.net	Air and water quality are precious to everone. I am hoping TVA will become a better steward of our resources.
itmatrsnot@aol.com	After the largest coal ash industrial spill in HISTORY occurred in 2008 in Roane County, Tennessee, and not only was in our water and air destroyed, we are just getting back birds, bees, fish and wildlife.m This should be a NO Thinking action. Protect us and the environment.
lvoyta@gmail.com	After the catastrophic NES ash spill it is essential the TVA protect the environment. It never should have happened, criminally negligent to say the least.
david1marsh@comcast.net	Act responsibly by removing coal ash to lined pits.
tina.m.tine@gmail.com	
astrohoops@aol.com	
hsellari@bellsouth.net	
punkrockphotographer@gmail.com	
skyebaer7@outlook.com	
brett2068@yahoo.com	
quiksilver1976@yahoo.com	
bryanowings@juno.com	
cotton_da@yahoo.com	
arenadog@msn.com	
singsharon@aol.com	
driall1@yahoo.com	
marynellbchat@gmail.com	
bbmathieson@gmail.com	
darrahl54@gmail.com	
joe@elephants.com	
poetheather@gmail.com	
indigo@thehellstens.com	
janice_everett@msn.com	
w.matt.king@gmail.com	
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tmi_darktower@yahoo.com	
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cobrie5@gmail.com
spencerkaaz@aol.com
morgantaylor.nmt@gmail.com
sarah.jane.7678@gmail.com
ksang10@gmail.com
brentmanley@yahoo.com
davidbwalker@bellsouth.net
wsshru@gmail.com
blancolayne@yahoo.com
fleurdelisrw@aol.com
christinagerdes@ymail.com
jenine.kerr@yahoo.com
frito219@yahoo.com
marcbrownsk@att.net
thomas_word@yahoo.com
paulledbetter5@gmail.com
rbcantrell5@gmail.com
carolyn.b.crabtree@gmail.com
rareairmusic@yahoo.com
stacrisp44@yahoo.com
nblondoner5@gmail.com
kdvmorris@gmail.com
arbyis@gmail.com
rickywestbrooks@aol.com
ifimust@hotmail.com
violetndedelman@gmail.com
tmd08949@gmail.com
malippard@gmail.com
slh2l@hotmail.com
kimmie21_99@yahoo.com
theatracal@aol.com
echarlieann@gmail.com
taylorhixson@live.com
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smbanbury@gmail.com

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powerup429@bellsouth.net
jsryder@btes.tv
feathers584@gmail.com
robbearls@gmail.com
foxridge@embarqmail.com
burkfour@gmail.com
hectorbertin@hotmail.com
mackeroni000@yahoo.com
balesch@gmail.com
skeetcutshall@yahoo.com
debtuck50@gmail.com
bisonbob09@gmail.com
rsindler@comcast.net
bmspa16@hotmail.com
adriana_pax@hotmail.com
netty_2_99@yahoo.com
martinkathie@comcast.net
martinkathie@comcast.net
jewheaton63@gmail.com
lmurphycpht1@yahoo.com
krmohning@hotmail.com
bpaulson@aol.com
gk.reaves@gmail.com
smoungs@yahoo.com
m.s.bentley@comcast.net
chattbiker@gmail.com
yorkq@comcast.net
rblforu@yahoo.com
wbyeager@wildblue.net
jerry.bauch@vanderbilt.edu
kkrikmap1@aol.com
kcaraway0@gmail.com
daydreamercab@aol.com
muggins6688@gmail.com
bmndrop@gmail.com
alsac@aol.com
jondmeade@aol.com
patsy.westberry@yahoo.com
rorlowske@gmail.com
piercing800@gmail.com
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hiarubenst@gmail.com
wadewilson049@icloud.com
michaeldarby12@yahoo.com
jessegore@yahoo.com
vdubdude65@gmail.com
cmeeks002@bellsouth.net
black-rose@mindspring.com
martinkathie@comcast.net
mf57902@bellsouth.net
pricklypear@mindspring.com
mattgarner98@gmail.com
lanekinkead@hotmail.com
cheardley@comcast.net
eclebsch@utk.edu
docmedlin@hotmail.com
lindalpearce@gmail.com
lindalpearce@gmail.com
pamnote@gmail.com
lhowes@utk.edu
lhowes@utk.edu
chrisbennett27@hotmail.com
thomas_pabst2002@yahoo.com
bettinaatwaldens@aol.com
jjcnrn@aol.com
shortgram4@gmail.com
johnfnelson56@gmail.com
johnfnelson56@gmail.com
sturgigk@bellsouth.net
dwaggtree@hotmail.com
charlie.palmgren@gmail.com
lpa1546219@comcast.net
bdpiano@gmail.com
merlotkitty1@yahoo.com
bhall@gatewaycreditunion.com
zel1336@bellsouth.net

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mersghost@gmail.com
freya.sachs@gmail.com
cmdortch@comcast.net
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pmikula@yahoo.com
kerm.east@gmail.com
sadiejo@bellsouth.net
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cwcomstock@ymail.com
bj.snell@comcast.net
michaelc@citlink.net
john_guenst@bellsouth.net
kathy@creativesync.com
stacylynnboydston@gmail.com
juliank442@mail2mycell.com
spudeka@gmail.com
kikanderson@att.net
m.s.bentley@comcast.net
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marimik@bellsouth.net
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skimmer144@localnet.com
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2jhobbs@comcast.net
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linnea.howie66@gmail.com
pdrjunker@gmail.com
lzachau@yahoo.com
dontlive4u@gmail.com
jcwils@comcast.net
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sllittle@comcast.net
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tollivershelton@gmail.com
trose315@comcast.net
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kadify@hotmail.com
mcgoldrick.charlotte@gmail.com
teaheadjones@gmail.com
jhammel77@gmail.com
leighn10ac@gmail.com
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bondonielsen@icloud.com
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evowell@hotmail.com
mccarverrd@gmail.com
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fisher2030@comcast.net
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suzannerogers@bellsouth.net
petersmcneilly@gmail.com
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hannah.seage@gmail.com	
surfinswellsdude@aol.com	
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joe-wilferth@utc.edu	
vjcasalone@bellsouth.net	
crbenson358@gmail.com	
rlcasalone@bellsouth.net	
k.g.stranch@gmail.com	
jascotham@yahoo.com	
alexandriarando@gmail.com	
sbeatty53@gmail.com	
lorenaglass72@yahoo.com	
jessica.thompson730@gmail.com	
tbidwell@utk.edu	
orionkeyser@gmail.com	
marannicks@gmail.com	
doneganteresa.td@gmail.com	
conniesuzanne2@yahoo.com	TVA's own studies show that you are poisoning the groundwater with pollutants including arsenic and boron and probably other toxins. Why have you allowed such a thing as this to happen? Should anyone need to tell you to clean it up? No they should not. Please do the right thing. I will volunteer my time and will find others to do so as well. I will help you. Free of charge. It's all about the money, isn't it? 615-680-2740
butlerjamie87@gmail.com	Merry Christmas! Please dispose of the waste properly! Don't you love Tennessee? 615-680-2740
bitlerjamie87@gmail.com	Happy Holidays! Please make the right choice. Hit you up again tomorrow. 615-680-2740
butlerjamie87@gmail.com	Every day. I have loved ones in that area. 615-680-2740
butlerjamie87@gmail.com	Dump it at trumps front door.
2512janet@gmail.com	Do the right thing! Love from Hartsville. 615-680-2740
butlerjamie87@gmail.com	Business as usual at this point is a death sentence for the human race and our beautiful planet. Please, dispose of it properly. Isn't Tennessee gorgeous? There's no other place I'd rather be. Much love from Hartsville. 615-680-2740
butlerjamie87@gmail.com	
dominicvanhorn@gmail.com	
kkiely123@gmail.com	
allygator76@gmail.com	
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kaerobbins@yahoo.com
yorkq@comcast.net
bryant539117@bellsouth.net

Address1	Address2	City	State	Postal Code	Action Date
802 Timberlane Ave		Tullahoma	TN	37388	12/22/2016
7408 Dunaway Dr		Nashville	TN	37221	12/23/2016
PO Box 1069		Norris	TN	37828	12/23/2016
2156 Alnwick Blvd		Maryville	TN	37801	12/22/2016
4846 Kaye Rd		Memphis	TN	38117	12/22/2016
15585 Versailles Rd		Rockvale	TN	37153	12/24/2016
719 Valley Bridge Rd		Chattanooga	TN	37415	12/22/2016
4613 Parker Loop Rd		Birchwood	TN	37308	12/22/2016
2918 Runnymeade Dr		Murfreesboro	TN	37127	12/22/2016
897 Old Highway 28		Clarkrange	TN	38553	12/22/2016
2801 Jarrell Ridge Rd		Clarksville	TN	37043	12/22/2016
1 Hastings Ct		Johnson City	TN	37604	12/22/2016
164 Cartwright Rd		Shelbyvillr	TN	37160	12/22/2016
760 Whippoorwill Cir		Seymour	TN	37865	12/23/2016
4226 Hillcrest Ave		Nashville	TN	37204	12/23/2016
641 pan gap Rd.		Chattanooga	TN	37419	12/23/2016

9020 Hillside Ave	Mascot	TN	37806	12/22/2016
60 Justin Ln	Henderson	TN	38340	12/31/2016
1678 Overton Park Ave	Memphis	TN	38112	12/22/2016
621 S Willett St	Memphis	TN	38104	12/22/2016
7324 Chowning Rd	Springfield	TN	37172	12/27/2016
1114 Abbey Rd	Columbia	TN	38401	12/27/2016
909 Harris Hollow Rd	Seymour	TN	37865	12/22/2016
1020 Saint Andrews Pl	Nashville	TN	37204	12/22/2016
7901 S Lamar Rd	Smyrna	TN	37167	1/4/2017
385 Sulphur Springs Rd	Rogersville	TN	37857	12/24/2016
224 Hunter Hills Cir	Bristol	TN	37620	12/23/2016
10413 Plum Creek Dr	Knoxville	TN	37922	12/22/2016
2116 Colonial Parkway Dr	Chattanooga	TN	37421	12/23/2016
1040 Big Tom Rd	Kingston Springs	TN	37082	12/22/2016

1716 River Dr	Nashville	TN	37218	12/23/2016
8135 Fatherson Cir	Ooltewah	TN	37363	12/25/2016
1051 Morton Mill Rd	Nashville	TN	37221	12/23/2016
240 Rattan Rd	Dayton	TN	37321	12/22/2016
9946 Humphrey Rd	Cordova	TN	38018	12/22/2016
12807 Geyser Ln	Knoxville	TN	37934	12/23/2016
4003 Auburn Ln	Nashville	TN	37215	12/23/2016
6293 Campbellsville Pike	Culleoka	TN	38451	12/23/2016
94 Cherry Branch Loop	Crossville	TN	38571	12/23/2016
12621 Pony Express Dr	Knoxville	TN	37934	12/28/2016
100 Orchard Ln	Oak Ridge	TN	37830	12/22/2016

5155 Drakes Branch Rd	Nashville	TN	37218	12/25/2016
219 Beasley Rd	Eagleville	TN	37060	12/22/2016
604 N Church St	Mountain City	TN	37683	12/23/2016
3409 Clayton Ct	Maryville	TN	37804	12/22/2016
7525 Antietam Ln	Murfreesboro	TN	37130	12/24/2016
10 Neely St	Toone	TN	38381	12/24/2016
4464 Highway 431	Columbia	TN	38401	12/23/2016
1306 Greenwood Ave	Nashville	TN	37206	12/22/2016
1145 Olde Cameron Ln	Franklin	TN	37067	12/23/2016
107 Timbercrest Ct	Brentwood	TN	37027	12/27/2016
900 Waldkirch Ave	Nashville	TN	37204	12/22/2016
404 Tobler Ln	Knoxville	TN	37919	12/22/2016
5808 Robert E Lee Dr	Nashville	TN	37215	12/23/2016

1475 Petty Rd	White Bluff	TN	37187	12/27/2016
7812 Ember Crest Trl	Knoxville	TN	37938	1/4/2017
3820 Ellis Mills Rd	Cumberland City	TN	37050	12/22/2016
1621 Saint Petersburg Rd	Knoxville	TN	37922	12/22/2016
520 Shute Ln	Hendersonville	TN	37075	12/22/2016
1331 Bluebonnet Dr	Clarksville	TN	37042	12/22/2016
242 Church St	Spencer	TN	38585	12/22/2016
9315 Chesapeake Dr	Brentwood	TN	37027	12/22/2016
2323 Hillmont Dr	Murfreesboro	TN	37129	1/3/2017
1808 Lakemont Ln	Knoxville	TN	37922	12/23/2016
208 Nelson Rd Apt A	Chattanooga	TN	37421	12/22/2016
3425 Tournament Dr S	Memphis	TN	38125	12/22/2016
4054 Darlene Dr	Antioch	TN	37013	12/22/2016
3703 Fox Creek Rd	Louisville	TN	37777	12/23/2016
5072 Serenity Dr	Mooresburg	TN	37811	12/22/2016
1492 Woodmont Blvd	Nashville	TN	37215	12/22/2016
1116 Arrowhead Drive	Brentwood	TN	37027	12/24/2016
511 Scenic Dr	Greeneville	TN	37743	12/22/2016
224 Travis Ln	Martin	TN	38237	12/23/2016

775 Tiger Creek Rd	Roan Mountain	TN	37687	12/22/2016
8236 Wood Rd	Corryton	TN	37721	12/23/2016
116 Conifer Trl	Bumpus Mills	TN	37028	12/24/2016
900 Lakeview Dr	Sharps Chapel	TN	37866	12/22/2016
5019 Welchshire Ave	Memphis	TN	38117	12/23/2016
2012 Anderson Ave	Chattanooga	TN	37404	12/23/2016
1708 Kittrell Ave	Maryville	TN	37804	12/23/2016
712 Mauldeth Rd	Chattanooga	TN	37415	12/29/2016
25 Woodard Cir	Chattanooga	TN	37412	12/22/2016
2421 Spring Place RD	Cleveland	TN	37311	12/22/2016
12540 Coburn	Eads	TN	38028	12/23/2016
406 S 17th St	Nashville	TN	37206	12/28/2016
7004 Treeline Dr	Harrison	TN	37341	12/24/2016

413 Ingle Hollow Rd	Sevierville	TN	37876	12/22/2016
1884 Hamlet Dr	Clarksville	TN	37040	12/22/2016
523 N Bertrand St	Knoxville	TN	37917	12/22/2016
715 Creek Landing Cir	Mount Juliet	TN	37122	12/23/2016
1931 Maplewood Dr	Knoxville	TN	37920	12/26/2016
7020 Wild Iris Dr	Nashville	TN	37221	12/29/2016
316 Burney Cir	Knoxville	TN	37934	12/22/2016
101 Mayfield Dr	Murfreesboro	TN	37128	12/22/2016
383 Hill Rd	Harrogate	TN	37752	12/23/2016
1026 Moores Ct	Brentwood	TN	37027	12/23/2016

313 Upper Mill Dr	Antioch	TN	37013	12/25/2016
317 Bass Rd	Chattanooga	TN	37421	12/22/2016
1230 Aslinger Rd	Sale Creek	TN	37373	12/23/2016
2813 Blair Blvd	Nashville	TN	37212	12/22/2016
139 Central Point Ln	Johnson City	TN	37604	12/22/2016
1745 Palmer Rd	Lebanon	TN	37090	12/23/2016
3730 Dellwood Dr	Knoxville	TN	37919	12/22/2016
942 Scenic Dr	Knoxville	TN	37919	12/22/2016
663 Douglas St	Chattanooga	TN	37403	12/22/2016
1514 Clydeway Dr	Murfreesboro	TN	37130	12/22/2016

1064 Isabelle St	Memphis	TN	38122	12/29/2016
4170 Knipfer Rd	Joelton	TN	37080	12/22/2016
5503 Sterling Rd	Knoxville	TN	37918	12/22/2016
1786 Harbert Ave	Memphis	TN	38104	12/22/2016
129 Oakview Dr	Kingston	TN	37763	12/23/2016
5705 Pollock Ln	Knoxville	TN	37914	12/24/2016
6708 Autumnwood Dr	Nashville	TN	37221	12/23/2016
1412 Carr Ave	Memphis	TN	38104	12/22/2016
1812 Eastside Ave	Nashville	TN	37206	12/22/2016
1100 Saint Marys Ln	Sewanee	TN	37375	12/23/2016
216 Vaughns Gap Rd	Nashville	TN	37205	12/22/2016
1757 N Union Rd	Thorn Hill	TN	37881	12/22/2016
1119 Park Ridge Dr	Nashville	TN	37215	12/22/2016

3529 Halleys Dr	Murfreesboro	TN	37127	12/22/2016
7920 Amber Hills Ln	Nashville	TN	37221	12/22/2016
7920 Amber Hills Ln	Nashville	TN	37221	12/22/2016
7920 Amber Hills Ln	Nashville	TN	37221	12/22/2016
1809 Roark Rd	Kingston	TN	37763	12/22/2016
1515 Caney Fork Ct	La Vergne	TN	37086	12/22/2016
PO Box 18446	Knoxville	TN	37928	12/22/2016
4831 E Summit Cir Apt 119	Knoxville	TN	37919	12/22/2016
1434 E Main St Apt 26	Murfreesboro	TN	37130	12/22/2016
1604 Key Corner Rd	Brownsville	TN	38012	12/22/2016
3700 Old Grbrier Pike Apt 3007	Springfield	TN	37172	12/22/2016
584 Walnut Grove Rd	Bluff City	TN	37618	12/22/2016
107 Cedar Way Dr	Lebanon	TN	37087	12/22/2016
212 Edgewood Dr	Hendersonville	TN	37075	12/22/2016
PO Box 68318	Nashville	TN	37206	12/22/2016
223 Kenilworth Pl	Memphis	TN	38112	12/22/2016
2012 Beech Ave Apt 3	Nashville	TN	37204	12/22/2016
2046 Lakeshore Dr	Monteagle	TN	37356	12/22/2016
1314 S Seminole Dr	Chattanooga	TN	37412	12/22/2016
810 Summerly Dr	Nashville	TN	37209	12/22/2016
2115 Yeaman Pl Apt 528	Nashville	TN	37206	12/22/2016
3316 Coffman Dr	Knoxville	TN	37920	12/22/2016
461 Farm Rd	Summertown	TN	38483	12/22/2016
2325 Willowbrook Dr, Apt M4	Murfreesboro	TN	37130	12/22/2016
12907 Orchard Crossing Ln	Knoxville	TN	37934	12/22/2016
7905 Wiebelo Dr	Knoxville	TN	37931	12/22/2016
1865 Nelson Ave	Memphis	TN	38114	12/22/2016
2120 Blair Blvd	Nashville	TN	37212	12/22/2016
4669 Dunn Ave	Memphis	TN	38117	12/22/2016
2549 Crescent Meadows Ct	Murfreesboro	TN	37128	12/22/2016
3804 Shirlwood Ave	Memphis	TN	38122	12/22/2016

PO Box 110631	Nashville	TN	37222	12/22/2016
26 E Main St Apt 213	Chattanooga	TN	37408	12/22/2016
7543 Webster Rd	White House	TN	37188	12/22/2016
8626 Poplar Pike	Germantown	TN	38138	12/22/2016
1615 Dellwood Ave	Cookeville	TN	38506	12/22/2016
939 Spain Ave	Nashville	TN	37216	12/22/2016
8168 Propeller Dr	Ooltewah	TN	37363	12/22/2016
4685 Highway 111 N	Cookeville	TN	38506	12/22/2016
130 Fagin Rd	Madisonville	TN	37354	12/22/2016
504 Laurel Park Dr	Nashville	TN	37205	12/22/2016
12 S Evergreen St	Memphis	TN	38104	12/22/2016
7501 Jana Ln	Knoxville	TN	37931	12/22/2016
2491 Loudon Ridge Rd	Lenoir City	TN	37771	12/22/2016
550 Techno Ln Apt 210	Memphis	TN	38105	12/22/2016
4765 Whiteoaks Ln	Arlington	TN	38002	12/22/2016
3691 Shirlwood Ave	Memphis	TN	38122	12/22/2016
725 Betsy Pack Dr	Jasper	TN	37347	12/22/2016
911 Oakmont Pl	Memphis	TN	38107	12/22/2016
160 Southcove Dr	Greenback	TN	37742	12/22/2016
4115 Jomandowa Dr	Knoxville	TN	37919	12/22/2016
716 Omega Dr	Whitwell	TN	37397	12/22/2016
300 13th St Apt 2	Knoxville	TN	37916	12/22/2016
6364 Cooks Ln	Smyrna	TN	37167	12/22/2016
621 Eva St	Memphis	TN	38112	12/22/2016
756 Jefferson Ave	Memphis	TN	38105	12/22/2016
9830 Houston Levee Cv	Germantown	TN	38139	12/22/2016
504 Crewdson Ave	Chattanooga	TN	37405	12/22/2016
PO Box 682792	Franklin	TN	37068	12/22/2016
119 W War Creek Rd	Sneedville	TN	37869	12/22/2016
4444 Andrew Jackson Pkwy	Hermitage	TN	37076	12/22/2016
311 Stonewall St	Memphis	TN	38112	12/22/2016
4857 Aster Dr	Nashville	TN	37211	12/22/2016
230 N Walnut St Apt 117	Hohenwald	TN	38462	12/22/2016
701 Maplewood Ln	Nashville	TN	37216	12/22/2016
1701 Eastside Ave	Nashville	TN	37206	12/22/2016
6010 California Ave # A	Nashville	TN	37209	12/22/2016
709 Watson Branch Dr	Franklin	TN	37064	12/22/2016
500 Alexander Dr	Franklin	TN	37064	12/22/2016
195 Claude Simmons Rd	Johnson City	TN	37604	12/22/2016
97 McClures Bend Ln	Carthage	TN	37030	12/22/2016
PO Box 11048	Chattanooga	TN	37401	12/22/2016
1609 Hamill Rd	Hixson	TN	37343	12/22/2016
PO Box 255	Bethpage	TN	37022	12/22/2016
1051 Stonewall St	Memphis	TN	38107	12/22/2016

1200 Mountain Creek Rd	Chattanooga	TN	37405	12/22/2016
9800 Frank Rd	Germantown	TN	38139	12/22/2016
5904 Gettysburg Dr	Harrison	TN	37341	12/22/2016
1010 Lakeside Cir	Ashland City	TN	37015	12/22/2016
1094 Highway 44	Bristol	TN	37620	12/22/2016
PO Box 30651	Knoxville	TN	37930	12/22/2016
2806 Oakland Ave	Nashville	TN	37212	12/22/2016
3351 Campbell Rd	Mountain City	TN	37683	12/22/2016
1060 Worlds Fair Park Dr	Knoxville	TN	37916	12/22/2016
6375 Old Highway 64	Whiteville	TN	38075	12/22/2016
16 Rolling Hills Dr	Fayetteville	TN	37334	12/22/2016
4104 Estes Rd	Nashville	TN	37215	12/22/2016
314 Woodvale Rd	Blountville	TN	37617	12/22/2016
625 Posey Hill Rd	Mount Juliet	TN	37122	12/22/2016
606 County Road 100	Athens	TN	37303	12/22/2016
2604 Stewart Rd	Signal Mountain	TN	37377	12/22/2016
295 Raintree Dr	Hendersonville	TN	37075	12/22/2016
2907 Berkley Dr	Chattanooga	TN	37415	12/22/2016
1035 Willow Creek Cir	Maryville	TN	37804	12/22/2016
1839 Turnstone Ct	Murfreesboro	TN	37128	12/22/2016
1839 Turnstone Ct	Murfreesboro	TN	37128	12/22/2016
PO Box 330217	Murfreesboro	TN	37133	12/22/2016
2521 Janalyn Trce	Hermitage	TN	37076	12/22/2016
615 Bowling Ave	Nashville	TN	37215	12/22/2016
458 Millwood Dr	Nashville	TN	37217	12/22/2016
107 St Simons Blvd	Tullahoma	TN	37388	12/22/2016
1006 Graybar Ln	Nashville	TN	37204	12/22/2016
6522 Rolling Fork Dr	Nashville	TN	37205	12/22/2016
10120 Bear Trail Dr	Soddy Daisy	TN	37379	12/22/2016
1332 Farrington Dr	Knoxville	TN	37923	12/22/2016
1806 Kimbrough Rd	Germantown	TN	38138	12/22/2016
PO Box 702	Newport	TN	37822	12/22/2016
889 Belton Dr	Nashville	TN	37205	12/22/2016
5472 Mandarin Cir	Hixson	TN	37343	12/22/2016
1308 W 53rd St	Chattanooga	TN	37409	12/22/2016
805 Creekside Dr Apt 1	Memphis	TN	38117	12/22/2016
10073 Carolina Dr	Nunnelly	TN	37137	12/22/2016
294 Jada Dr	Crossville	TN	38555	12/22/2016
9449 Chenoweth Pl	Brentwood	TN	37027	12/22/2016
610 Elaine Dr	Nashville	TN	37211	12/22/2016
5819 Rosedown Ct	Knoxville	TN	37918	12/22/2016
8429 Back Valley Rd	Evensville	TN	37332	12/22/2016
59 Bradford Way	Woodbury	TN	37190	12/22/2016
1321 Robert E Lee Ln	Brentwood	TN	37027	12/22/2016

8470 Rosemark Rd	Millington	TN	38053	12/22/2016
108 N Auburndale St Apt 721	Memphis	TN	38104	12/22/2016
832 Stirrup Dr	Nashville	TN	37221	12/22/2016
819 Ridgetop Dr	Mount Juliet	TN	37122	12/22/2016
4383 Tantallon Ln Apt 205	Memphis	TN	38125	12/22/2016
4304 Charlotte Ave	Nashville	TN	37209	12/22/2016
5033 Brevity Ln	Nashville	TN	37220	12/22/2016
794 N Graham St	Memphis	TN	38122	12/22/2016
569 Autumn Run Dr	Collierville	TN	38017	12/22/2016
500 Elmington Ave	Nashville	TN	37205	12/22/2016
264 Royce Ln	Oneida	TN	37841	12/22/2016
PO Box 3792	Knoxville	TN	37927	12/22/2016
2411 Chapel Ave	Nashville	TN	37206	12/22/2016
2816 Lafayette Dr	Thompsons Station	TN	37179	12/22/2016
6925 Gallop Dr	Cordova	TN	38018	12/22/2016
108 N Belvedere Blvd	Memphis	TN	38104	12/22/2016
1839 Turnstone Court	Murfreesboro	TN	37128	12/22/2016
8128 Suzanne Dr	Brentwood	TN	37027	12/22/2016
5423 Crestwood Rd	Knoxville	TN	37918	12/22/2016
805 Highland Park Ct	Nashville	TN	37205	12/22/2016
207 Bear Wallow Flt	Erwin	TN	37650	12/22/2016
103 Shadydale Dr	Hendersonville	TN	37075	12/22/2016
PO Box 719	Norris	TN	37828	12/22/2016
151 S Purdue Ave	Oak Ridge	TN	37830	12/22/2016
604 Spring House Ct	Brentwood	TN	37027	12/22/2016
604 Spring House Ct	Linda	TN	37027	12/22/2016
730 Dickinson St	Memphis	TN	38107	12/22/2016
8300 Bennington Dr	Knoxville	TN	37909	12/22/2016
8300 Bennington Dr	Knoxville	TN	37909	12/22/2016
8750 Old Stage Rd	Huntingdon	TN	38344	12/22/2016
112 Ez Ln	Manchester	TN	37355	12/22/2016
4905 Tanglewood Dr	Nashville	TN	37216	12/22/2016
212 Alexander St	Memphis	TN	38111	12/22/2016
1117 Wembley Dr	Hermitage	TN	37076	12/22/2016
210 Fairy Trl	Lookout Mountain	TN	37350	12/22/2016
210 Fairy Trl	Lookout Mountain	TN	37350	12/22/2016
1320 Autumn Springs Ln	Old Hickory	TN	37138	12/22/2016
9513 Briarwood Dr	Knoxville	TN	37923	12/22/2016
1142 Dora Whitley Rd	Franklin	TN	37064	12/22/2016
3870 Crouch Dr	Nashville	TN	37207	12/22/2016
114 Charlotte Dr	Shelbyville	TN	37160	12/22/2016
3019 Meade Lake Rd	Atoka	TN	38004	12/22/2016
419 Garden Ter	Clarksville	TN	37043	12/22/2016
4781 Whiteoaks Ln	Arlington	TN	38002	12/22/2016

1407 Graybrook Ln	Knoxville	TN	37920	12/22/2016
736 Intermont Rd	Chattanooga	TN	37415	12/22/2016
5621 Burbury Ln	Knoxville	TN	37921	12/22/2016
2310 Elliott Ave Apt 203	Nashville	TN	37204	12/22/2016
9689 Salisbury Ln	Ooltewah	TN	37363	12/22/2016
691 Bolivar Hwy	Jackson	TN	38301	12/22/2016
2009 Benjamin St	Nashville	TN	37206	12/22/2016
795 Holly St	Memphis	TN	38112	12/22/2016
6242 Highway 100 W	Pleasantville	TN	37033	12/22/2016
7201 Holt Run Dr	Nashville	TN	37211	12/22/2016
300 Revere Ln	Franklin	TN	37064	12/22/2016
2704 Granbrook Dr	Johnson City	TN	37601	12/22/2016
PO Box 473	Gallatin	TN	37066	12/22/2016
70 Creekwood Dr Apt 4	Crossville	TN	38555	12/22/2016
2517 Shadow Cv	Franklin	TN	37069	12/22/2016
3000 Hillsboro Pike	Nashville	TN	37215	12/22/2016
532 RACCOON TRL	CHATTANOOGA	TN	37419	12/22/2016
441 Mountain Preserve Pkwy	Crab Orchard	TN	37723	12/22/2016
3380 Roaring Fork Rd	Greeneville	TN	37745	12/22/2016
1235 Bob Kirby Rd	Knoxville	TN	37931	12/22/2016
6522 Rolling Fork Dr.	Nashville	TN	37205	12/22/2016
1107 Fern Hill Rd	Pikeville	TN	37367	12/22/2016
PO Box 124	Mohawk	TN	37810	12/22/2016
3529 Maloney Rd	Knoxville	TN	37920	12/22/2016
715 Ortega Rd	Nashville	TN	37214	12/22/2016
2817 West End Ave	Nashville	TN	37203	12/22/2016
5213 Meta Cir	Nashville	TN	37211	12/22/2016
1486 Massey Manor Ln	Memphis	TN	38120	12/22/2016
1955 Tom McCall Rd	Maryville	TN	37801	12/22/2016
1529 Orleans Ct E	Gallatin	TN	37066	12/22/2016
PO Box 147	Tellico Plains	TN	37385	12/22/2016
35 Asbury Ln	Hermitage	TN	37076	12/22/2016
3432 Shenandoah Ln	Cookeville	TN	38506	12/22/2016
912 Woodmont Blvd	Nashville	TN	37204	12/22/2016
505 Oak Forest Cir	Antioch	TN	37013	12/22/2016
266 S Front St	Memphis	TN	38103	12/22/2016
220 Kirby Smith Rd	Sewanee	TN	37375	12/22/2016
2242 Robin Dr	Clarksville	TN	37042	12/22/2016
250 Briar Point Rd	Allardt	TN	38504	12/22/2016
775 Buckhorn Rd	Gatlinburg	TN	37738	12/22/2016
935 Davis Blvd	Seymour	TN	37865	12/22/2016
3605 Wimbledon Rd	Nashville	TN	37215	12/22/2016
145 E Pecan Valley St	Collierville	TN	38017	12/22/2016
7624 Leveson Way	Nashville	TN	37211	12/22/2016

7335 Creek Song Ct	Knoxville	TN	37920	12/22/2016
1927 Howell Mill Dr	Chattanooga	TN	37421	12/22/2016
2606 Lanrick Cv	Memphis	TN	38119	12/22/2016
1085 Woodcock Hollow Rd	Kingston Springs	TN	37082	12/22/2016
600 Collinscrest Ct	Nashville	TN	37221	12/22/2016
4424 Damas Rd	Knoxville	TN	37921	12/22/2016
3409 Lockwood Cir	Chattanooga	TN	37415	12/22/2016
799 Stansberry Rd	Butler	TN	37640	12/22/2016
129 Walnut St Unit 122	Chattanooga	TN	37403	12/22/2016
1593 short st	Memphis	TN	38108	12/22/2016
99 S 2nd St	Memphis	TN	38103	12/22/2016
3986 New Highway 96 W	Franklin	TN	37064	12/22/2016
205 Becky Ln	Sharon	TN	38255	12/22/2016
2126 Clinch Valley Rd	Treadway	TN	37881	12/22/2016
6201 Hartsville Pike	Lebanon	TN	37087	12/22/2016
9680 White Spruce Cv	Lakeland	TN	38002	12/22/2016
2615 Woodbine Ave	Knoxville	TN	37914	12/22/2016
PO Box 11813	Memphis	TN	38111	12/22/2016
250 Sanders Ferry Rd Apt 50	Hendersonville	TN	37075	12/22/2016
7410 Pleasant Valley Rd	Corryton	TN	37721	12/22/2016
1008 Halcyon Ave	Nashville	TN	37204	12/22/2016
3165 Woodsman Ln	Bartlett	TN	38135	12/22/2016
5574 Wheeling Cv	Memphis	TN	38119	12/22/2016
2318 1/2 anderson st	Bristol	TN	37620	12/22/2016
PO Box 972	Chattanooga	TN	37401	12/22/2016
110 Lorien Cir	Shelbyville	TN	37160	12/22/2016
700 Amhearst Ct	Franklin	TN	37064	12/22/2016
432 Fourth St	Seymour	TN	37865	12/22/2016
129 W Lincoln Rd	Oak Ridge	TN	37830	12/22/2016
275 Blueberry Hill Rd	Lancing	TN	37770	12/22/2016
3542 Carnes Ave	Memphis	TN	38111	12/22/2016
515 Wells St	Chattanooga	TN	37405	12/22/2016
107 Nixon Rd	Oak Ridge	TN	37830	12/22/2016
522 Glen Echo Dr	Old Hickory	TN	37138	12/22/2016
1923 Oak St NW	Cleveland	TN	37311	12/22/2016
313 Lynnwood Blvd	Nashville	TN	37205	12/22/2016
20 Mason Dr	Chattanooga	TN	37415	12/22/2016
5907 Fisher Grove Rd	Greenbrier	TN	37073	12/23/2016
2048 Elliott Ave	Nashville	TN	37204	12/23/2016
PO Box 284	Pleasant Hill	TN	38578	12/23/2016
206 Davis Rd	Lebanon	TN	37087	12/23/2016
4605 Cloverdale Loop	Hixson	TN	37343	12/23/2016
1740 State Route 22A S	Jacks Creek	TN	38347	12/23/2016
1666 Allendale Dr	Nolensville	TN	37135	12/23/2016

203 Wells St Apt 303	Jackson	TN	38301	12/23/2016
523 N Bertrand St Unit 201	Knoxville	TN	37917	12/23/2016
4816 Petersburg Rd	Knoxville	TN	37921	12/23/2016
207 Clay St	Rogersville	TN	37857	12/23/2016
120 Coal Chute Rd	Elizabethton	TN	37643	12/23/2016
528 Charlie Russell Rd	Shelbyville	TN	37160	12/23/2016
2912 Boyle Ct	Murfreesboro	TN	37128	12/23/2016
10522 Dallas Hollow Rd	Soddy Daisy	TN	37379	12/23/2016
2959 Highway 49 E	Charlotte	TN	37036	12/23/2016
2348 Mark Ln	Chattanooga	TN	37421	12/23/2016
2746 Oakleigh Ln	Germantown	TN	38138	12/23/2016
224 Bermuda Dr	Nashville	TN	37214	12/23/2016
2933 Rich Acres Dr	Nashville	TN	37207	12/23/2016
3700 Sutherland Ave	Knoxville	TN	37919	12/23/2016
520 Porter Ln	Cunningham	TN	37052	12/23/2016
1628 Edgemont Ave	Bristol	TN	37620	12/23/2016
5908 Highway 421 S	Mountain City	TN	37683	12/23/2016
225 Cherokee Trl	Clarksville	TN	37043	12/23/2016
4198 Bull Run Rd	Ashland City	TN	37015	12/23/2016
1100 Marcumtown Rd	Oneida	TN	37841	12/23/2016
116 Rogers Dr	Manchester	TN	37355	12/23/2016
1036 Wandering Dr	Kingsport	TN	37660	12/23/2016
PO Box 50135	Nashville	TN	37205	12/23/2016
454 Perrolee St	Gallatin	TN	37066	12/23/2016
4831 E Summit Cir Apt 119	Knoxville	TN	37919	12/23/2016
8012 Ember Crest Trl	Knoxville	TN	37938	12/23/2016
2707 Boxwood Ln	Murfreesboro	TN	37127	12/23/2016
PO Box 977	Monteagle	TN	37356	12/23/2016
464A Natchez Trace Dr	Lexington	TN	38351	12/23/2016
251 James Gordon Outlaw Rd	Indian Mound	TN	37079	12/23/2016
7978 Highway 100	Nashville	TN	37221	12/23/2016
529 Cedar Ave	Knoxville	TN	37917	12/23/2016
123 Noel Cove Cir	Hermitage	TN	37076	12/23/2016
1013 Daniel Ln	Spring Hill	TN	37174	12/23/2016
1041 Walnut Bend Ln	Brentwood	TN	37027	12/23/2016
7741 Dyer Rd	Luttrell	TN	37779	12/23/2016
1500 Rosewood Dr Apt J47	Columbia	TN	38401	12/23/2016
800 Longview Rd Apt 210	Knoxville	TN	37919	12/23/2016
1296 Emerald Pointe Dr	Soddy Daisy	TN	37379	12/23/2016
303 54th Ave N	Nashville	TN	37209	12/23/2016
1012 Camellia Trce	Maryville	TN	37801	12/23/2016
2302 Sinking Creek Rd	Johnson City	TN	37604	12/23/2016
5600 Kendall Dr	Nashville	TN	37209	12/23/2016
1276 Jostin Dr	Clarksville	TN	37040	12/23/2016

7360 Woodshire Rd	Memphis	TN	38125	12/23/2016
2624 Berringer Station Ln	Knoxville	TN	37932	12/23/2016
914 Briarwood Crst	Nashville	TN	37221	12/23/2016
109 S Church St	Halls	TN	38040	12/23/2016
118 Glen Echo Dr	Smyrna	TN	37167	12/23/2016
2006 Crumley Rd	Greenback	TN	37742	12/23/2016
PO Box 23	Niota	TN	37826	12/23/2016
1101 Matthews Pl	Nashville	TN	37206	12/23/2016
9050 Rocky Cannon Rd	Cordova	TN	38018	12/23/2016
77 Sircy Ridge Ln	Pleasant Shade	TN	37145	12/23/2016
2140 Acklen Ave Apt 7	Nashville	TN	37212	12/23/2016
5709 Bluewood Ln	Knoxville	TN	37921	12/23/2016
3975 Highway 70 W	Dickson	TN	37055	12/23/2016
4540 Watt Cemetery Rd	Loudon	TN	37774	12/23/2016
3661 Annelle Rd	Murfreesboro	TN	37127	12/23/2016
1155 W Fairfax Dr	Chattanooga	TN	37415	12/23/2016
3120 Butler Rd	Columbia	TN	38401	12/23/2016
102 Erskine Ln Apt D27	Oak Ridge	TN	37830	12/23/2016
1461 Haynes Dr	Murfreesboro	TN	37129	12/23/2016
915 Silkwood Cir	Nashville	TN	37221	12/23/2016
417 Port Charles Dr	Knoxville	TN	37934	12/23/2016
4401 Sandpiper Ln	Antioch	TN	37013	12/23/2016
118 Wilson St	Collierville	TN	38017	12/23/2016
723 W Locust St	Johnson City	TN	37604	12/23/2016
PO Box 3115	Memphis	TN	38173	12/23/2016
1952 Barker Camp Rd	Dunlap	TN	37327	12/23/2016
8108 Hamilton Mill Dr	Chattanooga	TN	37421	12/23/2016
323 Sandy Ln	Townsend	TN	37882	12/23/2016
108 Lakeside Drive	Goodlettsville	TN	37072	12/23/2016
816 W Locust St	Johnson City	TN	37604	12/23/2016
508 Brown School Rd	Maryville	TN	37804	12/23/2016
57 Carriage Hl	Signal Mountain	TN	37377	12/23/2016
405 Heather View Dr	Jonesborough	TN	37659	12/23/2016
600 Franklin St	Johnson City	TN	37604	12/23/2016
2709 Pepperdine Dr	Murfreesboro	TN	37128	12/23/2016
2038 Carr Ave	Memphis	TN	38104	12/23/2016
211 Cates Rd	Rockwood	TN	37854	12/23/2016
184 Blakemore Cir	Johnson City	TN	37604	12/23/2016
230 Abbott Rd	Lenoir City	TN	37771	12/23/2016
1941 Orchard Park Dr	Murfreesboro	TN	37128	12/23/2016
1716 Sweetbriar Ave	Nashville	TN	37212	12/23/2016
1219 Pilleaux Dr	Knoxville	TN	37912	12/23/2016
1105 Signal Rd	Signal Mtn	TN	37377	12/23/2016
4115 Jomandowa Drive	Knoxville	TN	37919	12/23/2016

936 Lookout Dr	Kingsport	TN	37663	12/23/2016
2800 Capella Ct	Nashville	TN	37214	12/23/2016
811 Wallace Way	Grimsley	TN	38565	12/23/2016
9204 Hawks View Way	Knoxville	TN	37922	12/23/2016
7895 Poplar Pike	Germantown	TN	38138	12/23/2016
1393 Broad St	Elizabethton	TN	37643	12/23/2016
3421 Maloney Rd	Knoxville	TN	37920	12/23/2016
1300 Kenyon St	Knoxville	TN	37917	12/23/2016
5520 W Shady Trl	Old Hickory	TN	37138	12/23/2016
236 Nesbitt Ln	Madison	TN	37115	12/23/2016
110 Lawn St	Chattanooga	TN	37405	12/23/2016
PO Box 161	Old Fort	TN	37362	12/23/2016
3604 Golf St # A	Nashville	TN	37216	12/23/2016
2442 Broad St	Bristol	TN	37620	12/23/2016
1026 Shannon Ln	Franklin	TN	37064	12/23/2016
332 Campbell Dr	Rogersville	TN	37857	12/23/2016
332 Campbell Dr	Rogersville	TN	37857	12/23/2016
111 Buchanan Cir	Hendersonville	TN	37075	12/23/2016
3783 Gamewell Rd	Memphis	TN	38111	12/23/2016
3783 Gamewell Rd	Memphis	TN	38111	12/23/2016
111 Britton Ln	Crossville	TN	38558	12/23/2016
122 Maple Ln	Oak Ridge	TN	37830	12/23/2016
122 Old Orchard Ct	Lascassas	TN	37085	12/23/2016
6465 Massey Ln	Memphis	TN	38120	12/23/2016
4000 Anderson Rd Apt 55	Nashville	TN	37217	12/23/2016
4000 Anderson Rd Apt 55	Nashville	TN	37217	12/23/2016
1848 Fox Chase Dr	Goodlettsville	TN	37072	12/24/2016
6328 Fairest Dr	Harrison	TN	37341	12/24/2016
5516 Secluded Way	Knoxville	TN	37918	12/24/2016
1505 Demonbreun St Apt 430	Nashville	TN	37203	12/24/2016
3600 Saratoga Dr	Nashville	TN	37205	12/24/2016
2411 Pulaski Hwy Apt E45	Columbia	TN	38401	12/24/2016
105 Trace End Dr	Franklin	TN	37069	12/24/2016
1306 Litton Ave	Nashville	TN	37216	12/24/2016
809 Harbor Isle Cir E	Memphis	TN	38103	12/24/2016
1201 April Dr	Knoxville	TN	37919	12/24/2016
524 Summitt St	Memphis	TN	38104	12/24/2016
2216 Jennifer Ct	Hermitage	TN	37076	12/24/2016
3988 Moore Hollow Rd	Woodlawn	TN	37191	12/24/2016
109 Lands End Ct	Piney Flats	TN	37686	12/24/2016
2051 Raven Rd	Morristown	TN	37814	12/24/2016
395 Thomas Rd	Cookeville	TN	38501	12/24/2016
147 Glenwood Rd	Dyersburg	TN	38024	12/24/2016
232 Second Rd	Summertown	TN	38483	12/24/2016

1156 Highway 68	Crossville	TN	38555	12/24/2016
534 Main St W	Mount Carmel	TN	37645	12/24/2016
3241 Waterfront Dr	Chattanooga	TN	37419	12/24/2016
4391 Greenwood Dr	Jonesborough	TN	37659	12/24/2016
4391 Greenwood Dr	Jonesborough	TN	37659	12/24/2016
2715 Oakland Ave	Nashville	TN	37212	12/24/2016
5958 Manchester Pike	Murfreesboro	TN	37127	12/24/2016
5016 Rivercrest Ln	Bartlett	TN	38135	12/24/2016
6030 Big Bass Ln	Tallassee	TN	37878	12/24/2016
124 Treadway Dr	Johnson City	TN	37601	12/24/2016
2606 Coleman Hill Rd	Rockvale	TN	37153	12/25/2016
1325 5th Ave N #23	Nashville	TN	37208	12/25/2016
2769 Cascade Dr	Clarksville	TN	37042	12/25/2016
826 Younger Cir	Chattanooga	TN	37415	12/25/2016
317 Lower Stone Mountain Rd	Unicoi	TN	37692	12/25/2016
2814A W Kirkwood Ave	Nashville	TN	37204	12/25/2016
140 Shady Oaks Dr	Eads	TN	38028	12/25/2016
7043 Estacada Way S	Cordova	TN	38018	12/25/2016
37 Pine Ridge Rd	Crossville	TN	38572	12/25/2016
222 Lily Ln	Jasper	TN	37347	12/26/2016
8330 Lake Village Cir	Knoxville	TN	37938	12/26/2016
1515 Osceola St.	Johnson City	TN	37604	12/26/2016
1411 Saint Thomas St	Chattanooga	TN	37412	12/26/2016
500 Dodds Ave	Chattanooga	TN	37404	12/26/2016
7313 W Cook Rd	Springfield	TN	37172	12/26/2016
197 Chock Creek Rd	Johnson City	TN	37601	12/26/2016
477 Pattie Gap Rd	Philadelphia	TN	37846	12/27/2016
109 Willard St	Maryville	TN	37803	12/27/2016
398 Herman Brooks Rd	Martin	TN	38237	12/27/2016
605 Dorothy Dr	Goodlettsville	TN	37072	12/27/2016
500 Paragon Mills Rd Apt G6	Nashville	TN	37211	12/27/2016
PO Box 752	Harrison	TN	37341	12/27/2016
120 Crisman St	Chattanooga	TN	37415	12/28/2016
2701 Belmont Blvd	Nashville	TN	37212	12/28/2016
7114 W Arbor Trace Dr Apt 802	Knoxville	TN	37909	12/28/2016
1256 Vantage Pointe Unit 204	Ashland City	TN	37015	12/28/2016
820 Atlantic Ave	Knoxville	TN	37917	12/28/2016
510 Elaine Dr	Nashville	TN	37211	12/28/2016
1317 Garden Dr	Kingsport	TN	37664	12/28/2016
8702 Pleasant Hill Rd	Knoxville	TN	37924	12/28/2016
3353 Fairfield Pike	Bell Buckle	TN	37020	12/28/2016
680 Russell Rd	Bolivar	TN	38008	12/29/2016
1421 Old Hickory Blvd	Brentwood	TN	37027	12/29/2016
626 Waynick Rd	Jackson	TN	38305	12/29/2016

2005 Windsor Dr	Columbia	TN	38401	12/29/2016
9097 Old Charlotte Pike	Pegram	TN	37143	12/29/2016
396 Mahoney Rd	Oliver Springs	TN	37840	12/29/2016
1021 Columbia Hwy	Hohenwald	TN	38462	12/30/2016
1840 Lafayette Rd	New Market	TN	37820	12/30/2016
184 Woodcliff Cir	Signal Mountain	TN	37377	12/30/2016
408 Magnolia Hills Ct	Nashville	TN	37221	12/30/2016
1008 Waterstone Dr	Lebanon	TN	37090	12/30/2016
408 Magnolia Hills Court	Nashville	TN	37221	12/31/2016
3636 Taliluna Ave Apt 238	Knoxville	TN	37919	12/31/2016
1712 Emoriland Blvd	Knoxville	TN	37917	1/1/2017
106 Lancaster Gate Pl	Murfreesboro	TN	37128	1/1/2017
102 Newcastle Dr	Franklin	TN	37067	1/2/2017
1005 Hickory Hill Lane	Hermitage	TN	37076	1/3/2017
1704 Cottage Wood Way	Knoxville	TN	37919	1/3/2017
145 Farlow Dr	Knoxville	TN	37934	1/3/2017
1540 New Lascassas Hwy 523D	Murfreesboro	TN	37130	1/3/2017
1116 Section Line Rd	Union City	TN	38261	1/3/2017
1451 Toshiba Dr Apt A	Lebanon	TN	37087	1/4/2017
2529 Rivermont Circle	Kingsport	TN	37660	12/31/2016
411 Howell Street	Hartsville	TN	37074	12/28/2016
411 Howell Street	Hartsville	TN	37074	12/25/2016
411 Howell Street	Hartsville	TN	37074	12/24/2016
411 Howell Street	Hartsville	TN	37074	12/24/2016
1339 Stainback Ave	Nashville	TN	37207	12/22/2016
411 Howell Street	Hartsville	TN	37074	12/27/2016
411 Howell Street	Hartsville	TN	37074	12/23/2016
3093 Spottswood	Memphis	TN	38111	12/22/2016
8204 chesterfield dr	Knoxville	TN	37909	12/23/2016
7718 Mayes chapel rd	Knoxville	TN	37938	12/23/2016
1502 long ave	Nashville	TN	37206	12/23/2016
1960 North Parkway	Memphis	TN	38112	12/24/2016
704 River Road	Church Hill	TN	37642	12/24/2016

PO Box 58	Mountain Home	TN	37684	12/25/2016
1332 Farrington Drive	York	TN	37923	12/27/2016
936 Taylor Hill Rd.	Dandridge	TN	37725	12/31/2016

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From: Dorinda
To: Pilakowski, Ashley Anne
Subject: My opinion on coal ash
Date: Sunday, December 18, 2016 2:04:37 PM

TVA External Message. Please use caution when opening.

The best way to deal with coal ash is to close or retire all tea coal plants as soon as possible and replace them with wind, solar and natural gas plants. Thank you. Jack Gaw

Sent from my iPad

COMMENT FORM

Cumberland Fossil Plant Coal Combustion Residual Management Project
Environmental Impact Statement
Open House Public Scoping Meeting

Thank you for attending tonight's public scoping meeting. Your input and participation are important. Please take a few minutes to provide us with your comments, by completing this form here or mailing it to the address on the back. Attach additional pages if you would like to provide additional information. All comments received by January 6, 2016 will be included in the Environmental Impact Statement.

PLEASE PRINT:

NAME: Deanna Bowden

ADDRESS: 1215 Haber Drive

CITY / STATE: Brentwood TN 37027 ZIP:

PHONE: 615-584-0567 E-MAIL: deannabowden@netscape.net

COMMENTS:

TVA should continue to move toward best practices on coal ash storage. While it may be initially less expensive to cover and pray, in the long run, dry ash stored in lined storage should be used whenever possible.

The proximity of such a huge amount of ash, stored without liners, to two waterways is very worrysome.

The current storage over rock that is cracked is doubly worrisome.

Since Kingston, TVA has no excuses. There is no cover in saying floods, spills, or earthquakes could not have been anticipated. Safe storage is the best protection, not only for the river, but also for our investment.

You may also submit comments electronically at:
www.tva.gov/nepa or via e-mail to Ashley Pilakowski at
aapilakowski@tva.gov

COMMENT FORM

Cumberland Fossil Plant Coal Combustion Residual Management Project
Environmental Impact Statement
Open House Public Scoping Meeting

Thank you for attending tonight's public scoping meeting. Your input and participation are important. Please take a few minutes to provide us with your comments, by completing this form here or mailing it to the address on the back. Attach additional pages if you would like to provide additional information. All comments received by January 6, 2016 will be included in the Environmental Impact Statement.

PLEASE PRINT:

NAME: Elizabeth C. Garber

ADDRESS: 1327 Otter Creek Rd.

CITY / STATE: Nashville, TN ZIP: 37215

PHONE: (615) 668-1977 E-MAIL: garberb@hotmail.com

COMMENTS:

Given the close proximity to the Cumberland River, I believe that it is critical for the long-term protection of the water & ground water from pollution from the dry ~~and~~ wet ash, that it (ash + gypsum) be moved to an area that is lined and far enough away from rivers & creeks to be safe from severe weather events causing a polluting event.

You may also submit comments electronically at:
www.tva.gov/nepa or via e-mail to Ashley Pilakowski at
aapilakowski@tva.gov

From: Lesley Garrett
To: Pilakowski, Ashley Anne
Subject: Re: EIS at CUF
Date: Tuesday, December 06, 2016 10:48:31 PM

TVA External Message. Please use caution when opening.

I would be glad to be added to the distribution list.

Lesley Garrett
230 Ramsey Rd
Paducah, Kentucky 42003

On Tue, Dec 6, 2016 at 9:41 AM, Pilakowski, Ashley Anne <aapilakowski@tva.gov> wrote:

> Good morning,
>
> We are just now in the scoping period for the CUF CCR EIS. We are hosting a public meeting on December 12, 2016 at Freedom Point Events Center at Liberty Park, 1190 Cumberland Drive, Clarksville, TN 37040.
>
> There are technical documents associated with Coal Combustion Residuals at CUF located on the TVA website located here:
>
> https://www.tva.gov/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Cumberland#
>
> If you would like to be added to our distribution list to receive a notification of the release of the Draft EIS, please provide your full name and address and I can have you added to that list.
>
> Thank you,
>
> **Ashley A. Pilakowski**
>
> Tennessee Valley Authority
>
> NEPA Specialist
>
> 400 West Summit Hill Drive, WT 11D-K

Knoxville, TN 37902

865-632-2256 (work)

Privileged and Confidential - Pre-decisional Deliberative Document

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From: Lesley Garrett [mailto:lesleygarrett94@gmail.com]
Sent: Monday, December 05, 2016 3:25 PM
To: Pilakowski, Ashley Anne
Subject: EIS at CUF

TVA External Message. Please use caution when opening.

Greetings!

I just learned about the public comment period for the environmental impact statement (EIS) on the Management of Coal Combustion Residuals (CCR) at the Cumberland Fossil Plant (CUF). Do you have reading materials related to it? Technical documents are fine. Thank you,

Appendix C

Scoping Meeting Materials

Cumberland Fossil Plant Coal Combustion Residual Management Environmental Impact Statement

Introduction

The Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) to address the potential environmental effects associated with management of coal combustion residual (CCR) material produced at the Cumberland Fossil Plant (CUF) located near Cumberland City, Tennessee (see Figure 1). The purpose of the EIS is to address long-term management of CCR produced at CUF. The project will also help TVA comply with present and future regulatory requirements related to CCR production and management, including those of the U.S. Environmental Protection Agency (EPA's) CCR Rule and Effluent Limitations Guidelines and those of the State of Tennessee.

Figure 1. Cumberland Fossil Plant

Background

CUF is TVA's largest coal-fired plant by capacity, and was built between 1968 and 1973. CUF generates enough energy to supply about 1.1 million homes. It consumes an average of 5.6 million tons of coal annually and produces approximately 1.3 million tons of CCR a year. Of the CCR produced, CUF sells approximately 75 percent of the CCR produced (725,000 tons of gypsum and 275,000 tons of fly ash) annually for beneficial reuse as raw manufacturing material.

Currently, bottom ash generated by the operating units at CUF is sluiced to the existing bottom ash impoundment where the material settles out. The treated waste water flows on to the main ash impoundment for final treatment before discharge. The settled bottom ash is excavated and stacked for transport to the fly ash stack. Fly ash is conveyed dry from the plant and transported to the fly ash stack. Gypsum is conveyed to an adjacent wall-board manufacturer or to lined channels where it is dewatered. It is stockpiled for later use or disposed in the gypsum stack.

TVA intends to transition from a wet-sluiced bottom ash disposal system to a dry ash disposal system in order to fulfill its goal to eliminate wet ash storage at its coal plants.

To enable bottom ash wet-to-dry conversion, TVA will evaluate the potential environmental impacts of a new bottom ash dewatering facility and options for management and disposal of dry CCR produced at CUF.

What is the Purpose of the Environmental Impact Statement?

The purpose of this EIS is to evaluate appropriate and reasonable future CCR management alternatives at CUF, assess the potential impacts of the alternatives and identify the preferred alternative that fully meets the project needs.

TVA will also evaluate stopping operations and closing the Bottom Ash and the Main Ash Impoundments. TVA will develop and evaluate various alternatives in the EIS, including the No Action Alternative.

What are the Needs for the Project?

The current CUF fly ash stack has capacity to manage dry fly and bottom ash until about 2024. This storage capacity, however, is dependent upon demonstrating by 2018 that the impoundments meet state and federal rules for stability, location and groundwater monitoring; if they do not, the impoundments may need to be closed. Due to these potential limitations, TVA needs to evaluate additional long-term CCR management alternatives.

Additionally, the TVA Board of Directors committed to converting the wet ash management systems at all coal-fired plants, including at CUF, to dry storage systems. This project helps meet that commitment.

On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule) in the Federal Register. Under the CCR Rule, if an impoundment cannot demonstrate that it meets stability, location and groundwater requirements by 2018, an impoundment may be subject to a five-year closure deadline. On September 30, 2015, EPA finalized its Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category (ELGs). The ELGs set new or additional requirements for wastewater streams from fossil-fueled power plants, including waste streams from fly ash and bottom ash operations. These requirements may affect CUF's current CCR management processes.

What are CCRs

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

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

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

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

Proposed Action

TVA's proposed action is the long-term management of CCR at CUF. The proposed action will support the implementation of TVA's goal to eliminate wet CCR storage and ensure compliance with the CCR Rule and ELG requirements.

Alternatives

The proposed action would include several projects described below and shown on Figure 2 (see attachment):

- **No Action Alternative.** TVA would continue to manage CCR through its existing wet storage (Bottom Ash Impoundment and Main Ash Impoundment) and dry storage (fly ash stack and gypsum ash stack) system. The No Action Alternative does not meet the purpose and need of the project.
- **Bottom Ash Dewatering Facility.** Bottom ash is currently wet-sluiced to the bottom ash impoundment. TVA is proposing to build and operate a bottom ash dewatering facility with options for using a continuous or once-through system where water left over from the dewatering process would be treated and then discharged through an existing permitted outfall or recirculated back into the plant for future sluicing operations.
- **Landfill.** TVA will evaluate disposing of dry CCR at off-site permitted landfills and/or constructing a new on-site landfill. A new landfill would be designed to provide sufficient storage capacity for long-term management of CCR generated at CUF.
- **Closure of the Bottom Ash Impoundment and Main Ash Impoundment.** TVA will evaluate the closure of these two impoundments. At a programmatic level, TVA has previously considered two impoundment closure methods: Closure-in-Place or Closure-by-Removal. The alternative analysis will rely on this programmatic closure evaluation as well evaluating specific issues related to closing the Bottom Ash Impoundment and Main Ash Impoundment at CUF.

NEPA Process for EIS

The EIS will be prepared following the requirements of the National Environmental Policy Act (NEPA). The EIS will identify and assess potential social, economic, and environmental impacts of reasonable alternatives for long-term management of CUF's CCR to support TVA decision-making. TVA's preferred alternative will be protective of people's health and the environment.

The CUF EIS will use the findings of the 2016 Programmatic EIS (PEIS) to evaluate the closure alternatives for the existing Bottom Ash Impoundment and Main Ash Impoundment. The PEIS analyzed methods for closing impoundments that hold CCR materials at TVA fossil plants and identified specific screening and evaluation factors to help frame its evaluation of closures at its other facilities. The July 2016 Record of Decision determined that for qualifying impoundments, future environmental reviews of CCR impoundment closures could build off or tier from the PEIS. The CUF EIS is intended to tier or build off of the 2016 PEIS to evaluate the closure alternatives for the existing Bottom Ash Impoundment and Main Ash Impoundment.

Milestones

The timeline for this project is shown on Figure 3 (see attachment) and explained in more detail below.

- **Notice of Intent.** The publication of the Notice of Intent (NOI) in the Federal Register initiates the Scoping process
- **Public Scoping Period.** Provide input on EIS scope and issues at a public forum and through written comments (December 5, 2016 to January 6, 2017)
- **Prepare Draft EIS.** Review public scoping comments, identify alternatives, conduct studies and develop Draft EIS (Through Mid 2017)

- **Release Draft EIS.** Notify interested parties about availability of Draft EIS for comments (Mid 2017). Comment period lasts 45 days
- **Public Meeting.** Open house public meeting provides an opportunity for public to discuss Draft EIS with Project Team and provide comments (Mid 2017)
- **Finalize EIS.** Revise Draft EIS based on comments from the public and agencies (Late 2017)
- **Release Final EIS.** Notice of availability of Final EIS will be published (Early 2018)
- **Record of Decision (ROD).** TVA will make final determination concerning CUF CCR Management (Early 2018)

Next Steps

- Review public and agency comments that were received; comments will be considered in preparation of the EIS.
- Analyze alternatives for the management of CUF CCR: No action; bottom ash dewatering facility; managing CCR in a landfill; and closing the Bottom Ash Impoundment and Main Ash Impoundment.
- Evaluation of project environmental impacts will include, but not be limited to, the potential impacts on water quality, aquatic and terrestrial ecology, threatened and endangered species, wetlands, land use, historic and archaeological resources, solid and hazardous waste, safety, socioeconomic resources and environmental justice.
- Prepare EIS.

Get Involved and Stay Informed!

The success of this study depends on your participation and input.

Visit TVA's NEPA website:

www.tva.gov/nepa

- Get project updates
- Send comments or questions to the Project Team

Contact Us:

Written comments should be sent to Ashley Pilakowski, NEPA Project Manager, Project Environmental Planning, Tennessee Valley Authority, 400 West Summit Hill Dr. WT 11D, Knoxville, TN 37902-1499 or aapilakowski@tva.gov. Comments also may be submitted online at: www.tva.gov/nepa.

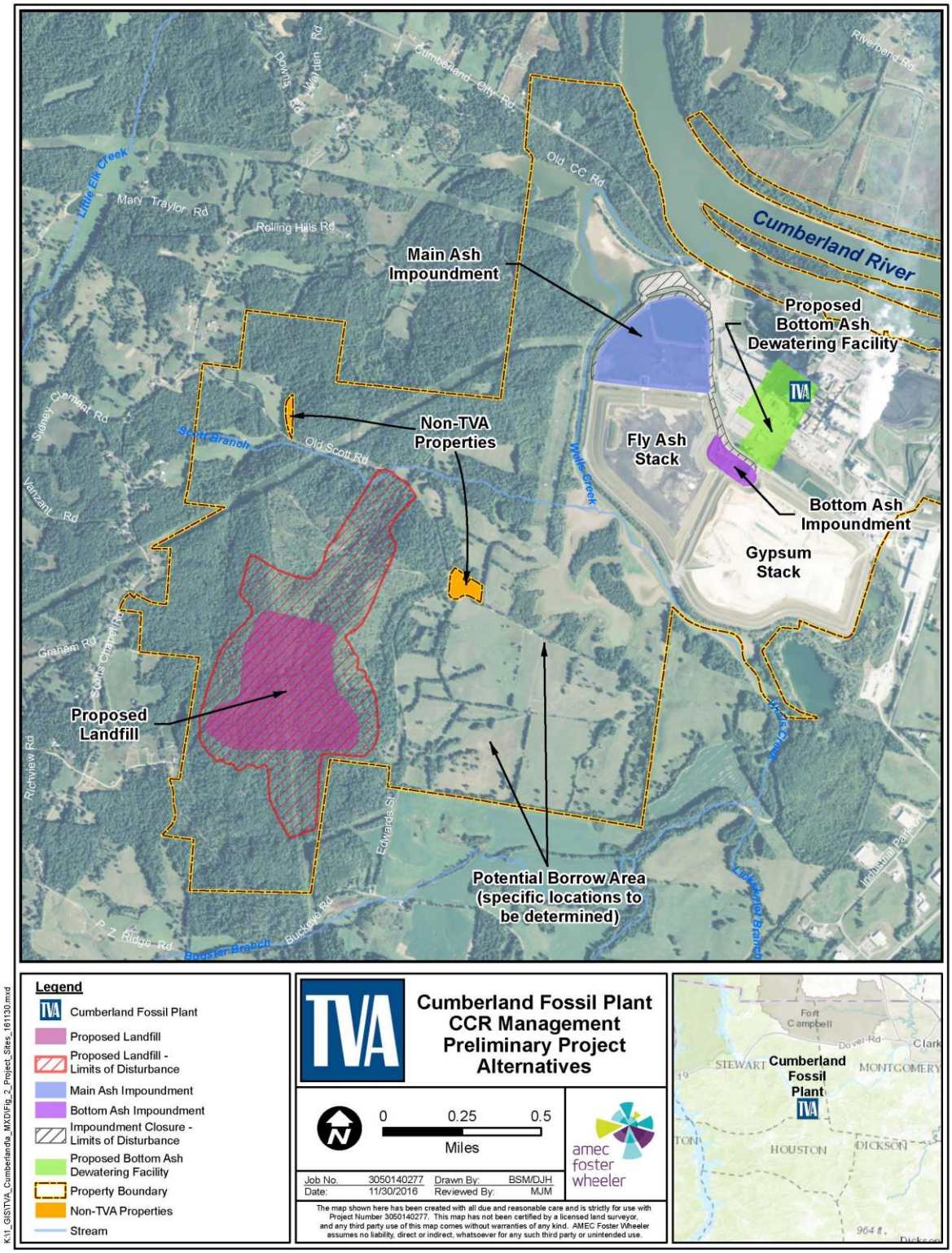


Figure 2: Preliminary Project Alternatives

NEPA Timeline

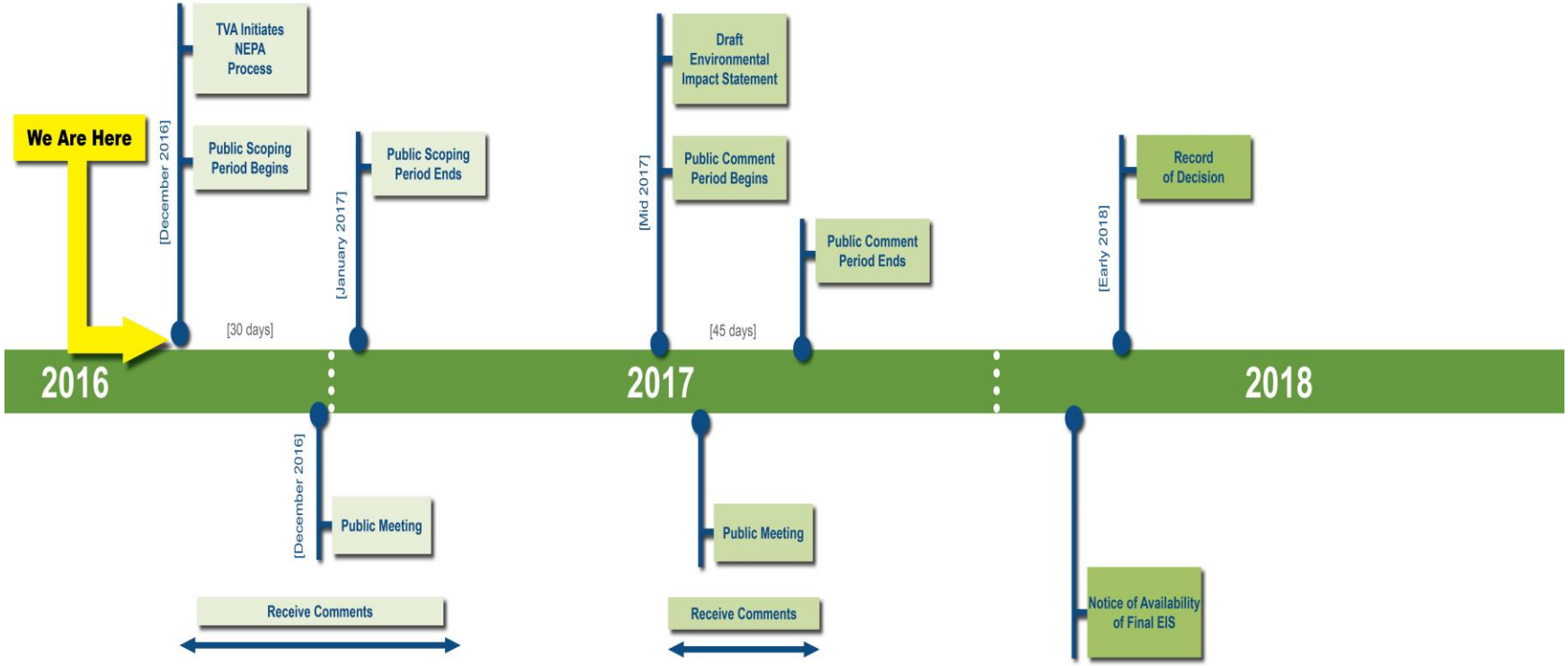


Figure 3: NEPA Timeline for the CUF CCR Management EIS

WELCOME

Cumberland Fossil Plant

Coal Cumbustion Residual Management Project

OPEN HOUSE PUBLIC SCOPING MEETING

PLEASE SIGN IN

TVA

Purpose of this Scoping Meeting

- Provide an overview and history of the project
- Explain the Environmental Impact Statement (EIS) process
- Identify project alternatives to be evaluated
- Solicit your comments and input

Projects and Alternatives

Projects:

- **Bottom Ash Dewatering Facility**
  - Option 1 - Continuous "Once Through" System
  - Option 2 - Recirculation of Bottom Ash Sluice Stream
- **Bottom Ash and Main Ash Impoundment Closures**
- **CCR Landfill Alternatives**
  - New On-site Landfill
  - Hauling CCR to an Existing Off-site Permitted Landfill

Alternatives Considered in the EIS:

- **Alternative A –** No Action Alternative
- **Alternative B –** Implementation of CCR Management Projects and On-site Construction and Operation of a Landfill for Storage of CCR
- **Alternative C –** Implementation of CCR Management Projects and Off-site Transport of CCR to an Existing Permitted Landfill

Project Purpose and Need

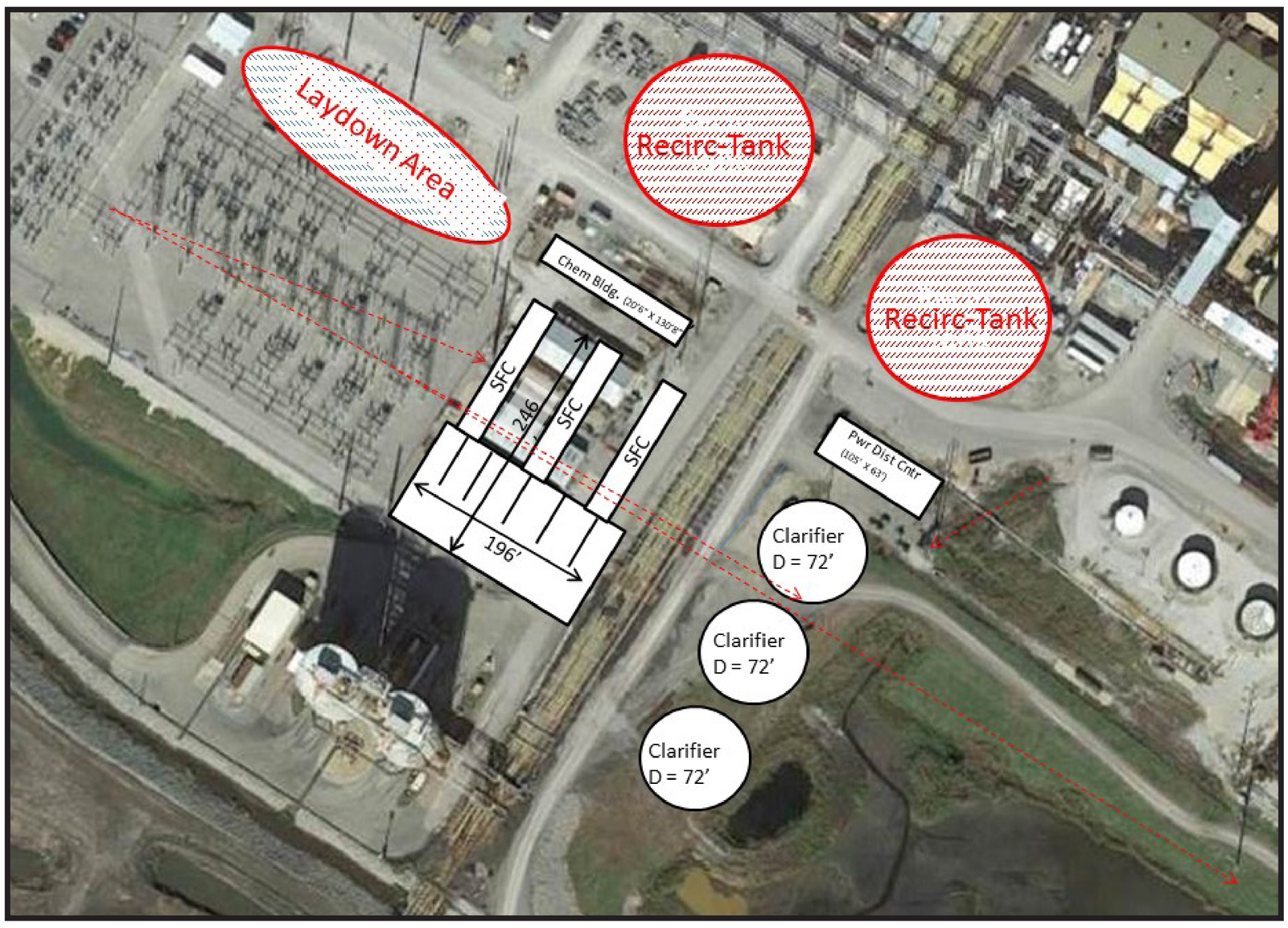
- Long-term management of coal combustion residuals (CCR) at Cumberland Fossil Plant (CUF)
  - TVA has historically managed storage of CCR generated at CUF in combination of dry stacks and impoundments
  - Fly ash stack has capacity to manage dry fly ash and bottom ash until approximately 2024
- Support TVA's commitment to eliminate wet CCR storage
- Meet federal and state requirements including the U.S. Environmental Protection Agency's CCR Rule

TVA

Cumberland Fossil Plant

Coal Combustion Residual Management Project

Bottom Ash Dewatering Facility



Proposed Bottom Ash Dewatering Facility Location

Similar Bottom Ash Dewatering Facility at Bull Run Fossil Plant

TVA

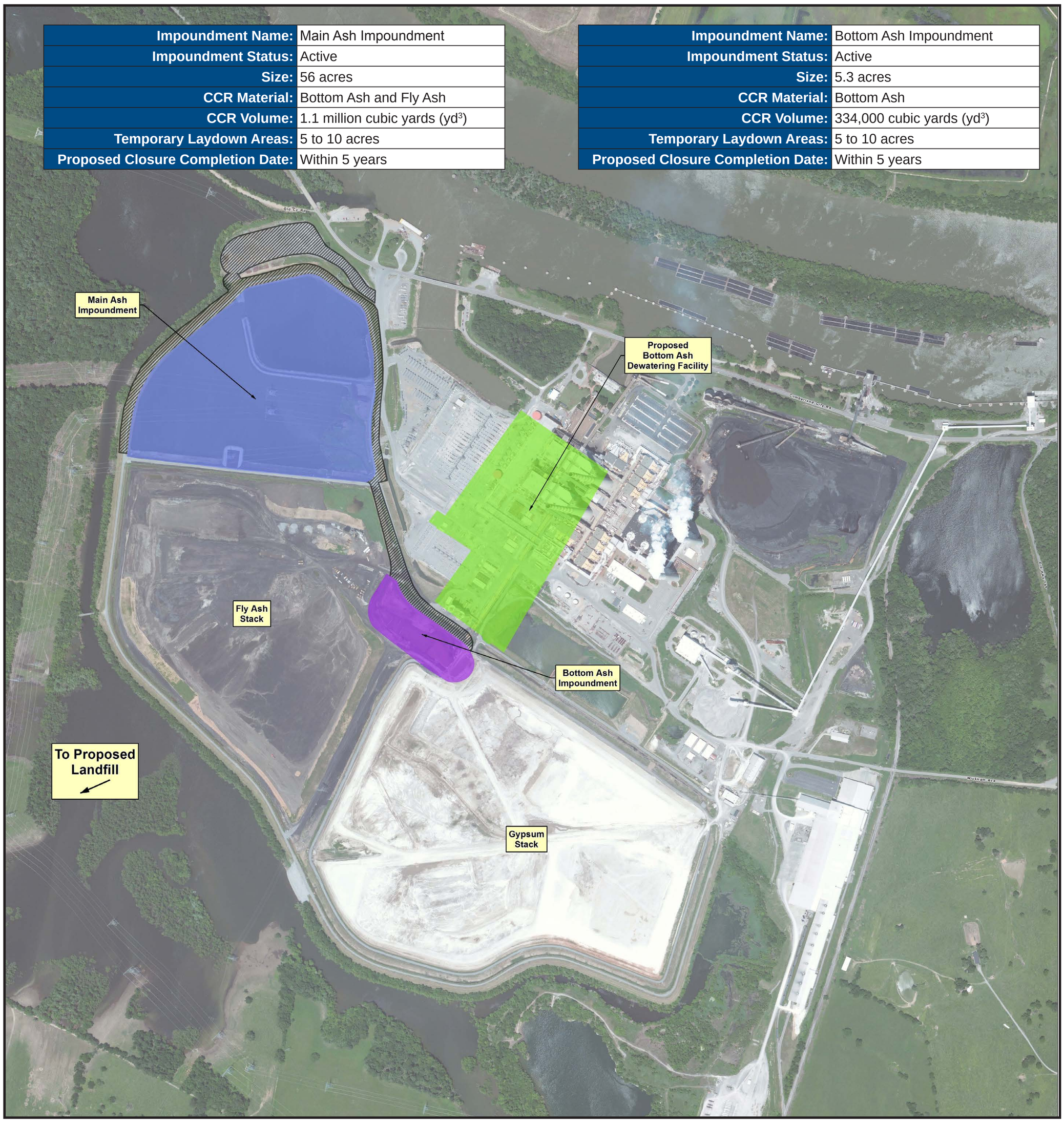
Cumberland Fossil Plant

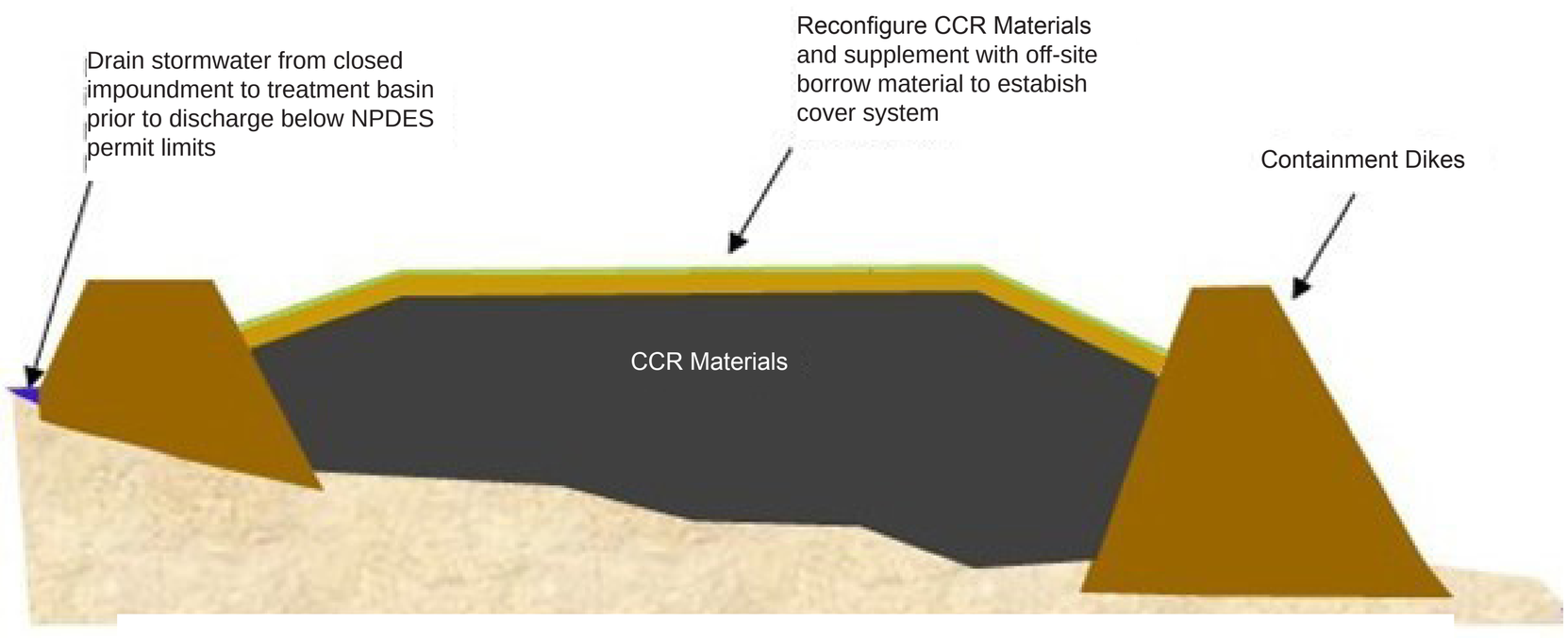
Coal Combustion Residual Management Project

Impoundment Closures

Impoundment Name:	Main Ash Impoundment
Impoundment Status:	Active
Size:	56 acres
CCR Material:	Bottom Ash and Fly Ash
CCR Volume:	1.1 million cubic yards (yd^3)
Temporary Laydown Areas:	5 to 10 acres
Proposed Closure Completion Date:	Within 5 years

Impoundment Name:	Bottom Ash Impoundment
Impoundment Status:	Active
Size:	5.3 acres
CCR Material:	Bottom Ash
CCR Volume:	334,000 cubic yards (yd^3)
Temporary Laydown Areas:	5 to 10 acres
Proposed Closure Completion Date:	Within 5 years



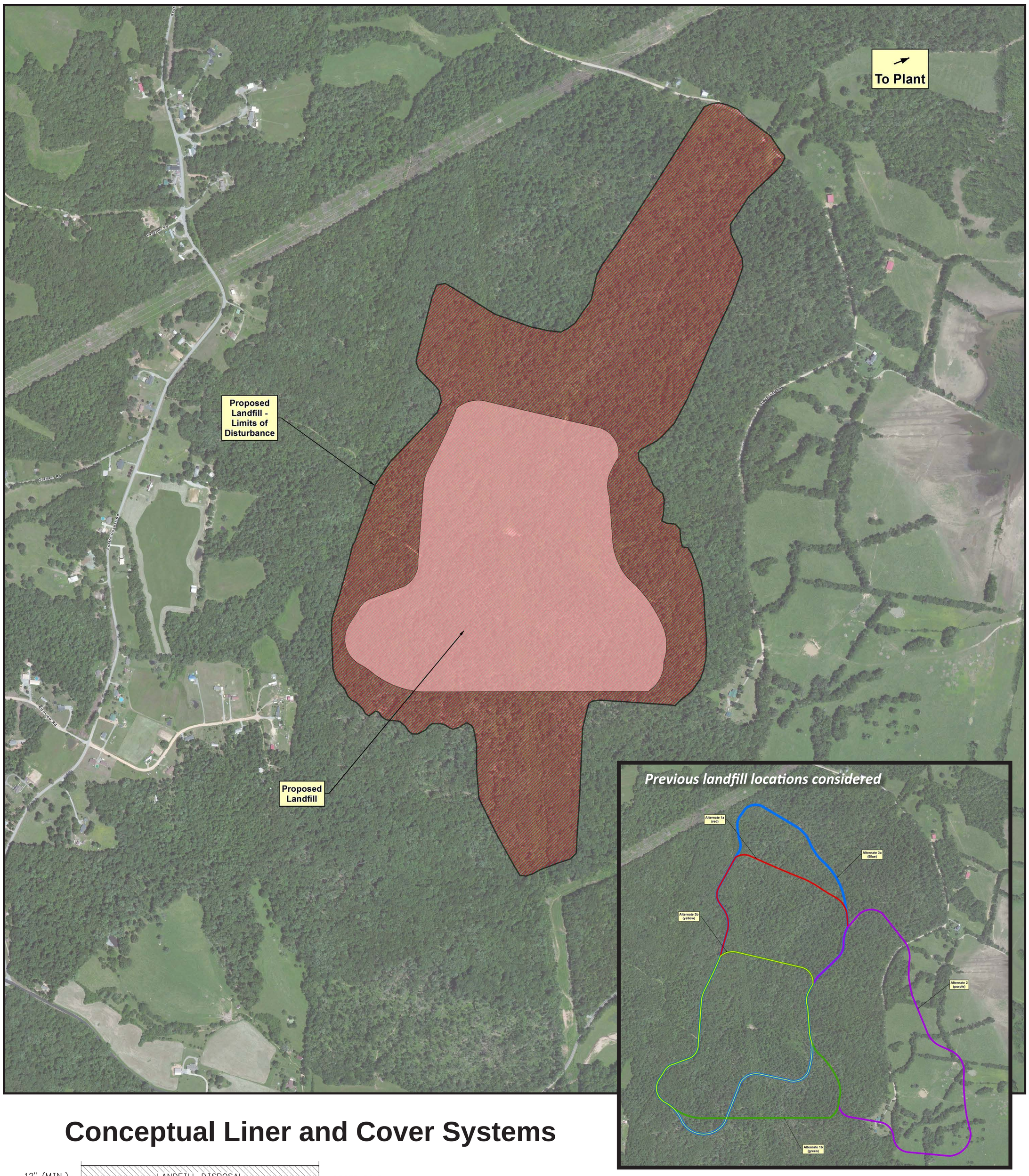


Closure-in-Place Alternative

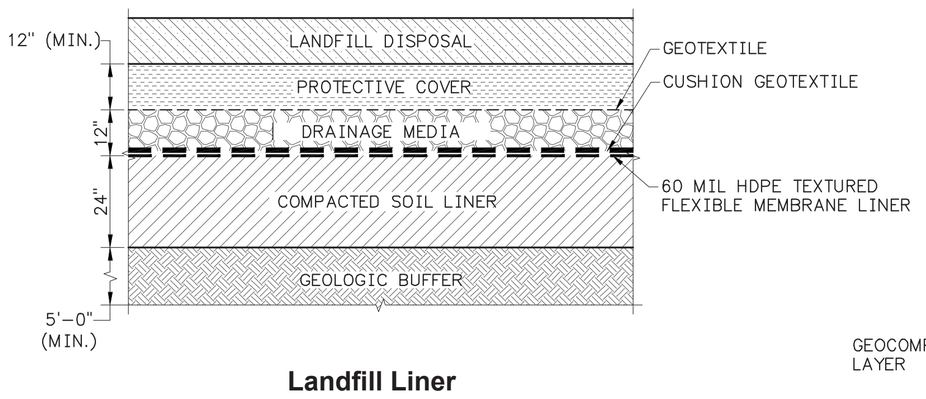
Cumberland Fossil Plant

Coal Combustion Residual Management Project

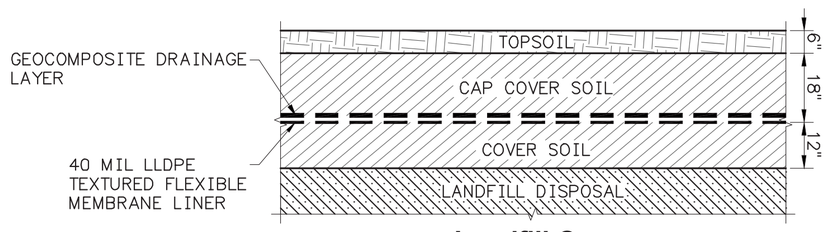
Proposed On-site Landfill



Conceptual Liner and Cover Systems



Landfill Liner



Landfill Cover

What is NEPA?

- The National Environmental Policy Act of 1969 (NEPA)
- Applies to federal actions (funding or permitting)
- Requires analysis of impacts to natural and cultural resources and the human environment
- Requires a transparent decision-making process with the public
- Analysis of impacts varies depending on project size, complexity and level of impact
  - **Environmental Impact Statement (EIS)** – for projects where it is known that the action will have a significant effect on the environment
  - **Environmental Assessment (EA)** – for actions in which the significance of the environmental impact is not clearly established
  - **Categorical Exclusion (CE)** – for actions that do not individually or cumulatively have a significant effect on the environment

An Environmental Impact Statement (EIS) is being performed for the Coal Cumbustion Residual Management Project

TVA

NEPA Process

The Environmental Impact Statement (EIS) process for this project includes these schedule milestones:

- **Notice of Intent.** The publication of the Notice of Intent (NOI) in the Federal Register initiates the Scoping process
- **Public Scoping Period.** Provide input on EIS scope and issues at a public forum and through written comments (December 5, 2016 to January 6, 2017)
- **Prepare Draft EIS.** Review public scoping comments, identify alternatives, conduct studies and develop Draft EIS (Through Mid-2017)
- **Release Draft EIS.** Notify interested parties about availability of Draft EIS for comments (Mid 2017); Comment period lasts 45 days
- **Public Meeting.** Open house public meeting provides an opportunity for public to discuss Draft EIS with Project Team and provide comments (Mid 2017)
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- **Release Final EIS.** Notice of availability of Final EIS will be published (Early 2018)
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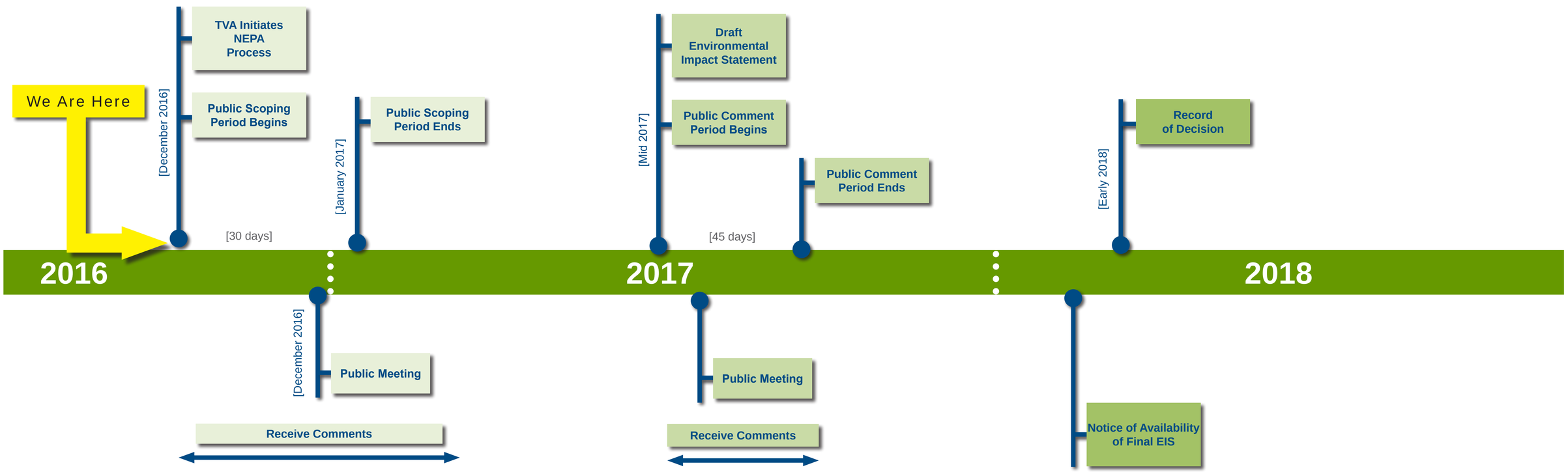
Cumberland Fossil Plant

Coal Combustion Residual Management Project

NEPA Timeline



How to Provide Your Comments

- Written comments can be left here or mailed to the address on the Comment Form
- You can also provide comments by:
  - Email: aapilakowski@tva.gov
  - Web: www.tva.gov/nepa
  - Mail:

    Attn: Ashley Pilakowski
    NEPA Project Manager
    Tennessee Valley Authority
    400 W. Summit Hill Drive
    WT 11D
    Knoxville, TN 37902-1499

All comments received by January 6, 2017 will become part of the EIS record

TVA

Appendix B – Public Involvement

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Appendix B
Public Comments and Responses to Comments on the Cumberland Fossil Plant Coal Combustion Residuals Management Operations Draft Environmental Impact Statement

The Notice of Availability of the Draft EIS was published in the Federal Register on November 17, 2017, initiating a 45-day public comment period which concluded on January 2, 2018. In addition, notification of availability of the Draft EIS was announced in regional and local newspapers, and a news release was issued to the media and posted to TVA's Web site. TVA's agency involvement included sending letters to local, state and federal agencies and federally recognized tribes to notify them of the availability of this Draft EIS.

TVA accepted comments submitted through mail, email, a comment form on the public website, and at a public meeting. During the public comment period, TVA hosted a public meeting on November 28, 2017, at the Cumberland City Fire Hall in Cumberland City, TN, to describe the proposed actions and to accept comments on the Draft EIS. Twenty-four people attended the meeting.

TVA received a total of 69 comments from 15 commenters. Of the 15 submissions, three were from federal entities, one was from a state entity, one was from a group of environmental organizations and 10 were from members of the public.

TVA carefully reviewed all of the substantive comments that were received. Summarized comments and TVA's responses are included in Table B-1. Original comment submissions are included following the table.

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Table B-1 CUF Coal Combustion Residuals Management Operations Response to Comments

No.	Name	Comment	Response
General Comments			
1	Email address-no name	I am retired from US Forest Service NE Station (USDA) and worked extensively on fly ash and its application in forestry. I published a Ph.D. dissertation on soils and fly ash at The Ohio State University in 1993. I live in Weakley County, TN near Gleason. Near my home are hundreds of acres of abandoned (open) clay mines. These mines could be filled with fly ash and the soils are clays and clay loams and would allow minimum movement of boron and arsenic. You could Google the mines immediately west of Gleason, TN to get an idea of the potential disposal sites. A rail line runs to the clay mines in Gleason. I would think that a lot of coal railcars are available with the collapse of the coal industry and could haul the ash cheaper than trucking. Anyway--this is for your consideration. The article in the Tennessean rekindled my interest in fly ash and its uses.	Thank you for your comment. Tennessee does not allow CCR to be used for minefill and as noted in the EIS, transport of CCR by rail was not considered a viable option at CUF.
2	Martha Yanchyshyn	Following comments were submitted at the public meeting: 1. Provide specific chemical pollutants found/expected in stored ash. 2. Please send EIS. 3. What is ash currently being used for? 4. Question stability of shattercones and mitigation of risks associated with the shattercones. 5. In case of spill, how will it be dealt with? 6. List of known/suspected toxins you will monitor. 7. Plans regarding climate change.	1. CCRs are byproducts produced from burning coal. As noted in the EIS (Chapter 3.11.1), CCRs produced at CUF primarily consist of fly ash, bottom ash and gypsum. Fly ash and bottom ash are composed primarily of silica, aluminum oxide and iron oxide. These waste streams also contain a variety of heavy metals at limited concentrations including arsenic, cadmium, chromium, copper, lead, mercury and selenium. 2. The EIS was delivered to Ms. Yanchyshyn on 12-7-17. 3. Opportunities for reuse of CCR produced at CUF include the manufacture of wallboard, roofing, cement, concrete and other products. 4. Potential geologic hazards including faults associated with the Wells Creek Structure were evaluated in a hydrogeologic investigation. As stated in the EIS (Chapter 3.5.1.2.2), the results of that study indicated that faults associated with the Wells Creek Structure near CUF are located deep beneath the surface and have been re-cemented through natural processes over geologic time such that they do not represent a significant seismic concern. 5. Comment noted. TVA has evaluated the structural stability of the dikes at the surface impoundments at CUF per requirements of the CCR rule and as part of the development

No.	Name	Comment	Response
			of conceptual closure plans. All berms have been demonstrated to meet appropriate static and seismic stability safety factors. Therefore, the chances of a spill are small. In addition, if the CCR impoundments were closed-in-place, the stability of the berms would be enhanced due to the reduction of water pressure. Thus, the chances of a spill would be further reduced under the Closure-in-Place alternative. In the unlikely event of a spill, the response would be tailored to fit the situation. TVA maintains an Integrated Pollution Prevention Plan that provides procedures to follow in the event of a spill. In addition, as required by the CCR Rule, TVA has posted an Emergency Action Plan to its public CCR Rule website that would be triggered in the event of a failure of an impoundment dike that has or could potentially result in off-site migration of CCR material. 6. Groundwater monitoring of the impoundments will be undertaken with periodic sampling of wells established within the certified groundwater monitoring network (monitoring network plan completed in October 2017) as required by the CCR Rule. In conjunction with this plan, TVA will also continue to work with the state under the TDEC Order to obtain samples and evaluate groundwater quality associated with the CCR management facilities at CUF. Constituents to be analyzed as part of that routine groundwater monitoring plan include arsenic, barium, boron, thallium, mercury, molybdenum, mercury, selenium, cadmium, cobalt, in accordance with Appendix III and Appendix IV of 40 CFR Part 257, as appropriate. 7. Project-related impacts to climate change and greenhouse gases have been evaluated in the EIS. The proposed projects would result in temporary localized emissions of CO_2 from the use of vehicles and construction equipment during site preparation and facility construction. These emissions would be minor and localized would not result in a change to regional GHG levels. Alternative D, would have an incrementally greater impact on greenhouse gas emissions related to the long-term transport of CCR to an offsite landfill. However, GHG emissions associated with Alternative D would also be relatively minor and long-term, and would not result in climate change or changes in regional GHG levels.
3	Martha Yanchyshyn	TVA did not communicate with the people of Stewart County. Some residents do not have access to the internet and cannot reach your website.	Comment noted. TVA held a public meeting in Cumberland City in Stewart County on November 28, 2017. The meeting was advertised in the Clarksville *Leaf Chronical* on November 10th, *Stewart-Houston Times* on November 15th, and the *Stewart County Standard* on November 21st. Also, a postcard announcing the meeting was sent to all addresses within three miles of the plant and newspapers wrote stories about the upcoming public educational forum. TVA provides hardcopies of NEPA documents when requested to accommodate individuals without access to the online version.

No.	Name	Comment	Response
4	Martha Yanchyshyn	Analysis is not complete as the field work to assess flora and fauna was completed in one day and fish samples were not collected.	TVA does not agree that the field studies were not sufficient. Qualitative field surveys were conducted to identify general vegetation type and species composition on the proposed landfill site on November 30, 2016. This study also reexamined the wetlands previously delineated by TVA in August 2014. The project areas were also surveyed for plant communities within the project area that included habitat searches for Price's potato-bean in August 2017. In addition, as reported in the EIS, a mist nest study was performed on the landfill site in 2011 to identify potential bat use of the project area. Furthermore, TVA periodically samples fish (electrofishing and gill netting) upstream and downstream of CUF in the spring, summer, and autumn with the most recent being in year 2015. These studies were used to characterize the aquatic biology.
5	Martha Yanchyshyn	Question the capacity of the Bi-County Solid Waste Landfill. Also is the landfill permitted to receive CCR?	As noted in the Chapter 2 (Section 2.2.3.2). TVA assumes that the offsite transport of CCR would be to an existing landfill that would have sufficient capacity and be permitted to receive CCR. The Bi-County Solid Waste Management Landfill is the closest landfill that can accept special waste and as such can apply for special waste approval from TDEC. It should be noted that the Bi-County Solid Waste Management Landfill is the closest suitable landfill to CUF and as such provides an estimate of the lowest range of transportation impacts as a comparison to onsite handing of CCR. Any other potential receiving landfill that may be considered by TVA would be located at a greater distance and would result in greater offsite impacts than that assessed for the Bi-County Solid Waste Landfill.
6	Martha Yanchyshyn	Question "reasonably foreseeable future actions" on floodplains as the FEMA maps are inaccurate.	Comment noted. TVA disagrees that the FEMA maps are inaccurate.
7	Martha Yanchyshyn	TVA should provide information regarding recycling of fly ash and gypsum.	Beneficial reuse is considered by TVA as part of all ash management activities. As noted in the EIS, Table 2-3, opportunities for reuse of CCR produced at CUF include the manufacture of wallboard, roofing, cement, concrete and other products. Currently, TVA sells approximately 75 percent of CCR produced at CUF annually.
8	PC Meadows	I read the description of TVA's plans to contain seepage from these damaging sites. Thank you for your work on this important issue. Instead of continuing to use coal which is doubly damaging to the environment, TVA should increase using power created by solar and wind.	Comment noted. TVA considers a diverse portfolio of resources including renewable resources to meet energy demands.
9	Eastern Shawnee Tribe of Oklahoma	Based on the information provided and a review of our records, we find that this project will have No Effect on properties of sacred and/or cultural significance to the Tribe. The project site is within the known regional area of the Shawnee prehistorically and historically, be aware of inadvertent discoveries. However, ESTO has no objection to the project proceeding as described. Please note that	Comment noted. As stated in the EIS, if an unidentified archaeological site is discovered during construction, TVA would cease all construction activities in the immediate area where archaeological material is discovered. TVA would contact the SHPO and tribes to determine what further action, if any, would be necessary to comply with Section 106 of the NHPA.

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		any future changes to this project will require additional consultation.	
10	Southern Environmental Law Center (SELC)	TVA's decision to "tier" its Cumberland EIS analysis from a Programmatic Environmental Investigation Statement is insufficient in that TVA does not take into account the extent of site-specific environment impacts at the Cumberland facility.	TVA disagrees with this comment. A programmatic NEPA review is a broad, high-level review that assesses environmental impacts of proposed policies, plans or programs. Subsequent reviews within the broad parameters of the programmatic then tier off of the programmatic by assessing site-specific impact. The NEPA analysis in the CUF EIS appropriately relies upon the over-arching and bounding analyses performed in the Programmatic EIS, while also integrating site-specific details and analyses where appropriate.
11	Tennessee Department of Environment and Conservation (TDEC)	Activities required under TDEC Order will direct closure methodology and further potential corrective actions. To ensure transparency of process and continuity between proposed actions and requirements under the Order, TDEC recommends that TVA provide a schedule of proposed activities, a description of how proposed actions relate to requirements of the TDEC Order, and whether any of the proposed actions, if selected, would require reevaluation per NEPA.	After TVA has made a decision(s) regarding proposed actions in this EIS, TVA intends to take actions on most of those decisions immediately. However, TVA understands that the NEPA decision-making process is happening concurrently with the EIP/EAR process. TVA will endeavor to schedule proposed actions to reduce their "at risk" nature under the TDEC Order, and to align them with the EIP/EAR process. TVA will endeavor to first perform investigative actions under the Order in areas where temporary or permanent infrastructure must be installed for CCR Rule compliance before said infrastructure is installed. In addition, TVA may employ a phased decision-making process in which TVA would issue separate records of decision for one or more of the actions identified within the EIS, allowing some actions to go forward immediately while others are implemented later to enhance their coordination with the Order process. If any additional actions are identified under the EIP/EAR process requiring TVA to exercise discretion, those additional activities would be analyzed under an additional NEPA analysis. See responses to Comments 21 and 47. Upon completion of this EIS and issuance of the Record of Decision, TVA plans construction of a Bottom Ash Dewatering Facility and an onsite landfill (subject to obtaining necessary permits). In addition, to meet CCR Rule deadlines, TVA plans to begin construction of new process water basins. As explained in the EIS, the new process water basins are proposed to be located within the footprint of the Main Ash Impoundment. This activity would involve removal of the ash in the area of the proposed new process water basins. As noted above, TVA intends to complete investigative activities in this area prior to construction to align these actions with the EIP/EAR process to the extent possible. These new process water basins are necessary to provide treatment for certain plant wastewaters should the Main Ash Impoundment be triggered for closure in early 2019. TVA has identified closure-in-place in the Final EIS as the preferred methodology for the Bottom Ash Impoundment and the remainder of the Main Ash Impoundment, in part because closure-in-place is the environmentally preferable alternative. However, it is TVA's intention not to pursue these closure-in-place activities immediately, but rather to

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			let the CUF EIP/EAR guide the closure activities in these areas to the maximum extent possible. The gypsum disposal area and the fly ash stack remain operational units in accordance with an existing permit (IDL # 81-102-0086), under which TDEC has approved a closure plan. TVA has no current proposed actions related to the closure of these units. Future decisions/actions with respect to these units would be in compliance with the TDEC-approved closure plan for those units and the TDEC Order process.
12	TDEC	TVA uses the term "future CCR" throughout the Draft EIS but does not provide a definition, describe or relate the associated timing of "future CCR" with project milestones throughout the Draft EIS. TDEC recommends that TVA consider defining "future CCR" and more clearly describe which activities will represent interim disposal practices and strategies.	Comment noted. Future CCR is defined in the text box on page 9 as dry CCR that would be produced at CUF under all of the proposed alternatives. Additional text was also added to Section 1.3 to clarify. See response to Comment 55 regarding disposal activities.
13	U.S. Environmental Protection Agency (EPA)	We recommend that the TVA should adhere to the federal and state permitting requirements as it relates to water quality as well as best management practices that have been identified in the DEIS.	Comment noted. As stated in the EIS, TVA adheres to all federal and state permitting requirements as well as the site specific Best Management Practices identified in the EIS.
Alternatives			
14	Tony Troyani	Prefer TVA to keep ash on-site. Would like for TVA to explore the option of extending rail spur across Wells Creek instead of trucking the ash.	As noted in the EIS (Section 2.2.4), although CUF has both rail and barge facilities, these facilities are not configured and designed to support loading and transport of CCR.
15	Judy Reiman	Thank you for the presentation and opportunity to comment. Personally, trucking everything off-site would be too pricey and present is own problems with bad, narrow roads, truck wrecks, etc. I would prefer a facility on CUF. It would keep more people employed and help our local economy, as well as developing new areas on our plant site. It sounds more economical in the long-run as well.	Comment noted.
16	Derrick Wynn	RJ Corman Railroad may be an option for TVA to use to transport CCR.	Comment noted. See response to Comment 19.
17	Robin Farmer	Agree that the No Action Alternative is not consistent with other actions and that TVA does not consider this a viable option. I hope that the TVA will continue advancing its clean air strategies.	Comment noted.
18	Robin Farmer	I am in support of option C with major concerns involving sensitive bat species. Biological surveys conducted within	As stated in Chapter 3.12 of the EIS, bat mist netting studies conducted in 2011 and a site survey conducted in November 2016 have determined that the forested area within

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		the proposed landfill area show an impact to sensitive bat species. The TVA should consider alternatives to conserving the sensitive bat species in the following ways. Additional surveying, planning, consideration and coordination with bat conservation groups to provide temporary roosts during construction and permanent roosts built to prevent torpor that bats may go through when returning to roost after disturbance. Donation to bat conservation groups to offset the impact and risks involved in loss of habitat structure should be considered. TVA should seriously consider other areas or methods for storage of CCR as well as investing in maintaining foraging areas and food sources for native species because CCR is not conducive to bat health and proliferation. It has been shown that people who live near coal-fired power plants have the greatest health risks from power plant pollution. It was would be irresponsible to exclude and disregard any of the species that inhabit and forage in the immediate vicinity of this plant.	the proposed landfill project area is of low summer roosting quality for threatened and endangered bats, although it may be used as a foraging area. Programmatic Endangered Species Act (ESA) Section 7 Consultation with USFWS is underway regarding potential impacts to the federally listed gray bat, Indiana bat and northern long-eared bat from a variety of TVA activities (including development of CCR storage facilities). Based on the absence of hibernacula and documented roost sites within the project footprint, potential effects to these species are limited to alteration of foraging habitat. TVA will incorporate appropriate avoidance and minimization measures identified during this consultation into project execution.
19	TDEC	TVA states that the environmental impacts of developing rail facilities and utilizing rail for transport of CCR material offsite eliminates any environmental advantages, however TVA does not provide analysis of these environmental impacts in the Draft EIS. TDEC recommends TVA include analysis and feasibility of utilizing rail as an alternative to trucking in the Final EIS.	In Chapter 2.2.4 of the Programmatic PEIS, TVA conducted a thorough analysis of CCR transport by rail and determined rail to be a viable transport mode to be considered for future impoundment closures. Conclusions from that analysis apply to conditions at CUF. Site specific considerations are explored in more detail in Chapter 2.2.4 of this EIS. While CUF has rail facilities, these facilities are not configured and designed to support loading and transport of CCR offsite. Furthermore, rail facilities would have to be expanded and improved to support CCR loading operations. This expansion could result in additional environmental impacts in the vicinity of the CUF site. Additionally, rail unloading facilities are not typical near permitted landfills and are not available at the Bi-County Solid Waste Management Landfill. As such, any CCR theoretically hauled by barge or rail for landfill disposal would still entail trucking. For rail transportation, a rail carrier would be needed. Rail cars dedicated for use as CCR transport would also have to be acquired to support CCR removal operations and rail facilities would have to be expanded and improved at most facilities to support CCR loading and unloading operations. Environmental risks from discharges or releases may occur. After the KIF spill in 2008, it was determined that the effort involved in transporting by rail was labor intensive, required dedicated rail cars and was slower than anticipated. For these reasons, along with schedule constraints and volume of CCR, transporting CCR from the inactive impoundments using barge or rail was not considered reasonable, especially for impoundments having a lower volume of CCR. CCR volumes of the main ash

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			impoundment at CUF are considered to be relatively low to moderate (MAP = 1.1 million yds^3) and as such, the use of rail facilities would be relatively more impactful and not offer notable advantages relative to trucking. For these reasons, transport by rail was not considered reasonable at CUF. This additional detail has been added to Chapter 2.2.4 of the Final EIS.
20	TDEC	In the Draft EIS TVA describes the Closure-in-Place treatment method to include Closure-by-Removal of CCR material from the Main Ash Impoundment. TDEC recommends that TVA consider referring to this as a combination of Closure-in-Place and Closure-by-Removal.	TVA agrees with this comment. TVA describes the proposed closure methods in Sections 2.2.2.4, 2.3.2 and 2.3.3 of the EIS. Impoundment closures analyzed under all alternatives include Closure-in-Place and Closure-by-Removal for both the Main Ash Impoundment and the Bottom Ash Impoundment and a combination of both closure options. Impacts associated with the combination of closure methods of the Main Ash Impoundment and Stilling Impoundment would be the same for all alternatives except for the effects related to transport and storage of existing CCR removed from the impoundments..
21	SELC	This DEIS is premature because it is impossible to determine whether either of TVA's stated preferred alternatives will be adequate to comply with the terms of the TDEC Commissioner's Order No. OGC15-0177.	The DEIS is not premature, because NEPA requires TVA, a federal agency, to consider the environmental impacts of its proposed actions and any feasible alternatives to those actions before taking a major federal action. Therefore, the NEPA process must occur now for TVA to thoroughly consider impacts and alternatives and choose its preferred action to complete those actions by deadlines established under the CCR Rule. This means that the NEPA decision-making process must occur in some cases concurrently with the EIP/EAR processes under the TDEC Order. In Section VII.D.1 of Commissioner's Order OGC15-0177, TDEC recognizes that TVA may, in compliance with CCR Rule requirements, elect to close CCR surface impoundments and/or landfills before the investigative process outlined in the Order is complete. While TVA may be forced to do so to complete construction by CCR Rule closure completion dates, TVA remains dedicated to completing the site-wide investigation, comprehensive environmental assessment, and any corrective actions identified necessitated by the Commissioner's Order. If TVA must take certain actions before the Order process is complete, it recognizes that TDEC may later require TVA to take other and/or further remedial actions deemed appropriate as a result of the investigative process.
22	SELC	The DEIS is also inadequate because TVA has not selected one alternative for coal ash management and storage at CUF, but has named two preferred alternatives and/or a combination of two, as possibilities. The failure to select a remedy is inadequate.	CEQ regulation §1502.14(e) contemplates that an agency can identify more than one preferred alternative in draft NEPA documents. As stated in the Draft EIS, TVA identified two preferred alternatives, Alternative B or C. Both alternatives include the construction and operation of a Bottom Ash Dewatering Facility, construction of an onsite landfill for the storage of future CCR produced at CUF, and construction of Process Water Basins. As stated in the PEIS, TVA recognized that site specific closure decisions are also subject to discussion and consultation with state regulatory agencies. Specifically, the PEIS states "Under [the Administrative Order], TDEC may require TVA to take additional or different actions to address CCR risks at its plants. The TDEC Order and other environmental regulatory programs help ensure that CCR management activities at

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			TVA's plants will continue to be protective of human health and the environment."). Although that consultation is ongoing, it is also appropriate for TVA to make its own determination as to what alternatives are acceptable and preferable through the NEPA process. See response to Comment 11. TVA has identified closure-in-place in the Final EIS as the preferred methodology for the Bottom Ash Impoundment and the combination of Closure-by Removal and Closure-in-Place for the Main Ash Impoundment and Stilling Impoundment as this option allows for construction of the Process Water Basins. However, it is TVA's intention not to pursue these closure-in-place activities immediately, but rather to let the CUF EIP/EAR guide the closure activities in these areas to the maximum extent possible. The Notice of Availability of the Final EIS will be published in the Federal Register and the publication begins the minimum 30-day wait period. TVA will not make a final decision regarding any of the proposed actions until after the 30-day wait period has ended. See response to Comment 11.
23	SELC	TVA states that, under both Alternatives B and C, it "is considering Closure-in-Place, Closure-by-Removal, as well as a combination of Closure-in-Place and Closure-by-Removal of each of the impoundments at CUF." It is, thus, unclear which of several actions TVA will take to close the impoundments under Alternatives B and C.	TVA's preference has been identified in the Final EIS. These choices were based on site-specific conditions and are in keeping with EPA's assessment that both closure methods are equally protective provided they are conducted properly. 80 Fed. Reg. 21301, 21412. See responses to Comments 11 and 22.
24	SELC	TVA failed to fully examine the effectiveness of Closure in Place: 1. TVA states that, "At the programmatic level, TVA concluded that both closure options can be equally protective of human health and the environment, provided that they are implemented properly." Proper closure does not allow for ash to remain in the groundwater, and the programmatic EIS does not take into account that ash will be submerged in groundwater. 2. TVA's preferred alternative does not comply with the minimum requirements established by the federal Coal Ash Rule, violates the Clean Water Act, and violates TVA's permit. The DEIS thus does not meet its purpose of assuring compliance with applicable laws.	TVA disagrees with the assumptions and conclusions set forth in Comment 24. 1. TVA notes that EPA determined in the CCR Rule that "both methods of closure (i.e., clean closure and closure with waste in place) can be equally protective, provided they are conducted properly. [80 Fed. Reg. 21412 (April 17, 2015)]. As stated in the PEIS: "TVA's analyses confirm EPA's determination in the CCR Rule that Closure-in-Place and Closure-by-Removal are equally protective if done properly. Part I, Section 3.6 of the Final PEIS provides details concerning benefits to groundwater resulting from implementation of Closure-in-Place. Dewatering an impoundment and preventing infiltration of runoff and precipitation by capping the impoundment reduce the water pressure and this reduces the movement of coal ash constituents into the groundwater. Even when CCR is in contact with groundwater, dewatering and capping an impoundment should reduce contamination risks. The level of reduction would be less than if CCR is excavated and removed when it is in contact with groundwater, but it would be rare that groundwater is not improved." (TVA 2016) Closure with waste in place is protective in part because the CCR Rule provides for 30 years of post-closure care and corrective action if necessary. As stated in Section 3.6.2.2.2 of this Final EIS,

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		3. A technically thorough discussion of site-specific conditions, like underlying geology and hydrogeology, the history of construction of the dikes, and other features of the impoundment, and how they will affect issues such as releases to ground and surface water, the potential impoundment of water, and stability, is crucial to enable citizens and decision-makers to evaluate whether TVA's plan satisfies the performance standards in the Coal Ash Rule, and therefore, whether the alternative is reasonable for purposes of NEPA compliance. 4. The DEIS discusses the impact to the groundwater of a cap in very general terms for the Closure-in-Place of the Bottom Ash Impoundment, with no attempt to quantify how a cap would result in groundwater cleanup over time as compared to any other alternative. 5. This proposal will not control or minimize releases "to the maximum extent feasible," as required by the Coal Ash Rule because the waste will be left perpetually submerged in groundwater that is hydrologically connected to the nearby creek and Cumberland River. 6. TVA does not explain how it will remove the free water and pore water and stabilize remaining waste when the ash is perpetually submerged in groundwater. 7. Contrary to the requirements of the federal Coal Ash Rule, the DEIS concludes that capping a coal ash unit in place is a reasonable alternative where coal ash is buried in groundwater.	specific conditions of the ash impoundments at CUF would not be expected to change the impact analysis presented in the PEIS. 2. TVA disagrees that the preferred alternative violates the Clean Water Act or TVA's NPDES permit. TVA will consider comments received on the draft EIS and the execution of the TDEC Order when making a decision on closure methodology (Closure-in-Place, Closure-by-Removal or a combination of the two closure methods). Closure using any of these methods would comply with federal and state requirements including the CCR rule, the preamble of which states that both "clean closure and closure with waste in place can be equally protective." 80 Fed. Reg. 21412. Additionally, if the performance standards for clean closure and the performance standards for closure with waste in place can be met, the CCR Rule allows an owner or operator to determine which alternative is appropriate for their particular unit. 3. Comment noted. Geology of the area is discussed in Section 3.5 and groundwater conditions are evaluated in Section 3.6 of this EIS. 4. The EIS (Chapter 3.6.3.2.2) notes that closure-in-place would reduce risk to groundwater and improve water quality in comparison to the No Action Alternative through the reduction in water pressure by elimination of rainfall infiltration through the impoundment which reduces the migration of contaminants into groundwater. In addition, the EIS cites TVA's ongoing monitoring of similar ash management facilities at CUF which demonstrate the effectiveness of these benefits. 5. See responses to Comment 24 (Number 1 and 2) above. 6. Dewatering methods would follow standard industrial practices. Dewatering of impoundments at CUF would comply with applicable NPDES permit requirements and would sufficiently stabilize the remaining waste per CCR Rule requirements. 7. See response to Comment 24 (Number 1) above.

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25	SELC	TVA provides no explanation regarding why it is not planning to immediately close the Fly Ash Stack and the Gypsum Disposal Area. The DEIS should have analyzed a reasonable range of alternatives for clean closure and removing ash from the Fly Ash Stack and the Gypsum Disposal Area in addition to the Main Ash Impoundment and Bottom Ash Impoundment.	The gypsum disposal area and fly ash stack are currently in operation under permit number (IDL # 81-102-0086). If closure of our permitted landfill facilities is required , it will commence in compliance with the TDEC-approved closure plan, which was covered under the original NEPA document dated May of 1992, and the federal CCR Rule. If closure is required prior to exhausting all of the permitted airspace available, the current permit provides a procedure for this process.
26	SELC	TVA describes plans for construction of a new, on-site, lined landfill where it proposes to store newly-generated coal ash. Excavating legacy coal ash and disposing of the coal ash in the newly-constructed lined landfill is an alternative that should be considered in the EIS.	The gypsum disposal area and fly ash stack remain in operation under permit number (IDL # 81-102-0086). Therefore, in order to facilitate continued operations, the proposed process water basins will need to be constructed and in service to handle wastewater flows within a timeframe that meets anticipated requirements under the CCR rule. TVA proposes repurposing the Main Ash Impoundment through removal of the legacy CCR and placement on the existing fly ash stack to create the footprint needed to form the process water basins. Since the authorization needed to begin the construction of the basins is independent of the new landfill and landfill permitting process, the removal of the legacy CCR is expected to be completed well in advance of the new landfill's permitting and construction being complete. In addition, TVA sized the proposed new landfill taking into account the current and future operation of these two facilities. At current generation levels, the closure date is approximately 2040. In the event beneficial reuse via marketing continues at its current rate, the landfill closure is approximately 2100.The estimated capacity provides adequate CCR storage for long-range planning purposes. The volume of CCR to be removed from the ash impoundments at CUF that are proposed for closure in the EIS ranges from 334,000 yd^3 at the Bottom Ash Impoundment to 1.1 million yd^3 at the Main Ash Impoundment. Disposal of this material would reduce capacity of the proposed landfill by two years at CUF's current marketing rate, and as such would not meet the long-term need for ash management at CUF. Should the newly proposed landfill be permitted and constructed in a timeframe that would allow legacy CCR to be disposed of in the new landfill prior to the deadlines set by the CCR Rule, and thus is considered a feasible alternative, additional NEPA analysis will be completed to analyze that alternative.
27	SELC	TVA failed to consider that retirement of CUF would eliminate the generation of new, "dry" coal ash, and therefore eliminate the need for additional coal ash	As noted in Section 1.2 of the EIS and evaluated in the referenced IRP (2015), CUF is one of the coal plants that TVA plans to continue operating in the future as part of its balanced approach to meet future demand for electricity.

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		disposal facilities, eliminate the production of toxic bottom ash, and eliminate the need for a bottom ash dewatering facility. Ceasing to burn coal at CUF is an alternative that TVA should have evaluated and considered in the DEIS.	
28	SELC	To the extent TVA intends to construct a new on-site landfill for disposal of newly-generated coal ash, it should first consider using such a landfill for the disposal of the Plant's legacy coal ash.	Comment noted. See response to Comment 26.
29	SELC	The federal Clean Water Act, Coal Ash Rule, and state water quality and solid waste disposal laws must form the basis for determining the range of alternatives available to TVA for "long term management of CCR produced at CUF." To comply with these laws and regulations and with NEPA, TVA must prepare an EIS that discloses and analyzes the site-specific impacts, including impacts to groundwater and surface water, associated with its proposed actions and a reasonable range of alternatives.	Comment noted. TVA conducted a complete analysis of all reasonable alternatives as well as a thorough analysis of site specific impacts to all environmental resources including groundwater and surface water within the EIS
30	EPA	The EPA has rated Alternative C as a Lack of Objections. The EPA has rated Alternatives B and D as Environmental Concerns with additional information being requested for the FEIS. Based on our review of the DEIS and as indicated by the ratings, Alternative C appears to be the environmentally preferred alternative.	Comment noted.
31	EPA	The EPA recommends that TVA further identify the specific options (i.e., Closure-in-Place versus Closure-by-Removal) for its preferred alternative in the FEIS and provide the relevant environmental impacts for the components of either Alternative B or C that are ultimately selected.	TVA has identified Alternative C in the Final EIS as its preferred alternative. This alternative includes the construction and operation of a Bottom Ash Dewatering Facility and construction of an onsite landfill for the storage of future CCR produced at CUF. Upon completion of this EIS and issuance of the Record of Decision, TVA plans to construct a Bottom Ash Dewatering Facility and an onsite landfill (subject to obtaining necessary permits). In addition, to meet CCR Rule deadlines, TVA plans to begin construction of new process water basins. As explained in the EIS, the new process water basins are proposed to be located within the footprint of the Main Ash Impoundment. This activity would involve removal of the ash in the area of the proposed new process water basins. As noted in comment 11, TVA intends to complete investigative activities in this area prior to construction to align these actions with the EIP/EAR process to the extent possible. These new process water basins are necessary to provide treatment for certain plant wastewaters should the Main Ash Impoundment be triggered for closure in early 2019.

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			TVA has identified Closure-in-Place in the Final EIS as the preferred methodology for the Bottom Ash Impoundment and a combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment and Stilling Impoundment, in part because closure-in-place is the environmentally preferable alternative when large quantities of CCR are transported offsite. However, it is TVA's intention not to pursue these closure-in-place activities immediately, but rather to let the CUF EIP/EAR guide the closure activities in these areas to the maximum extent possible. The Notice of Availability of the Final EIS will be published in the Federal Register and the publication begins the minimum 30-day wait period. TVA will not make a final decision regarding any of the proposed actions until after the 30-day wait period has ended. See response to Comment 11.
32	EPA	The EPA concurs with the TVA's assessment that under Alternative D, the air emissions, noise emissions, safety risk and disruptions to the public that would be associated with the offsite transport of CCR along public roadways is the least environmentally preferred option.	Comment noted.
Air Resources			
33	TDEC	TDEC recommends TVA implement air monitoring both onsite at the TVA CCR disposal site and also at any location selected to receive CCR materials for disposal offsite. Such air monitoring would help quantify any potential particulate or dust impacts and any environmental or health exposures during the relocation process. The air monitoring to be employed should be selected based on the composition of the CCR involved and any toxicity associated with the components. At a minimum, this should include an evaluation for metals and particulates in the PM2.5 or smaller size range. It is also recommended that an air monitoring action plan be used to address any air monitoring results indicating that the National Ambient Air Quality Standards (if applicable) or other accepted exposure levels are nearing exceedance, so that proactive steps can be taken to prevent any actual exceedance or unacceptable exposures both onsite and offsite.	Under the Federal solid waste regulations at 40 CFR § 257.80, TVA has developed a fugitive dust control plan for minimizing fugitive dust emissions from CCR management activities at the Cumberland Fossil Plant. The measures identified in the plan minimize CCR dust emissions from CCR units, CCR piles, roads and other CCR management activities. Under this plan, fugitive dust is primarily controlled through the conditioning and wetting of CCR material. Additional controls, such as the construction of berms as wind breaks and the use of chemical suppressants, are utilized based on information obtained from site monitoring and citizen input received via a dedicated phone line (1-844-TVA-DUST). The fugitive dust plans along with annual reports and the results of any investigation of citizen complaints can be found at TVA's public website at https://www.tva.gov/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Cumberland#. Further, the Title V permit issued by TDEC under the Clean Air Act requires TVA to use water trucks to keep plant road and stockpiles wet to control dust from motor vehicle traffic and from wind erosion. The permit also establishes a visible emission standard applicable at all times, restricting fugitive dust from crossing the property line. This permit also requires a semi-annual evaluation of visible emissions at the property boundary to ensure compliance with the fugitive dust limits. Accordingly, TVA already has plans and measures in place to ensure fugitive dust emissions are minimized to prevent any exceedance of ambient air quality standards or other permissible exposure levels. The rigorous program in place for minimizing fugitive

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			dust and for optimizing the use of dust suppression measures ensures that environmental and human health standards are being maintained. Although the fugitive dust control program at CUF does not include air monitors, other monitoring mechanisms are in place such as periodic visible emission evaluations, site monitoring, and the investigation of any public complaints and concerns. TVA believes that these existing requirements are sufficient to protect the environment and human health.
34	TDEC	TDEC recommends that TVA develop a plan for addressing potential fugitive dust generated during removal or relocation activities. TDEC would recommend development of a site-specific detailed fugitive dust mitigation plan including any mechanisms designed to prevent "track out" on heavy truck bodies, truck under carriages or wheel assemblies as they leave the site. Possible application of dust suppressing agents or water and the use of temporary covering agents should be investigated. Reducing exposed areas of CCR to a minimum and working only on exposed areas leaving other areas covered or sealed will mitigate drying and wind erosion and transport. TDEC encourages TVA to include discussion regarding this in the Final EIS	In accordance with CCR Rule requirements, TVA has a dust control plan available on the TVA CCR website. TVA also plans to have a truck wash and wheel wash at the landfill to minimize track out from the landfill. TVA also uses water trucks for controlling fugitive dust from roads and stockpiles. The dust control efforts are also for safety reasons to ensure visibility of workers and equipment on site reducing the possibility of an accident. When possible, TVA uses construction equipment with enclosed cabs that include climate control to minimize exposure to extreme temperatures as well as minimize dust exposure. TVA routinely minimizes the amount of active work area to allow inactive areas to stay covered or sealed to minimize wind erosion. See response to Comment 33.
35	TDEC	There will likely be air quality impacts associated with a relocation project either onsite or offsite. The possible impacts are likely to be associated with the transport distances and the methods employed to minimize and mitigate fugitive dust onsite and offsite. Additional temporary emission impacts would also be expected from the on and off road vehicles and construction equipment employed. TDEC recommends the use of Best Management Practices as a method to minimize construction related emissions.	TVA uses water trucks to keep plant roads and stockpiles wet to control dust from both motor vehicle traffic and wind erosion from stockpiles. Other BMPs for dust control are implemented as needed. See response to Comment 33.
36	EPA	Emissions associated with the proposed project would have a minor impact on localized air quality. However, Closure-by-Removal emissions would be greater than Closure-in-Place. Alternative D would have the greatest emissions due to the numerous truckload required for off-site disposal. The DEIS indicated that Alternative C emission impacts are similar to Alternative B. The EPA recommends that the TVA define a timeframe for	TVA uses water trucks for controlling fugitive dust from roads and stockpiles. The dust control efforts are also for safety reasons to insure visibility of workers and equipment on site reducing the possibility of an accident. When possible, TVA uses construction equipment with enclosed cabs that include climate control to minimize exposure to extreme temperatures as well as minimize worker exposure to fugitive dust. See response to Comment 33. Temporary impacts as described in the EIS refer to construction impacts associated with emissions from vehicles and equipment as well as generation of fugitive dust. Once construction of the Bottom Ash Dewatering Facility and

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		"temporary impacts," as it relates to fugitive dusts and what mitigation measures are included in BMPs for impacts to the local workers and the environment.	impoundment closures are complete these impacts would not occur. Construction and operational localized emissions associated with the onsite landfill would occur throughout the life of the landfill.
Water Resources			
37	Marc and Sonja Schmid	The Schmid farm, south of the ash pit off of Buckeye Road, has a natural flowing spring which provides drinking water for our homeplace. We are concerned about the quality of the drinking water being contaminated from hazardous waste from run off of the ash pit. Another concern is will the ash pit restrict water flow to the spring?	The proposed landfill has been designed in accordance with current regulatory requirements. These requirements include protective measures such as liner and cover systems along with operational monitoring of surface water and groundwater. Surface water runoff from the proposed landfill will be monitored through permitted discharge points to ensure minimum water quality standards are maintained. The landfill is not anticipated to impact flow volumes from the subject spring. The landfill is being permitted for disposal of coal combustion residuals, which are not a hazardous waste.
38	James Bishop	I am interested in buying land in the Cumberland City area. In the past, I have heard comments by the Mayor and local citizens that underground contamination existed. The area in particular near the Scotts Chapel Road and vicinity and that public water had to be installed. The water wells were not safe anymore. I would like to know if contamination exists and some general locations it exists. It's my understanding studies have been conducted although TVA may not be the cause. Any information would be appreciated.	TVA is not aware of any power generation or other TVA operations that are linked to groundwater impacts that extend beyond the TVA property boundary. It is suggested that TDEC be consulted for information related to local groundwater quality.
39	SELC	The proposed action is inadequate to meet its purpose because TVA's proposed actions would not stop coal ash from being in contact with groundwater at Cumberland.	See responses to Comment 24 (Numbers 1 and 2).
40	SELC	TVA dumps mercury, selenium into the river through permitted outfalls. The proposed EIS must discuss the full extent of current and ongoing surface water pollution and the implications of that contamination for the preferred alternatives.	Effluent limitations set by TDEC are determined based on analytical data from IMP 001 and Outfall 002 at CUF, background analytical data from the Cumberland River, flow data from Outfalls at CUF and the flow in the Cumberland River. Based on reasonable potential analysis and water quality based effluent calculations (Appendices 5a and 5c of the CUF NPDES permit), discharges from the ash impoundment IMP 001 and Outfall 002 do not have a reasonable potential to cause or contribute to aquatic toxicity since projected metals concentrations are substantially below toxic concentrations. CUF's NPDES Permit requires Whole Effluent Toxicity (WET) testing from Outfall 002. None of the WET testing from June 2005 to July 2017 resulted in permit exceedances. This, further reinforces the conclusion that the discharge does not cause or contribute to aquatic toxicity. Furthermore, TVA periodically samples fish (electrofishing and gill netting) upstream and downstream of CUF in the spring, summer, and autumn with the most recent being in

No.	Name	Comment	Response
			year 2015. These studies were used to characterize the aquatic biology (See Section 3.11 of the Final EIS for the evaluation of aquatic biology). A detailed model of the current discharges (Table 4.1); the discharges expected from the bottom ash dewatering (Table 4.2); and both leachate and storm water discharges (Table 4.3, 4.4 and 4.5) from the landfill, in addition to information about other process and storm water discharges was included in the EIS Appendices Surface Water Technical Memorandum. Additionally, characterization of new process water streams would be conducted to modify the current NPDES permit or as per new permit requirements to ensure the protection of water quality.
41	SELC	TVA fails to include any analysis of how its proposed alternatives for coal ash management will impact ongoing pollution from the coal ash that is sitting below the water table and in contact with groundwater.	See responses to Comment 24 (Numbers 1 and 2). As discussed in Chapter 3.6 of the Draft EIS, TVA expects either Closure-in-Place or Closure-by-Removal would reduce groundwater contamination impacts relative to baseline (current) conditions regardless of the location of ash with respect to the water table. Additionally, as noted in TVA's response to SELC's comment on the PEIS, "Part I, Section 3.6 of the Final PEIS provides details concerning benefits to groundwater resulting from implementation of Closure-in-Place. Dewatering an impoundment and preventing infiltration of runoff and precipitation by capping the impoundment reduces the water pressure thereby reducing the movement of coal ash constituents into the groundwater. Even when CCR is in contact with groundwater, dewatering and capping an impoundment should reduce contamination risks. The level of reduction would be less than if CCR is excavated and removed when it is in in contact with groundwater, but it would be rare that groundwater is not improved." (TVA 2016) Groundwater would be monitored after closure to detect groundwater impact improvements in accordance with an approved state closure plan and CCR post-closure requirements, which would include monitoring, assessment and corrective action, if appropriate. If groundwater contamination exceeds applicable standards, additional action would be taken to address this in the future.
42	SELC	The proposed EIS must discuss the full extent of current and ongoing groundwater pollution at CUF and the implications of that contamination for the preferred alternative. TVA fails to discuss the implications of the groundwater contamination reported in its own studies. TVA's groundwater monitoring reports from 2003-2013 found exceedances of boron, iron, manganese, molybdenum, chloride, sulfate, and total dissolved solids (TDS) in at least one test well location. On September 8, 2017, TVA issued a "Groundwater Assessment Monitoring Report Submittal for July 2017 Sampling Event." The 2017 report states that, "Sampling events	TVA submitted a minor modification to its existing landfill permit to include parameters from Appendix III and IV of the CCR Rule on 10/7/16 and TDEC approved this modification on 11/10/16. Upper prediction limits have not yet been established for these constituents under the landfill groundwater program. Future environmental impacts associated with existing landfill operations are outside the scope of this EIS. Any potential impacts from CCR units will be evaluated and investigated under the assessment monitoring program in TDEC solid waste regulations, the TDEC Order, and/or the CCR Rule as applicable. As noted in Chapter 3.6.2.2 of the Draft EIS specific conditions of the ash impoundments at CUF would not be expected to change the impact analysis presented in the PEIS. In the preamble to the CCR Rule, EPA determined that either Closure-in-Place or Closure-by-Removal can be equally protective of human health and the environment if done properly (80 FR 21412). Impacts

No.	Name	Comment	Response
		since October 2016 have exhibited exceedances of arsenic, which is the only parameter to exhibit GWPS exceedances since July 2001." The report fails to take into account detections of boron, sulfate and TDS.	from ash impoundment closure at CUF are therefore expected to be positive as described in the responses to Comment 24.
43	SELC	Under Alternative B, TVA proposed to move the ash that is excavated from the Main Ash Impoundment and the Stilling Impoundment to "An existing onsite landfill (Fly Ash Stack) or an existing commercial offsite landfill." TVA failed to consider the effectiveness of storing coal ash in the fly ash stack. The Fly Ash Stack is a former surface impoundment that contains ash submerged in groundwater and is polluting groundwater and surface water. TVA did not consider this when determining that Alternative B was its preference for closing the Main Ash Impoundment and the Stilling Impoundment, and this alternative will not meet the requirements of the Clean Water Act, the Coal Ash Rule, or state law.	Under current operations, dried bottom ash and fly ash are stacked in the Fly Ash Stack, and gypsum that is not conveyed to the adjacent wall-board manufacturer is disposed in the Gypsum Stack. Both of these facilities are permitted to receive these materials. TVA complies with all conditions outlined in the existing approved permits for these facilities.
44	SELC	The DEIS does not properly analyze the potential groundwater impacts of using the new proposed on-site landfill for coal ash disposal.	Potential direct and indirect groundwater impacts associated with the proposed new landfill are sufficiently evaluated in Chapter 3.6.3.2.3.
45	SELC	The DEIS must analyze whether the newly-designed landfill will meet the siting requirements of the TN Solid Waste Disposal Rule prohibiting landfills from being constructed over a groundwater flow conduit system that would cause degradation of the groundwater.	The landfill would meet siting requirements of TDEC Chapter 0400-11-01. The construction and operation of the facility would be in accordance with the TDEC issued permit. Site characterization results have not identified any potential for conduit groundwater flow.
46	SELC	TN Solid Waste Disposal Rule 0400-01-.04(3)(a) requires landfills be located and constructed "200 feet from the normal boundaries of springs, streams, lakes (except that this standard shall not apply to any wet weather conveyance nor to bodies of water constructed and designed to be part of the facility)." The DEIS concludes that the new landfill will meet this minimum 200-foot setback, but the DEIS also states that construction will result in filling and/or culverting 3,573 feet of perennial stream and 1,211 feet of intermittent stream. These streams do not fall within the exception to the set-back requirement.	Comment noted. The landfill would meet at all siting requirements of TDEC Chapter 0400-11-01. The construction and operation of the facility would be in accordance with the TDEC issued permit. Mitigation for the loss of streams will be permitted in accordance with TDEC's Aquatic Resource Alteration Permit (ARAP)/Section 401 Water Quality Certification and a U.S. Army Corps of Engineers Clean Water Act Section 404 Permit.
47	TDEC	TDEC is concerned that the proposed modifications to the impoundments do not align with actions required for	See responses to Comments 11 and 21. TVA will endeavor to schedule proposed actions to align them with the EIP/EAR process and schedule in order to reduce their "at

No.	Name	Comment	Response
		CCR "at risk" problem areas or issues per the TDEC Order, and that pursuing the proposed modifications to the impoundments could hinder further investigation required for the completion of the Environmental Assessment Report (EAR) for the facility as a part of the TDEC Order. TVA does state in the Draft EIS that it will implement supplemental groundwater mitigation measures that could include monitoring, assessment, or corrective action programs as mandated by state and federal requirements. However, TDEC recommends that TVA provide discussion as to how timing for the proposed actions in the Draft EIS will relate with the completion of the CUF EAR as described in the Order.	risk" nature under the TDEC Order. TVA will endeavor to first perform investigative actions under the Order in areas where temporary or permanent infrastructure is installed for CCR Rule compliance before installing said infrastructure.
48	TDEC	The Draft EIS also notes stormwater discharge permits and outfalls for the proposed onsite landfill that would go to either Wells Creek or Scott Branch. Scott Branch is a zero flow stream, which prompts questions as to whether a stormwater discharge from the proposed landfill could be permitted to that stream. The use of the wastewater treatment additives in the clarifying tanks during dewatering operations would also have to be addressed and approved by TDEC in the NPDES permitting process. TDEC recommends that TVA address these considerations in the Final EIS.	Currently, TVA is working on a treatability study to better evaluate the stormwater flows and concentrations expected from these discharges and the type of water treatment that could be employed. Based on the study, TVA would propose the needed treatment to ensure water quality to Scott Branch/Wells Creek or would reroute flows to another outfall. All chemicals proposed to be used as part of treatment would be approved by TVA's internal aquatic toxicologist and TVA would seek approval by TDEC prior to use of chemicals.
49	TDEC	TDEC recommends that TVA consider remediation methodology of areas Closed-By-Removal where excavated CCR is found to be below the groundwater table in the Final EIS. Similarly, TDEC recommends that TVA further discuss removal of pore water in the event that CCR material exists below the groundwater table in the Final EIS.	Comment noted.
50	EPA	On page 82 of the DEIS, it states that natural groundwater quality would eventually be reestablished. Statements in this section would seem to suggest that the groundwater has been impacted, but not yet at actionable levels. This would seem to preclude a scenario where the CCR material is closed-in-place as some adverse impact to groundwater may have already occurred.	TVA notes that, under the CCR Rule, the presence of groundwater impacts does not foreclose the application of a closure-in-place methodology. EPA determined in the CCR Rule that "both methods of closure (i.e., clean closure and closure with waste in place) can be equally protective, provided they are conducted properly. [80 Fed. Reg. 21412 (April 17, 2015)]. Closure with waste in place is protective in part because the CCR Rule provides for thirty years of post-closure care and corrective action if necessary to address any groundwater impacts which may have occurred.

No.	Name	Comment	Response
			As noted in the Programmatic EIS and Section 3.6.2.2 in this Draft EIS, under the Closure-in-Place option, a cover system with an approved closure system over the compacted CCR not only prevents additional infiltration from precipitation, but also would facilitate management of stormwater runoff thus reducing the potential for migration of leachate to groundwater beneath the impoundment and receiving surface waters.
51	EPA	Based upon the review of the TVA's Groundwater Assessment Monitoring Report of July 2015, the EPA understand there may have been past contamination issues related to Wells Creek (which also leads to the Cumberland River) and associated with the unlined CCR impoundment and the contact of the waste with groundwater.	In compliance with the TDEC Order, TVA has committed to determine if CCR is being or has historically been released into Wells Creek, its tributaries, or the Cumberland River. The findings from this investigation will be assessed and corrected as required by the Order and the CCR Rule.
52	EPA	To eliminate any potential future issues of groundwater contamination, the EPA recommends that the existing CCR should be removed, stabilized and placed in a dry landfill under Alternative C consistent with the CCR rules.	EPA's preference for closure-by-removal under Alternative C is noted. TVA's preferred alternative in the Final EIS is a combination of Closure-in-Place and Closure-by-Removal of the Main Ash Impoundment and Stilling Impoundment and Closure-in-Place of the Bottom Ash Impoundment. With respect to the Main Ash Impoundment, this closure methodology includes closure-by-removal of a large portion of the Main Ash Impoundment associated with construction of the new process water basins. These choices were arrived at after a careful evaluation of the specific conditions at each site and are consistent with EPA's preamble to the CCR Rule which states that both closure methods are equally protective provided they are conducted properly. 80 Fed. Reg. 21301, 21412. See response to Comment 50.
53	EPA	We recommend that any remaining contamination of groundwater from CCR storage in the existing impoundment should be identified, monitored and remediated in accordance with applicable TDEC requirements.	The CCR Rule relies on the post-closure care groundwater monitoring and corrective action program to address potential releases to groundwater from units that are closed-in-place. Should groundwater monitoring required under applicable law demonstrate that groundwater has been contaminated, such contamination would be remediated in accordance with applicable legal requirements, including the CCR Rule, TDEC solid waste regulations, and the TDEC Order, as applicable.
Solid Waste Management			
54	SELC	The DEIS fails to include meaningful, site-specific analysis of the feasibility of recycling.	TVA pursues beneficial reuse whenever feasible and gypsum produced at CUF is used to manufacture wallboard at an adjacent manufacturing plant. TVA has an active marketing program to identify opportunities for the beneficial use of CCR. TVA recycles about 75 percent of its coal ash produced at CUF for beneficial reuse annually.

No.	Name	Comment	Response
55	TDEC	TDEC recommends the Final EIS clarify whether the Fly Ash Stack and Gypsum Disposal Complex will be used for storage of future CCR produced at CUF. Additionally, TDEC recommends that the Final EIS address how TVA plans to handle the storage of future CCR produced at CUF during the interim period prior to which an onsite landfill for future CCR is permitted and constructed.	See response to Comment 26 and 28. TVA will continue to dispose of CCR produced at CUF on the existing dry Fly Ash Stack and dry Gypsum Disposal Complex in accordance with its current permit (IDL # 81-102-0086) until capacity is reached or closure commences.
56	TDEC	TDEC encourages TVA to clarify in the Final EIS whether a separate NEPA process will be required if the Fly Ash Stack and Gypsum Disposal Complex needs to close (either Closure-in-Place, Closure-by-Removal or a combination of Closure-in-Place and Closure-by-Removal) prior to exhausting all of the permitted airspace available in the existing permitted landfill. Additionally, TDEC recommends that the Final EIS address whether TVA will issue a revised or new EIS if the Fly Ash Stack and Gypsum Disposal Complex is required to close (either Closure-in-Place, Closure-by-Removal or a combination of Closure-in-Place and Closure-by-Removal) prior to completion of the Closure By-Removal as described in Alternative C.	See response to Comment 25. If closure of TVA's permitted landfill facilities is required, closure would commence in compliance with Tennessee's Rules at Chapter 0400-11-01 and the closure/post-closure care plan approved by TDEC and incorporated into the permits for these areas. If closure is required prior to exhausting all of the permitted airspace available at CUF, the current permit provides a procedure for this process. If closure significantly deviates from the closure plan in the existing permit and cannot be completed in accordance with TN Rules for modification of the permit, additional NEPA analysis will be performed as appropriate. If closure were required prior to completion of the closure-by-removal actions identified under Alternative C, TVA would reevaluate the offsite disposal method and either complete additional NEPA analysis, or issue a new Record of Decision, if necessary.
57	TDEC	The Draft EIS raises concerns about the impact Closure-by-Removal only for CCR material in the Bottom Ash Impoundment would have on the support and slope stability of the Fly Ash Stack and Gypsum Disposal Complex. TDEC encourages TVA to evaluate the feasibility of removal and regrading of material in the Fly Ash Stack and Gypsum Disposal Complex in order to satisfy stability requirements under a Closure-by-Removal treatment in the Final EIS.	Evaluation of structural integrity of adjacent units and mitigation was considered in the EIS. The EIS documents significant cost impacts and marginal benefits associated with the closure by removal scenarios.
58	TDEC	TDEC encourages TVA to provide clarification in the Final EIS for Alternative B Closure-In-Place regarding whether the CCR removed to support the process water basins is expected to be directed to the Fly Ash Stack or to an offsite landfill.	TVA has identified Alternative C as its preferred alternative in the Final EIS, with a closure methodology of a combination of Closure-in-Place of the Main Ash Impoundment. CCR removed from the Main Ash Impoundment to support construction of the process water basin would be directed to the existing Fly Ash Stack. Under Alternative B, all CCR removed from the impoundments would be transported offsite. This has been clarified in the FEIS.

No.	Name	Comment	Response
59	TDEC	Alternatives direct additional waste from the Closure-in-Place and Closure-by-Removal options to the Fly Ash Stack, which is not lined. This site is currently in groundwater assessment monitoring. TDEC recommends that TVA include discussion regarding groundwater assessment and impacts of directing additional CCR material to the Fly Ash Stack for disposal in the Final EIS.	The groundwater monitoring system established under the existing permit for the Dry Fly Ash Stack includes the parameters associated with CCR including, but not limited to Appendix III and IV from the CCR Rule. The addition of dewatered CCR from the Main Ash Impoundment is consistent with the current conditions in which the Dry Fly Ash Stack operates. The assessment monitoring of this unit will not be impacted by the additional waste in the selected alternative. Permitted additional capacity remains on the Dry Fly Ash Stack and TVA will continue to operate until capacity is reached or closure commences.
60	TDEC	TDEC encourages design and operation of the proposed onsite landfill such that it will reduce the stated maximum peak leachate flow of 1.12 million gallons per day, and recommends that TVA include a description of efforts to reduce maximum peak leachate flow in the Final EIS.	The landfill has been designed to be constructed in stages and with multiple design and operational controls to reduce the amount of leachate that would be generated. In addition to the staged design, and associated surface water controls, operational measures including maintaining working face positive drainage and application of cover materials would also contribute to reducing leachate production.
61	TDEC	TDEC encourages the amount of CCR exposed to be restricted to 10 acres or less for ammonia loads and maximum peak leachate flow calculations. It is recommended that this be addressed in the Final EIS.	Comment noted. This is addressed in the appendices of the document in the Surface Water Technical Memorandum, pages 20 (Section 4.2.5.1), 28 and 29.
62	TDEC	Leachate and stormwater discharge sampling locations are anticipated to be included in the proposed landfill permit and will require testing for all Appendix III and IV constituents identified in the CCR Rule. This should be considered as Option 1 under Alternatives B, C and D is evaluated in the future and it is recommended that this be included in the Final EIS.	Comment noted. These wastewater streams will be characterized and monitored as required per Solid Waste and NPDES permits.
63	EPA	The DEIS indicates that there will be a loss of capacity from the Fly Ash Stack under the Closure-in-Place option. The EPA recommends that TVA provide additional information on the minor impact associated with the “loss of capacity” from the Fly Ash stack under the Closure-in-Place option. Furthermore, please clarify in the FEIS when the TVA expects to reach capacity and seek to transport Fly Ash off-site under a Closure-by-Removal option.	As stated in Section 3.14, the loss of capacity associated with storage of existing CCR from the impoundments under both closure options would be minor as future CCR generated at CUF would be disposed of in the proposed onsite landfill. Also, as stated in Section 3.14, TVA has determined that adequate capacity is available in the existing Fly Ash Stack to also manage the placement of existing CCR and would not transport existing CCR offsite under the preferred alternative.
64	EPA	Beneficial reuse is considered by TVA as part of all ash management activities. The DEIS states that TVA would identify opportunities for beneficial use of CCR. The EPA recommends that TVA continue to identify opportunities for beneficial use of CCR ash management.	Comment noted.

No.	Name	Comment	Response
Geology			
65	SELC	Although the DEIS says that "Karst features are not known to existing within the proposed landfill footprint," TVA does not conclude that karst is not present there and does not describe any investigation of that area that could lead to that conclusion. Newer studies should be conducted to determine the extent of karst and fractured, conduit-prone limestone below the proposed landfill.	The landfill site has been fully characterized through geotechnical, geologic and hydrogeologic field investigations and subsequent evaluations as submitted in the Hydrogeological Report of the landfill application. None of these investigations and evaluations have indicated karst activity or the potential for karst activity at that location.
66	SELC	The DEIS also recognizes that there are "Ancient joints, fractures, faults, and contacts between rock types that influence the bedrock groundwater flow system at CUF." Further, "At many locations, dissolution of the limestone has produced effective openings for groundwater movement in the bedrock." The DEIS notes that, "there might be some correlation between the locations of fault zones and preferential movement of groundwater at the site along these features." TVA does not analyze this issue further.	TVA is conducting additional analysis of groundwater flow in bedrock within the vicinity of the existing CCR units per the TDEC Order. It is not anticipated that the results of these studies will change the core conclusion that the existing groundwater monitoring systems adequately protect human health and the environment through early detection of any related groundwater impacts.
67	TDEC	The proposed onsite landfill is close to the outcrop of the Chattanooga Shale. Although the Chattanooga Shale was not delineated on the geologic map in Tennessee Geologic Survey Bulletin 68 "Geology of the Wells Creek Structure, Tennessee", it was described as 15 to 58 feet thick, grayish-black, fissile, and pyritic, at the base of the Mfp geologic map unit. Construction of the landfill with excavations may expose the Chattanooga Shale which could pose the possibility of acid rock drainage. Some type of mitigation may need to be considered, either encapsulation or acid runoff treatment, in case the black shale is encountered during the construction of the onsite landfill. TDEC recommends TVA discuss these considerations in the Final EIS.	Due to the relatively deep bedrock site-specific conditions there would be no bedrock excavation during construction or operation of the landfill. Boring logs from borings advanced as part of the landfill permit application to the State of Tennessee do not indicate that encountering bedrock during construction is likely.
68	TDEC	It should be noted that TVA may choose to pursue CCR impoundment closure-in-place at any of its Fossil Plants. However, should TVA begin CCR surface impoundment closures at any of its Tennessee Fossil Plants and TDEC subsequently determines based on soil, surface water, ground water and/or geologic instability that closure in place is not protective of public health and/or the	Comment noted.

No.	Name	Comment	Response
		environment, then TDEC shall, in accordance with the Commissioner's Order, require TVA to commence appropriate corrective action including removal of CCR surface impoundments where TVA has begun or completed closure-in-place. Further, it should be noted that Tennessee Code Annotated Section 68-211-106(j) may require a permit or other approval from TDEC for the disposal or use of coal ash.	
Natural Resources			
69	United States Department of the Interior	If the TVA chooses to proceed with the preferred alternative, which would require tree removal, we recommend further consultation to address concerns regarding habitat loss of the Indiana bat and northern long-eared bat.	Programmatic Endangered Species Act (ESA) Section 7 Consultation with USFWS is underway regarding potential impacts to the federally listed gray bat, Indiana bat and northern long-eared bat from a variety of TVA activities (including development of CCR storage facilities). Based on the absence of hibernacula and documented roost sites within the project footprint, potential effects to these species are limited to alteration of foraging habitat. TVA will incorporate appropriate avoidance and minimization measures identified during this consultation into project execution.

Appendix C – Conceptual Project Plans

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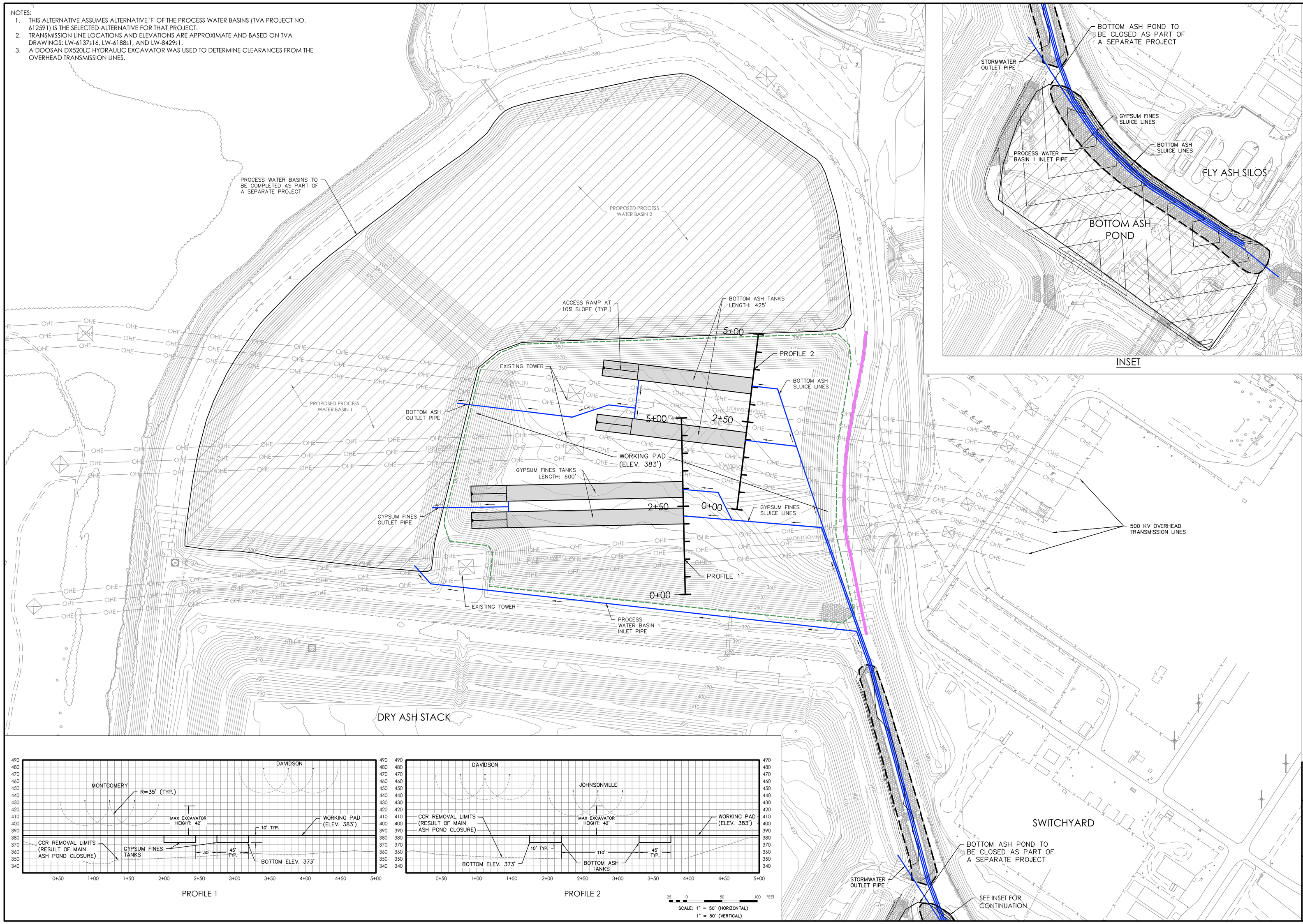
NOTES:
1. THIS ALTERNATIVE ASSUMES ALTERNATIVE 'F' OF THE PROCESS WATER BASINS (TVA PROJECT NO. 612591) IS THE SELECTED ALTERNATIVE FOR THAT PROJECT.
2. TRANSMISSION LINE LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND BASED ON TVA DRAWINGS: LW-6137s16, LW-6188s1, AND LW-842951.
3. A DOOSAN DX520LC HYDRAULIC EXCAVATOR WAS USED TO DETERMINE CLEARANCES FROM THE OVERHEAD TRANSMISSION LINES.



LEGEND

- LINER BOUNDARY
- ACCESS ROAD
- —xxx— PROPOSED GROUNDLINE CONTOUR
- —xxx— EXISTING GROUNDLINE CONTOUR

50 0 100 200 FEET
GRAPHIC SCALE: 1" = 100'
CONTOUR INTERVAL = 2 FEET

CUMBERLAND FOSSIL PLANT

BOTTOM ASH AND GYPSUM TANKS: PHASE 1 ALTERNATIVE B: TANKS UNDER TRANSMISSION LINES IN EAST-WEST DIRECTION

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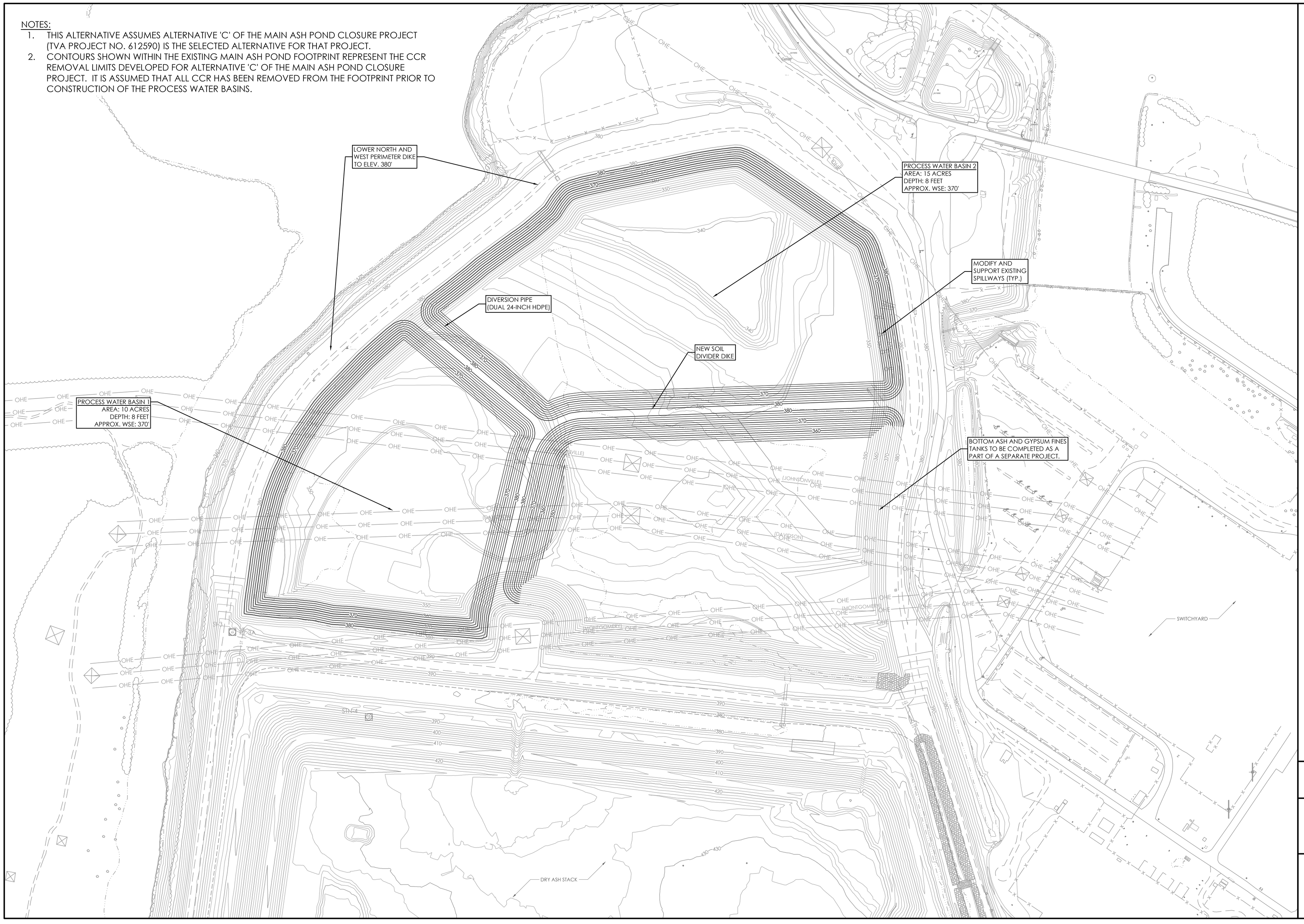
CUMBERLAND FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

SEPTEMBER, 2017

NOTES:

1. THIS ALTERNATIVE ASSUMES ALTERNATIVE 'C' OF THE MAIN ASH POND CLOSURE PROJECT (TVA PROJECT NO. 612590) IS THE SELECTED ALTERNATIVE FOR THAT PROJECT.
2. CONTOURS SHOWN WITHIN THE EXISTING MAIN ASH POND FOOTPRINT REPRESENT THE CCR REMOVAL LIMITS DEVELOPED FOR ALTERNATIVE 'C' OF THE MAIN ASH POND CLOSURE PROJECT. IT IS ASSUMED THAT ALL CCR HAS BEEN REMOVED FROM THE FOOTPRINT PRIOR TO CONSTRUCTION OF THE PROCESS WATER BASINS.



50 0 100 200 FEET

GRAPHIC SCALE: 1" = 100'
CONTOUR INTERVAL = 2 FEET

CUMBERLAND FOSSIL PLANT

PROCESS WATER BASINS CONFIGURATION: PHASE 1 ALTERNATIVE F - STAGE 2

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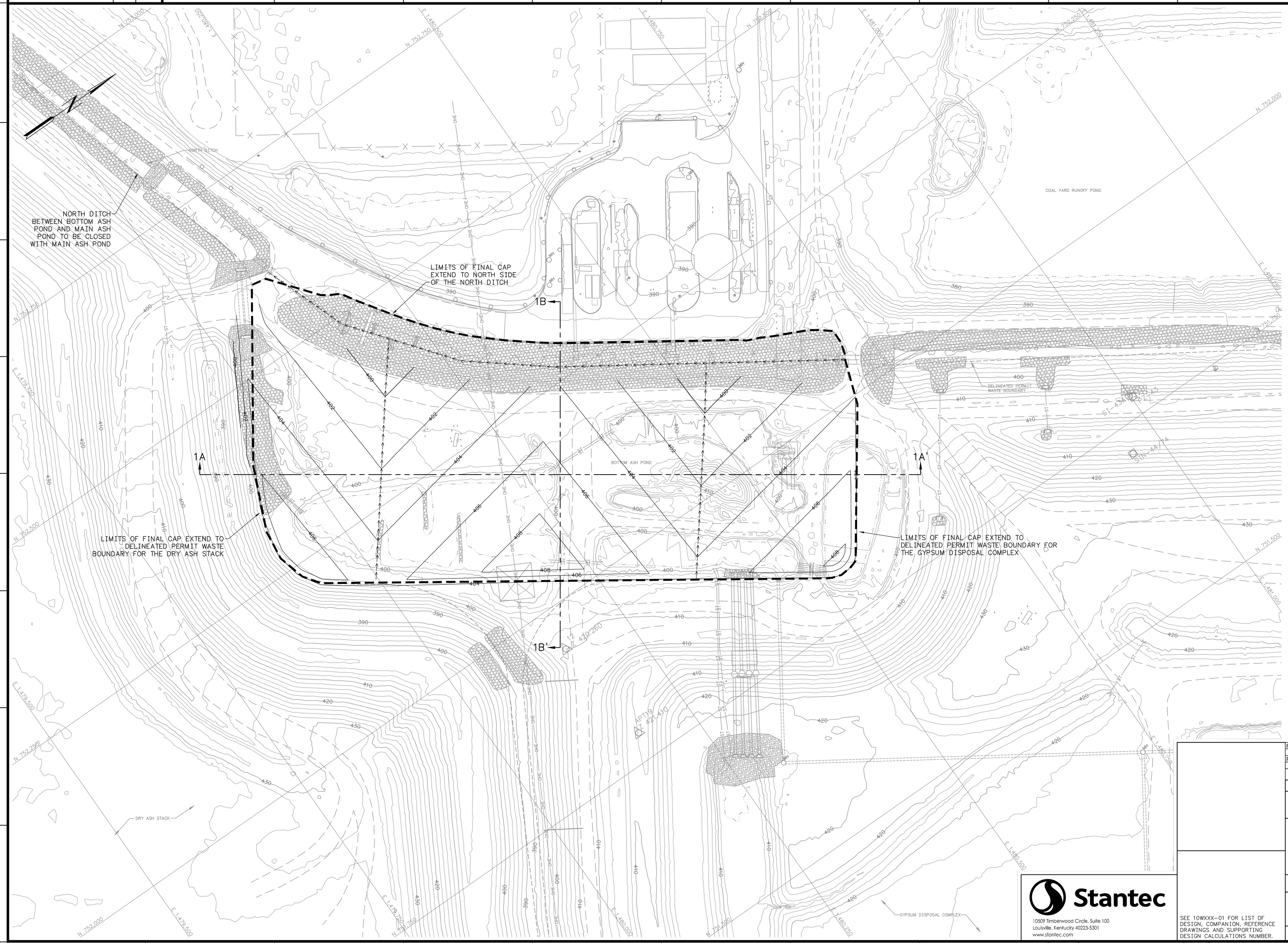
SEPTEMBER, 2017



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.

NOTES:

THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING SERVICES, INC. (STANTEC) USING SURVEY INFORMATION FROM AERIAL, GROUND AND HYDROGRAPHIC SURVEYS PROVIDED BY TVA FROM APRIL 2011 THROUGH JULY 2015.

LEGEND

- LIMITS OF FINAL CAP CLOSURE
- DRAINAGE DITCH
- 380 INDEX CONTOUR
- 382 INTERMEDIATE CONTOUR
- 380 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR

10□ CONCEPTUAL PLAN
ISSUED FOR REVIE□
NOT FOR CONSTRUCTION

25 0 50 100 FEET
GRAPHIC SCALE: 1" = 50'
CONTOUR INTERVAL = 2 FEET

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R A	01/27/17	BGB	RRP	NAB	NAB	DGS	MST	JCK	610867	–	–
ISSUED FOR REVIEW											

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1"=50' EXCEPT AS NOTED

YARD
BOTTOM ASH POND

FACILITY CLOSURE CONCEPT GRADING PLAN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
B.G. BLAKELY	R.R. PETTY	N.A. BADER	N.A. BADER	D.G. STEPHENS	M.S. TURNBOW	J.C. KAMMEYER

CUMBERLAND FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2013 | DATE 01/27/17 | 46 | C | 10WXXX-03 | R A

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SEE 10WXXX-01 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

46 C 10WXXX-03

Legend

- Closure Boundary
- Wall

DEPTH TABLE				
NUMBER	MIN. DEPTH	MAX. DEPTH	AREA	COLOR
1	−60.00	−50.00	72.27	
2	−50.00	−40.00	61,351.77	
3	−40.00	−30.00	163,652.01	
4	−30.00	−20.00	107,229.51	
5	−20.00	−10.00	22,739.04	
6	−10.00	0.00	0.00	

BAP VOLUMES (ASH REMOVAL)

CUT:	333,100 CU. YD.
FILL:	0 CU. YD.
NET:	333,100 CU. YD. (CUT)

BAP VOLUMES (GRADE AT 2%)

CUT:	11,600 CU. YD.
FILL:	10,700 CU. YD.

25 0 50 100 FEET

GRAPHIC SCALE: 1" = 50'
CONTOUR INTERVAL = 2 FEET

CUMBERLAND FOSSIL PLANT

BOTTOM ASH POND
ALTERNATIVE C: CLOSURE-BY-REMOVAL

Stantec
10509 Timberwood Circle, Suite 100
Louisville, Kentucky 40223-5301
www.stantec.com

CUMBERLAND FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUGUST 2, 2016

SURVEY CONTROL NOTE:

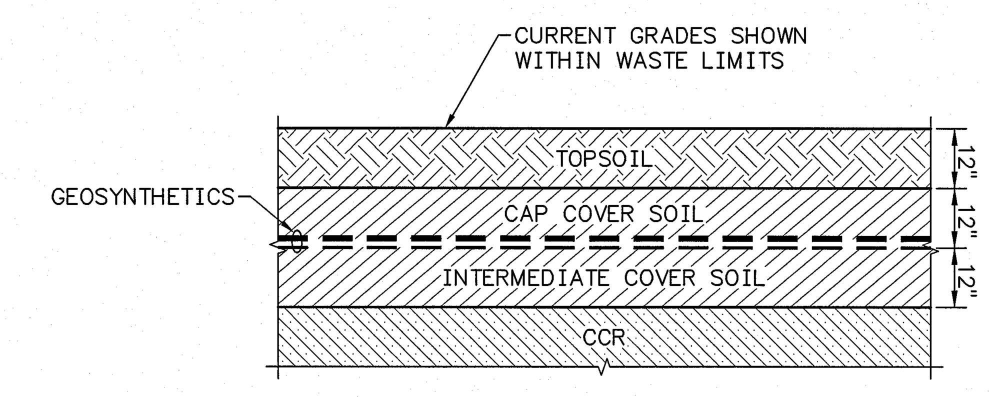
A GLOBAL POSITIONING SYSTEM (GPS) BASE STATION HAS BEEN ESTABLISHED AND TRANSFORMATION PARAMETERS DETERMINED BY TVA USING SELECTED SURVEY CONTROL MONUMENTS. CONTACT WITH TVA SURVEYING DEPARTMENT (423)751-8416 OR (423)751-2571 SHALL BE MADE BEFORE ANY SURVEY OR CONSTRUCTION WORK IS COMMENCED. BASE STATION 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.

NOTE:

TOPOGRAPHIC MAPPING WAS OBTAINED FROM AN AERIAL SURVEY PERFORMED BY TUCK MAPPING SOLUTIONS, INC. IN DECEMBER, 2010 AND SUPPLEMENTED WITH A FIELD RUN SURVEY PERFORMED BY THE R.L.S. GROUP LAND SURVEYING WITHIN THE ANTICIPATED LANDFILL FOOTPRINT IN MARCH, 2016. THE COORDINATE SYSTEM IS BASED ON TENNESSEE STATE PLANE NAD 27 HORIZONTAL DATUM AND NGVD 29 VERTICAL DATUM.

LEGEND

- UTILITY POLE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- STREAM
- OVERHEAD ELECTRIC LINE
- FENCE
- TREELINE
- TVA PROPERTY LINE
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- WASTE LIMITS



ALTERNATE CAP SYSTEM

PERMIT DRAWING
100% SUBMITTAL
ISSUED FOR REVIEW

GRAPHIC SCALE: 1"=100'
CONTOUR INTERVAL = 2 FEET

SECTION OR DETAIL NO.
DRAWING WHERE SHOWN
REFERENCE KEY

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Lexington, Kentucky 40511-2024
www.stantec.com

SEE 10WXXX-01 FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R –	–	–	–	–	–	–	–	–	–	–
R A	02/28/17	JDK	TJ	RJM	JAS	DGS	MST	JCK	–	–

ISSUED FOR REVIEW

SCALE: 1"=100' EXCEPT AS NOTED

YARD
–

CCR LANDFILL
FINAL GRADING PLAN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
J.D. KOPP	T. JOHNSON	R.J. MAZZONI	J.A. SPARKMAN	D.G. STEPHENS	M.S. TURNBOW	J.C. KAMMEYER

CUMBERLAND FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2013 | DATE 02/28/17 | 46 | C | 10WXXX-17 | R A

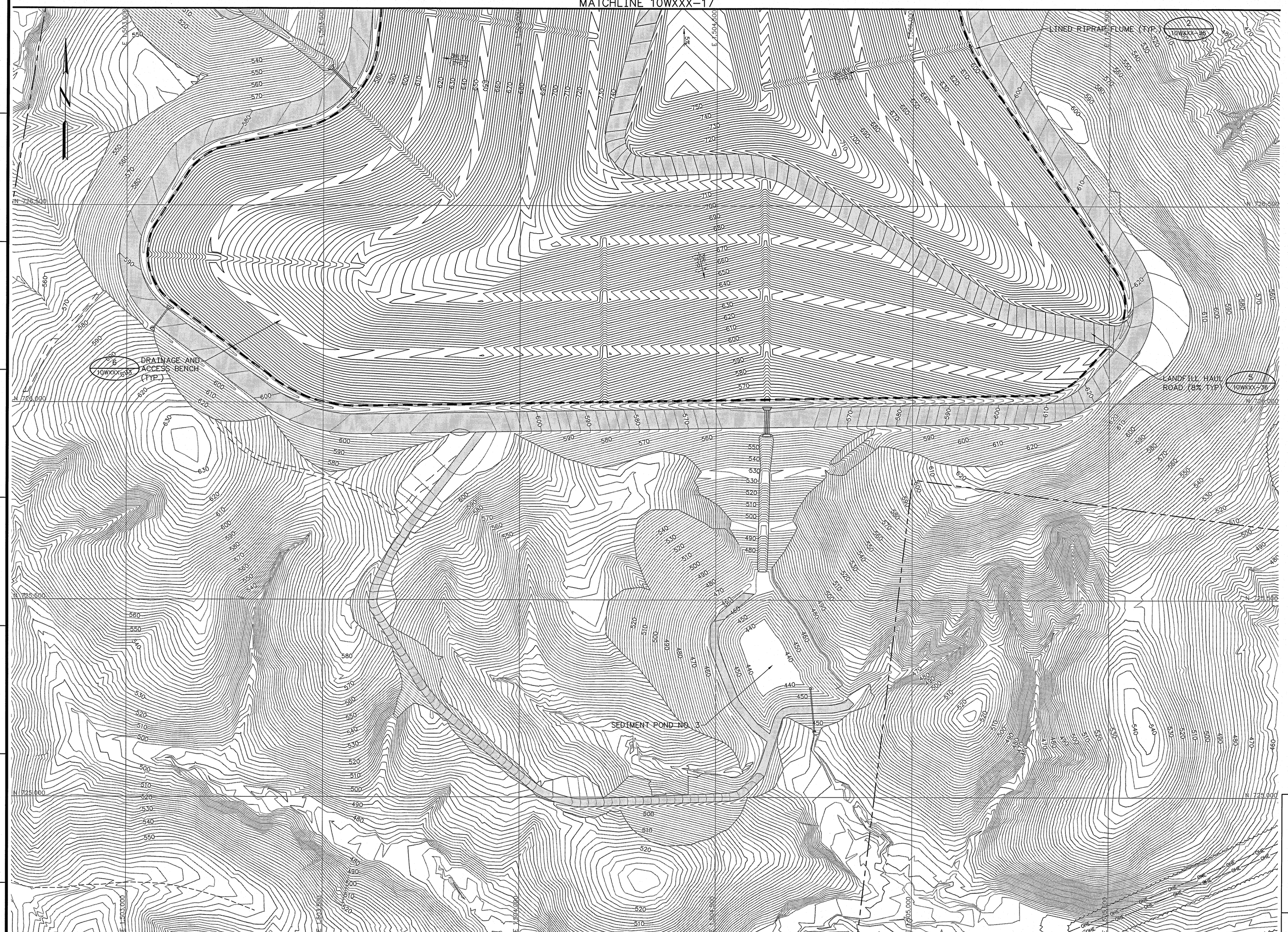
STANTEC | A
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:1
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

46 | C | 10WXXX-17

MATCHLINE 10WXXX-17



GRAPHIC SCALE: 1" = 100'
CONTOUR INTERVAL = 2 FEET

SECTION OR DETAIL NO.
DRAWING WHERE SHOWN
REFERENCE KEY

SURVEY CONTROL NOTE:

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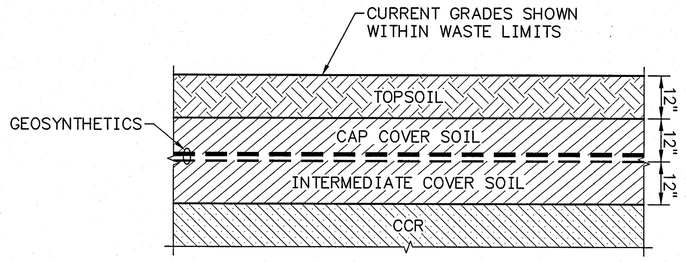
LEGEND

- UTILITY POLE
- 600 — INDEX CONTOUR
- INTERMEDIATE CONTOUR
- STREAM
- OHE — OVERHEAD ELECTRIC LINE
- X — FENCE
- TREELINE
- TVA PROPERTY LINE
- 600 — PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- WASTE LIMITS



ALTERNATE CAP SYSTEM

PERMIT DRAWING
100% SUBMITTAL
ISSUED FOR REVIEW

PLOT DATE: 03/20/2017 USER: ELDING, BENJIE
V:\175150008\ENV\ENVIRONMENTAL\DRAWING\SHEET_FILES\CAP23\REV0\REMITTAL\CAP_SUBMITTAL\16-17_185008-100-FP01.DWG

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1409 North Forbes Road
Lexington, Kentucky 40511-2024
www.stantec.com

SEE 10WXXX-01 FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
–											
R A	02/28/17	JDK	TJ	RJM	JAS	DGS	MST	JCK	–	–	–
ISSUED FOR REVIEW											

DISCIPLINE INTERFACE

SCALE: 1"=100' EXCEPT AS NOTED

YARD
–

CCR LANDFILL
FINAL GRADING PLAN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
J.D. KOPP	T. JOHNSON	R.J. MAZZONI	J.A. SPARKMAN	D.G. STEPHENS	M.S. TURNBOW	J.C. KAMMEYER

CUMBERLAND FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2013 | DATE 02/28/17 | 46 | C | 10WXXX-16 | R A

PLOT FACTOR:1
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

STANTEC	A
TASK COMPLETED BY:	REV NO.

Appendix D – Technical Memorandum – Surface Water

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TVA Project Technical Memorandum

Project Name:	**Cumberland CCR Impoundment Closure EIS**
Project Number:	**325216056**
Date:	**October 8, 2017, updated March 3, 2018**
To:	**Anita Masters**
Subject:	**NEPA Surface Water**
Prepared by:	A.C. Williams and C.L. McEntyre

1.0 Introduction/Project Description

TVA is proposing to change the way that coal combustion residuals (CCR) are managed at the Cumberland Fossil Plant (CUF) located in Stewart County, Tennessee. CCRs at CUF are byproducts produced from burning coal and include fly ash, hydrated lime, bottom ash, and flue gas desulfurization (FGD) materials. Currently, CCR generated by the operating units at CUF are managed by:

- sluicing bottom ash to the existing bottom ash pond,
- conveying dry fly ash to the dry ash stacking area, and
- sluicing FGD to the gypsum disposal complex area.

These CCR materials together with coal yard runoff, sumps, chemical and non-chemical metal cleaning wastewaters, and some yard drainage are discharged to the existing main ash pond. This main ash pond discharges to an existing stilling pond which discharges through National Pollutant Discharge Elimination System (NPDES) Internal Monitoring Point (IMP) 001 to the CUF condenser cooling water (CCW) channel. The CCW discharges through Outfall 002 to the Cumberland River at Cumberland River mile (CRM) 103. TVA intends to transition from a wet bottom ash disposal system to a dry bottom ash disposal system as part of a new agency-wide directive. Therefore, TVA has proposed the following projects at CUF:

- construct and operate a new bottom ash dewatering facility,
- closure of the existing main ash impoundment and stilling impoundment, either by closure in-place or by removal;
- construct and operate a new special waste landfill for future ash or haul future ash to an existing offsite landfill.

On April 17, 2015, the EPA established national criteria and schedules for the management and closure of CCR facilities (80 Federal Register 21302) (herein referred to as the CCR Rule).

This Surface Water Technical Memorandum is in support of the preparation of an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA), to analyze the potential environmental impacts associated with the implementation of these new CCR management operations at CUF.

Figure -1. Location of Existing CCR Facilities

The areas within the existing plant footprint are bordered to the south and west by Wells Creek and to the north by the Cumberland River. The areas have been previously disturbed and remain an active part of the CUF facility.

The new areas located outside of the existing plant facility to the south and southwest consist of a mixture of land uses. The proposed Landfill Area is completely wooded while the proposed Borrow Area consists largely of pasture with wooded fence lines and drainage corridors. The proposed Access Route consists of an existing farm road that leads to an existing bridge structure over Wells Creek. Drainage on the property flows generally north and west to Wells Creek and Scott Branch.

2.0 Methods and Assumptions

2.1 Methods

Surface water NEPA evaluations follow the NEPA methodology of: (a) describing and assessing the existing environment, (b) evaluating the potential changes which could occur from the proposed actions or projects, and (c) estimating the potential impacts those changes could have on the existing environment.

For surface water quality, this process normally consists of first describing the existing surface waters adjacent to the proposed actions/projects including any existing wastewater streams that currently discharge into those surface waters. The second step is to estimate any new or changed wastewater streams that could result from the proposed actions and compare them to any existing wastewater streams. The third and final step is to evaluate the proposed changes and discuss the potential impacts that those changes could have on surface water quality.

2.2 Assumptions

- This NEPA review of CCR impoundment closures and new dewatering facilities at CUF is based on and tiers off the Final Ash Impoundment Closure Environmental Impact Statement, Part 1 – Programmatic NEPA Review, prepared by TVA in June 2016. It is available at the following website: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Closure-of-Coal-Combustion-Residual-Impoundments.
- Current operations at CUF comply with all applicable regulations and permits.
- Wolf Creek Dam repairs were completed in 2013 and full pool elevations were restored in 2014. River flows past the plant have returned to historical norms, and TVA's biological assessments indicate that biological recovery is occurring and a balanced, indigenous population of aquatic life is returning to the river downstream of the plant.
- Reductions in wastewater loadings discharged to surface waters resulting from the proposed actions should have beneficial impacts on surface water quality.

2.3 Governing Regulations

- Federal Clean Water Act (40 CFR 401 and 401)
- Federal Safe Drinking Water Act (40 CFR 141-143)
- Tennessee NPDES Regulations – (http://www.tennessee.gov/environment/topic/permit-water-subpermits-npdes)
- Tennessee Division of Water Resources Water Pollution Control Rules (http://share.tn.gov/sos/rules/0400/0400-40/0400-40.htm)
- Tennessee Drinking Water Regulations – (http://www.tennessee.gov/environment/topic/wr-wq-dw-drinking-water)
- Tennessee Division of Water Resources (Drinking Water Supply) Rules – (http://share.tn.gov/sos/rules/0400/0400-45/0400-45.htm)

3.0 Affected Environment – Surface Water

3.1 Surface Water – Lower Cumberland River, Barkley Reservoir

CUF is in northern middle Tennessee, southwest of Clarksville on the south shore of Barkley Reservoir, (Cumberland River) approximately 72 miles upstream of Barkley Dam. Unit 1 began commercial operation in 1981 and Unit 2 in 1982. Net operating capacity is approximately 2,300 MW of electricity. With both units at maximum power, maximum condenser cooling water (CCW) demand is 2,097 million gallons per day (MGD).

CUF is drained by permitted storm water outfalls, wet weather conveyances, the CCW discharge (Outfall 002), and process and storm water discharges from the Main Ash Impoundment (Internal Monitoring Point [IMP] 001). The CCW, Outfall 002, discharges to the Cumberland River at CRM 102.8. The plant intake is located approximately at CRM 103.2 and intakes water for cooling and process purposes (TDEC 2008a).

The Lake Barkley Watershed (USGS HUC 05130205) is approximately 2,343 square miles with approximately 982 square miles in Tennessee and includes parts of six counties in Tennessee. As part of the Cumberland River drainage basin, the watershed has 1,258 stream miles and 27,000 acres in Tennessee. The land use in the watershed is primarily deciduous forest (68%) and agricultural (22% with 13% in pasture/hay, 5% in grassland/herbaceous and 4% in row crops). The remainder is low intensity residential comprising 4% and evergreen forest, wetlands, and open water comprising 2% each. Therefore, most of the watershed has little impervious surface (<2 to 5%). (TDEC 2008a)

The Lake Barkley Watershed in Tennessee is mainly karst topography characterized by sinkholes, springs, disappearing streams and caves. Karst describes a landform that indicates dissolution of underlying soluble rocks by surface water or ground water. The area around CUF is in the Western Highland Rim (71f) subecoregion which is characterized by dissected, rolling terrain of open hills. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. (TDEC 2008)

The Lower Cumberland River from the Kentucky-Tennessee line (CRM 74.6) to Cummings Creek (CRM 118.3) is classified for use for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Wells Creek from mile 0.0 to its origin is classified for use for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2013). No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are near the proposed action. Scott Branch adjacent to CUF has not been assessed, but would assume designations for aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2013)..

The Cumberland River (Barkley Reservoir) downstream of CUF is subject to the influence of the thermal discharges from the plant. Under normal conditions, the Cumberland River flow near CUF is primarily dependent upon releases from the U.S. Army Corps of Engineers' (USACE) Cheatham Dam located approximately 46 miles upstream, and to a lesser extent by downstream releases from Barkley Dam and tributary inflows upstream of the plant. However, in 2007, leakage was discovered in

USACE's Wolf Creek Dam upstream of CUF at CRM 460.9 which impounds the 65,530-acre Lake Cumberland in Russell County, KY. To accommodate repairs, the reservoir pool was lowered substantially which resulted in reduced flows in the Cumberland River system downstream for approximately 5 years.

During this time of reduced river flows; and even though the plant reduced power production (derated) to comply with thermal discharge limits, a large proportion of the flow in the river was withdrawn by the plant for condenser cooling which magnified the potential for adverse effects to the aquatic community downstream.

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

3.2 Onsite Surface Water Features

The ash impoundments and the proposed bottom ash dewatering facility site are in previously disturbed areas and remain an active part of the CUF facility. These areas are bordered to the south and west by Wells Creek and to the north by the Cumberland River. Wells Creek has an 1Q10 (lowest one day flow with an average recurrence frequency of once in 10 years) of 8.72 million gallons per day (MGD) based on a USGS study in 1992 (USGS 1992) and Scotts Branch (a tributary to Wells Creek) is considered a zero-flow stream.

The proposed landfill site is located to the south and southwest of the main plant area and is primarily wooded. Drainage on the property flows generally north and west to Wells Creek and Scott Branch.

Jurisdictional streams and wetlands were delineated within the proposed project areas in November and December 2016 (Amec Foster Wheeler 2017). As ash impoundments and manmade drainage features within the existing plant boundary are not considered jurisdictional, the proposed Bottom Ash Dewatering site, impoundment closure projects, and laydown areas would not impact any streams or wetlands. One perennial stream, one intermittent stream, four wet weather conveyance/ephemeral streams, and one wetland were documented in the project area defined for the proposed landfill and access road (Figure 3-5). The total linear footage of the portion of the perennial stream and the intermittent stream within the proposed landfill site is 3,573 feet and 1,211 feet respectively. The total linear footage of the four wet weather conveyances is 4,111 feet. Wetlands are addressed in Section 3.13.

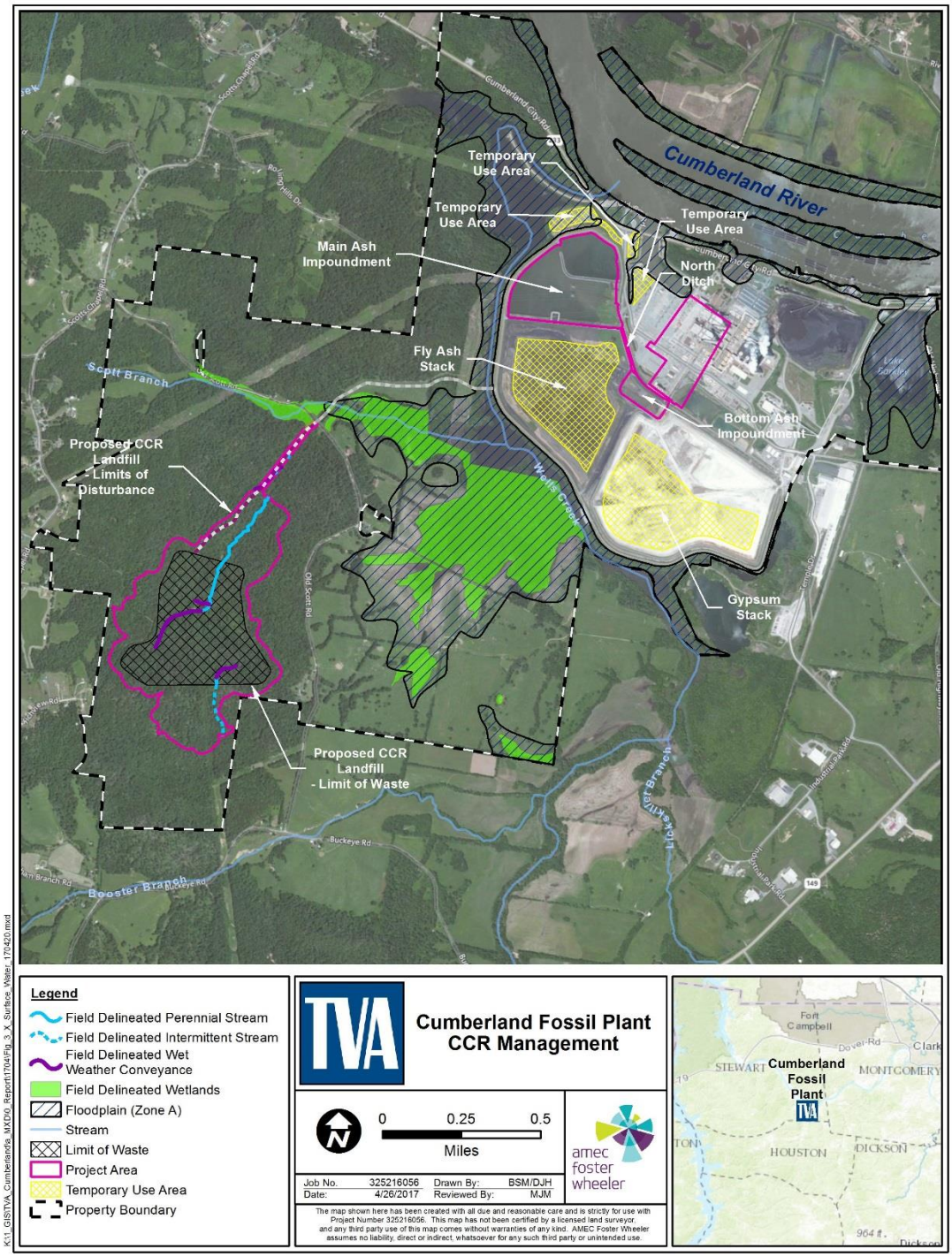

Figure 2. Surface Water Features of the CUF Project Areas

3.3 Existing CUF Wastewater Streams

3.3.1 Intake and Condenser Cooling Water (CCW)

CUF operates a surface water intake structure that withdraws an average of 2,096 MGD from the Cumberland River for use as CCW and plant process water (e.g., sluice water, fire protection, boiler feed water, safety eye wash and showers, and miscellaneous wash water). Approximately 98 percent of the water withdrawal is used for cooling, while approximately 2 percent is used for other uses including process water. The withdrawn water is returned to the river after appropriate treatment and complies with CUF's NPDES permit.

3.3.2 Coal Combustion Residue

The existing systems for handling CCR includes several areas that receive and treat CCR wastewater streams, including the Bottom Ash Impoundment, the Main Ash Impoundments (including the Stilling Impoundment), the Fly Ash Stacking area, and the Gypsum Stack (see Figure 1).

<u>Bottom Ash</u>

Approximately 8 percent of the coal burned at CUF remains as ash, of which approximately 20 percent is bottom ash and 80 percent is fly ash, but varies slightly. Approximately 70,000 dry tons of bottom ash is wet-sluiced to the bottom ash impoundment each year.

Bottom ash collects in the bottom of the boiler. It is washed from the boiler bottoms with jets of water and sluiced to the Bottom ash impoundment where suspended solids are settled. The bottom ash is dredged and stacked in the Dry Ash Stack and the process water is conveyed through a series of ditches to the Main Ash Impoundment, which is west of the powerhouse and north of the Dry Ash Stack. The Main Ash Impoundment receives runoff from the Dry Ash Stack and Gypsum Disposal Complex via perimeter ditches in addition to the effluent from the Bottom Ash Impoundment. The Main Ash Impoundment discharges under a floating skimmer to the Stilling Impoundment. The Stilling Impoundment discharges through four spillways via IMP 001 into the CCW main plant discharge channel and via Outfall 002 into Barkley Reservoir. The IMP 001 discharge to the CCW channel has an average flow of 21.73 MGD. TVA is required under NPDES Permit No. TN0005789 to meet pH, total suspended solids, oil and grease, and ammonia as nitrogen limits on this discharge (TDEC 2008a and 2008b).

As shown in Table 3-1 below, bottom ash sluice flow at CUF averages 12.69 million gallons per day (MGD). Precipitation runoff from the coal storage area drains to the ash impoundment.

Table 3-1. Inflow Average Annual Daily Flow Sources to Ash Impoundments

Source	Inflow to BAP (MGD)	Percent of Total Inflow (%)
Bottom ash sluice	12.69	58.4
FGD Dewatering System	5.04	23.2
Coal Yard Runoff Pond	2.02	9.3
Station Sump	1.35	6.2
Demineralizer Sump	0.375	1.7
Ash Slurry Sump	0.144	0.7
South Yard & Roof Drains	0.065	0.3
Miscellaneous	0.35	1.6
Evaporation	(0.305)	(1.4)
Total	21.729	100

Source: Flow schematic in July 2016 for NPDES Permit TN0005789

Please note all streams that are storm water driven are denoted in average annual daily flows; however, a storm event can produce flows greater than these amounts in a 24-hour period.

Ancillary streams flow into these major streams, but are not mentioned in this table.

Air preheater ash is a non-chemical metal cleaning waste containing CCR. It is sluiced to the Coal Yard Runoff Pond. The discharge flow values above are based on information gathered for the NPDES permit and represent average daily flows on an annual basis.

Fly Ash

Approximately 282,000 dry tons of fly ash is stacked in the Dry Ash Stack each year. Approximately 197,000 tons or 70 percent of the fly ash is beneficially reused.

The NPDES permit also requires that IMP 001 be monitored for a series of total metals, but there are no current limitations for these metals. These metals include cadmium, chromium, copper, lead, mercury, iron, manganese selenium, and silver. Total dissolved solids, chloride, sulfate, and fluoride must also be sampled, analyzed, and reported for IMP 001 (TDEC 2008).

FGD Scrubber Gypsum Byproduct

When the gypsum concentration reaches about 15 percent, solution blow-down is initiated to maintain equilibrium. This blow-down stream is conveyed either:

- To one of the two flexible membrane lined slurry settling channels in the northern portion of the Gypsum Disposal Area.

  or

- It is sent to the SynMat dewatering facility which dewaters and markets the by-product for wallboard production, and the dewatered (filtrate) waste water stream is then discharged to the ash impoundment.

The dewatered gypsum is then either placed in the gypsum disposal area or beneficially reused as commercial grade gypsum. Approximately 629,000 tons of gypsum is conveyed to the gypsum disposal area. Approximately 566,000 tons or 90 percent of the gypsum is beneficially reused. The gypsum disposal area drains to the Main Ash Impoundment.

A Selective Catalytic Reduction (SCR) system is used at CUF for air pollution control. Ammonia is added to the flue gases as part of the SCR process to remove nitrogen oxides. Some ammonia may slip through the SCRs. Most of the ammonia slip would be removed from the stack gases in the FGD scrubber for that unit and become part of the FGD scrubber gypsum disposal area wastewater. CUF performs monthly monitoring of IMP 001 for total ammonia nitrogen per Permit TN0005789.

Other Surface Runoff

The existing plant site runoff is regulated under the NPDES Permit TN0005789. Existing facilities and BMPs are used to ensure compliance with the permit conditions. Some plant runoff is directed through the Main Ash Pond system IMP 001 or through the CCW discharge Outfall 002 discussed above. Other storm water discharges associated with the industrial activity at CUF is covered by the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities TNR0510000, Tracking Number TNR051933.

4.0 Results of Impact Evaluation – Environmental Consequences to Surface Water Quality

4.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not construct the proposed new facilities, and no construction impacts would occur. TVA would continue to operate the existing systems for bottom ash, fly ash, and gypsum. The existing wastewater streams would continue to be authorized under NPDES Permit TN0005789. Discharges would continue to comply with all applicable permit limits and therefore, surface water quality adjacent to CUF should remain approximately the same.

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

4.2 Alternative B – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place or By-Removal to Offsite Landfill), Onsite Landfill for Future CCR Produced at CUF

4.2.1 Construction Impacts Other than Onsite Landfill

For all these projects, wastewaters generated during construction of the proposed projects may include construction-related storm water runoff, drainage of work areas, non-detergent equipment washings and dust control, hydrostatic test discharges and domestic sewage.

Demolition and construction activities have the potential to temporarily affect surface water via storm water runoff. TVA would comply with appropriate state and federal permit requirements. Demolition and construction activities of the associated project would be located on the plant property. Appropriate best management practices (BMPs) would be followed, and proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized. A General Permit for Storm Water Discharges Associated with Construction Activities (TDEC 2016) would be required for this project. This permit requires development of a project-specific SWPPP. This plan would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Additionally, BMPs as described in the *Tennessee Erosion and Sediment Control Handbook* (TDEC 2012), would be used to avoid contamination of surface water in the Project Area. Where soil disturbance could occur, the area would be stabilized and vegetated with noninvasive grasses and mulched as described in the above-mentioned handbook. BMPs or equivalent measures would be used to avoid contamination of surface water in the Project Area. Therefore, no significant impacts to surface water would be expected due to surface water runoff from the construction site. Additionally, because this project would not take place in “Waters of the United States” or “Waters of the State of Tennessee” or in regulated adjacent waters, no water quality certification or USACE permit would be required for this project.

Impervious buildings and infrastructure prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams. Any existing structures and infrastructure would be removed from the project site; however, they would be replaced with the covered dewatering facility and would alter the current storm water flows. A portion of the project area is within an industrial site and is partially covered with impervious structures or ground cover that decreases percolation. Construction would not significantly increase impervious surface area but it would increase it. On the proposed landfill site, the area has little infrastructure or impervious cover therefore storm water flows would be altered significantly.

Equipment washing and dust control discharges would be handled in accordance with BMPs described in the BMP Plan required by the site’s NPDES Permit TN0005789 to minimize construction impacts to surface waters.

Onsite hydrostatic testing will have the option to use potable or surface waters and would be covered under the current NPDES Permit TN0005789.

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

Potential on-site borrow areas have been identified and evaluated to ensure the material is suitable for construction and capping activities for the proposed projects. The borrow material has been evaluated to ensure that it can met the required compaction requirements of the proposed designs and other specifications. The onsite NPDES BMP Plan would cover any needed best management practices that would be required to ensure that no adverse impacts to surface water would be expected from the use of these borrow areas.

With the implementation of appropriate BMPs only temporary minor, impacts to surrounding surface waters would be expected from construction activities associated with dewatering facilities and impoundment closure.

4.2.2 Construction Impacts from Onsite Landfill for Future Ash

Landfill construction activities could include, but are not limited to, the clearing and grading of the project site and grading of new separate storm water and leachate basins; the installation of the landfill facility (including liner and leachate collection fields) and the installation of a forced main to pump leachate to its discharge outfall. Direct impacts to 3,573 feet of perennial stream and 1,211 feet of intermittent stream would occur as a result of landfill construction activities (filling and/or culverting). Indirect effects include potential sedimentation of downstream areas associated with runoff from the construction site. However, such indirect effects are expected to be minimized by the installation of detention basis and other BMPs within the construction site.

A characterization of aquatic features was conducted on the proposed project areas. One perennial stream, one intermittent stream, and four wet weather conveyance/ephemeral streams were documented on the proposed landfill project area. The USACE performed a Jurisdictional Determination to determine wetlands and stream features and concurred with identified resources. The requirement of a state 401 water quality certification (either an individual or general ARAP permit) and federal 404 permits to be obtained for any stream/wetland impact and the terms and conditions of these permits would likely require mitigation, such as contributing to a stream mitigation bank, for these proposed activities.

4.2.3 Operational Impacts

<u>Bottom Ash Dewatering Facility Operational Impacts</u>

Option 1 - Construction/Operation of a Process Dewatering Facility Utilizing a Continuous or “Once Through” System

The bottom ash that would be dewatered is currently sluiced from the boiler bottoms to a series of impoundments, where it settles and then is mechanically dewatered utilizing heavy machinery. During the interim period between closure of the Bottom Ash

Impoundment and prior to construction of the Bottom Ash Dewatering Facility bottom ash and gypsum fines would be directed to standalone tanks and would be dipped or scooped for removal and placed in trucks to be transported to either the current onsite stack or the future onsite landfill. Once the Bottom Ash Dewatering Facility is operational, the standalone tanks would be used to support process water treatment or to support other plant needs. The tanks would be placed within the closed portion of the Main Ash Impoundment or within the closed portion of the Bottom Ash Impoundment.

Currently the bottom ash sluice stream also sluices economizer ash. CUF currently uses a 100% Illinois Basin coal blend which does generate a pyrite waste steam; however, this byproduct production has the potential to change based on the coal blend utilized by the facility. For the purposes of this project all three of these waste streams would remain commingled and would go to the dewatering facility to be dewatered and dry solid waste would be sent to an approved onsite landfill. Depending on the timing of various phases of construction, there may be a possibility that the impoundment system could still be operational for a time after the implementation of the dewatering system. Therefore, sluice water would be released to either the current impoundment system or, in the future, after closure of the impoundment system to a proposed process water basins. Either impoundment/basins would ultimately discharged through IMP 001 to the CCW and Outfall 002 to the Cumberland River. Clarified water from the dewatering facility would meet current NPDES permit limits.

To support the dewatering effort, an internal study was performed in 2011 to determine the potential wastewater management issues of the bottom ash and pyrite reject waste streams during the dewatering process. This study specifically focused on the solubility of the pyrite/coal mixture, both separately and combined, in the sluice water prior to and after the dewatering process (TVA 2011).

The results of this study determined that the dewatering was of such a short duration that the metals and pyritic bacteria had little time to react and cause significant water chemistry changes, reducing the likelihood of pH and metal accumulation problems in the dewatered stream. All metals concentrations were below TDEC's Water Quality Criteria (WQC) limits. Furthermore, the pH throughout the study period was found to be within pH range of 6 to 9 standard units (s.u.). This study's results indicate that the waste stream that would be generated by this process would likely meet the current TDEC pH and metals in-stream WQC. In addition, the study illustrated that because the fines associated with this waste stream were much finer than were previously theorized (TVA 2011b), however final design would have a performance guarantee that would require the discharge to meet TSS levels at or below the current NPDES requirements. The effluent flows from the proposed dewatering facility would have additional treatment prior to discharge from IMP 001. Mitigation measures would be implemented to ensure that discharges would meet NPDES limits.

Results for operational dewatering systems could vary greatly based on many factors including the nature and composition of the coal burned, the make-up water used in the system, and the moisture level of the bottom ash. This study focused upon a dewatering process with pyritic reject streams, results of this study are applicable to CUF due to similar coal sources and coal conveyance.

No direct negative impacts to the surface waters would be anticipated from the operation of this facility because any discharges would be required to meet NPDES limits and Tennessee WQC that are developed to be protective of designated uses. Additionally, associated process storm water associated with this facility would be routed to sumps and to either the current impoundment system or the future Process Water Basins for co-treatment prior to discharge.

Discharge Characterization

To characterize the current conditions and changes in the IMP 001 discharge, an evaluation of in-stream mixing calculations of chemical characteristics was conducted. These measures are useful in predicting potential impacts to water quality that may arise resulting from the changes to the bottom ash handling systems.

Results of the surface water mixing analysis under current operations are presented in Table 4-1. For the current operations analysis, metals data were collected from the IMP 001 impoundment discharge, Outfall 002 and the plant intake, from the recent 24-hour NPDES sampling conducted in 2016. This information was used to show current operations with the resultant discharge concentrations after mixing with the receiving stream. The projected in-stream mixing concentrations were based on analyses of the CUF intake and the minimum one-day low flow that occurs once in 10 years (i.e., the “1Q10”) of 678.8 MGD from the Water Quality Based Effluent Calculations in the CUF NPDES Permit TN0005789 Rationale. The 1Q10 stream flow is the regulated low flow condition according to U.S. Geological Survey data for the protection of fish and aquatic life. However, under this low flow condition, the units would either need to be derated or would not be able to operate due to thermal issues and the need for more intake water than is available. However, these circumstances are evaluated because they are deemed conservative and alternative cooling flows are not available.

Table 4-1. In-Stream Mixing Concentrations of Current Operations

Element	Current Baseline	Current Operations			Water Quality Criteria * Conc., (mg/L) @ 100 mg/L hardness
	Intake Conc.** (mg/L)	Ash Impoundment Discharge** (IMP 001) Conc. (mg/L)	Outfall 002 Discharge** Conc. (mg/L)	Mixing Conc. at Cumberland River 1Q10 (mg/L)	
Antimony	<0.0005	<0.0005	<0.0005	0.00025	0.0056
Arsenic	<0.0005	0.00176	<0.0005	0.00025	0.01
Barium	0.0211	0.025	0.02540	0.02435	2.0
Beryllium	<0.0010	<0.001	<0.0010	0.00050	0.004
Cadmium	<0.0004	0.0045	<0.0004	0.00020	0.00025
Chromium	0.0421	0.057	0.00099	0.01104	0.1
Copper	0.00249	0.0040	0.00109	0.00143	0.009
Iron	0.357	0.22	0.16200	0.20969	
Lead	<0.0002	0.043	0.00023	0.00020	0.0025
Manganese	0.0254	0.434	0.03090	0.02956	
Mercury	0.00000201	0.000186	0.00000375	0.000003	0.00005
Nickel	0.00161	0.0168	0.00870	0.00694	0.052
Selenium	<0.0006	0.110	<0.0006	0.00030	0.005
Silver	<0.0005	<0.002	<0.00050	0.00025	0.0032
Thallium	<0.0005	0.000643	<0.00050	0.00025	0.00024
Zinc	<0.01	0.0855	<0.01	0.00500	0.12
lbs/day = conc. in mg/L X flow in MGD X 8.34 lbs/gal.					
Ash Impoundment Flow	21.7				
CCW Flow	2097.032				
1Q10 River Flow	678.8				
Flows taken from NPDES flow schematic 2016 for permit No. TN0005789 permit renewal					
Mass Discharge and Loadings were calculated using 0.5 the Minimum Detection Limit					
*TDEC Criteria, Rule 0400-40-03					
**Data was taken from most recent NPDES Permit Renewal Data 01/21/16					
The Maximum concentration was used as worse case although this number may not be representative of all other samples or the average concentratio					
Hardness was not taken as part of NPDES sampling therefore a Hardness of 100 mg/L was assumed					
Used 1/2 of the MDL for because of continuous BDL results.					

Results of the in-stream mixing concentrations show that all the constituents except cadmium would meet the TDEC lowest criteria (i.e., the limit equal to minimum of the water quality criteria). The thallium exception is the result from testing methods that can only detect these constituents in concentrations over the TDEC criterion of 0.00024 milligrams per liter (mg/L). Since no thallium was detected in the intake or in Outfall 002, the mixing calculation conservatively assumes one-half the method detection limit (MDL); thus, weighting the calculation with assumed thallium detections of 0.0005 mg/L. The conservative use of these assumed values at more than four-times the health-protective TDEC criterion for thallium salts, predisposes the thallium results to exceed TDEC criteria. These results, however, are due to limitations in testing methods and do not represent true impacts to water quality due to thallium concentrations. The

mixing analysis indicates that the overall impact of current and future dewatering operations would not cause impacts to surface water quality.

Future metal discharge rates for the proposed operation are conservatively represented by current conditions depicted in Table 4-1. This shows concentrations of in-stream metals below Tennessee WQC except for thallium as described previously. Additionally, in-stream metals concentrations could be further reduced in the proposed dewatering process through settling or treatment with waste water treatment chemicals in the dewatering clarifiers. Consequently, future operations of the bottom ash dewatering facility would be expected to have minor temporary, even potentially beneficial, impacts on the receiving stream. TVA is aware that this system as designed would not meet future ELG requirements, which calls for no discharge of bottom ash transport waters. The dewatering of the bottom ash would be a necessary initial phase of any action to reduce and/or eliminate this flow, however upgrading or enhancement of this initial dewatering design may be required to meet future regulations

TVA would conduct an operational characterization of the altered and new waste streams to confirm that no significant impacts to the Cumberland River would occur from this action. Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If the operational characterization showed impacts, then mitigation measures, including altered settling times and chemical treatments, would be undertaken to meet requirements ensuring discharges meet NPDES and chronic toxicity limits and not cause an exceedance of in-stream TDEC WQC.

Any discharges into surface waters would comply with all NPDES permit limits. Thus, continued operations at CUF under Option 1 conditions would not be expected to cause any additional direct or indirect effects to local surface water resources.

Option 2 – Construction/Operation of a Process Dewatering Facility with a Recirculated Bottom Ash Sluice Stream

This option would have similar impacts to the construction impacts noted above for Option 1. However, the operational, withdrawals, and discharges details and impacts would be altered with Option 2, as discussed below.

The dewatering process for Option 2, would be similar to the process for Option 1, with the addition of recirculating most of the bottom ash sluice transport water. This recirculation would include a make-up water stream, a low volume continuous blowdown stream, and an outage waste stream. The make-up water stream would be additional raw water that would replace or supplement the water lost from evaporation or leakage in the system. This raw make-up water withdrawal rate would range from 300 to 600 gpm, which is equated to a maximum 0.864 MGD of additional make up water. Not only would make-up water ensure that water lost in the system was replaced, but it would help to balance the pH and other chemical constituents in the recirculating system to maintain the integrity of the system’s infrastructure and materials.

Wastewater would flow from the dewatering conveyor to the clarifier and process flow tanks and lastly into a wastewater containment facility (or recirculation tank) prior to being recirculated. The blowdown stream from the containment facility would help to

regulate the hydraulic flow levels from all two generation units and would reduce the existing bottom ash discharge from12.844 MGD to a maximum of 2 MGD of process water. During outages, the waste stream flow from the system could range between 0.2 to 0.5 MGD to purge the system. All process waste streams would be managed to comply with the site specific NPDES permit.

Discharge Reduction Characterization

Discharge from the bottom ash system would be managed in accordance with the ELGs finalized on January 4, 2016. Therefore, it is assumed that bottom ash sluice waste water would not be directly discharged and that the recirculation blow-down stream would be managed to comply with ELG regulations as applied through the site specific NPDES permit.

Results of the reduction in loading ranges for Option 2 (i.e., following the bottom ash dewatering with recirculation) are displayed in Table 4-2. Bottom ash sluice data was collected at the same time as the 2016 NPDES permit renewal sampling. These samples were collected from the bottom ash sluice prior to mixing and treatment in the ash impoundments. The bottom ash sluice data displayed some variability in concentrations; therefore, the minimum and maximum concentrations were used to display the range of reduction. It should be noted that this range of reduction does not reflect the loadings being discharged from IMP 001/Outfall 002 or to the receiving stream (Cumberland River), but rather the reduction in the loadings being discharged into the ash impoundment prior to co-treatment.

Some metals concentrations would be expected to decrease with the removal of the bottom ash waste stream. The analysis indicates that the overall impact of future dewatering operations with recirculation would have beneficial impacts to surface water quality. Thus, continued operations at CUF under Option 2 would not be expected to cause any additional direct and/or indirect impacts to local surface water resources.

As with Option 1, TVA would conduct routine monitoring of the altered and new waste streams at IMP 001 to confirm this study's results that no significant impacts to the Cumberland River would occur from this action. Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If the routine monitoring shows impacts, then mitigation measures, including altered settling times and chemical treatments, would be undertaken to meet requirements for ensuring that discharges meet NPDES and chronic toxicity limits.

Table 4-2. Reduction of Bottom Ash Loadings Into the CUF Impoundment System with Implementation of Option 2

Element	Current Operations		Range of Loading Reductions	
	Low End	High End	Low End	High End
	Current Bottom Ash Sluice Conc. mg/L	Current Bottom Ash Sluice Conc. mg/L	Current Bottom Ash Sluice Loading* lbs/day	Current Bottom Ash Sluice Loading* lbs/day
Aluminum	0.95	2.3300	101.7313	249.5094
Antimony	0.0010	0.0015	0.1052	0.1638
Arsenic	0.00414	0.0342	0.4433	3.6623
Barium	0.042	0.0924	4.4976	9.8947
Beryllium	<0.001	<0.001	0.0535	0.0535
Cadmium	<0.0004	0.0062	0.0214	0.6596
Chromium	0.00766	0.0269	0.8203	2.8806
Copper	0.00416	0.0324	0.4455	3.4696
Iron	1.03	4.1700	110.2982	446.5470
Lead	0.00442	0.0501	0.4733	5.3650
Manganese	0.0508	0.1820	5.4399	19.4896
Mercury	0.0000022	0.0000027	0.0002	0.0003
Nickel	0.00967	0.0209	1.0355	2.2381
Selenium	0.00108	0.0011	0.1157	0.1189
Silver	<0.0005	<0.0005	0.0268	0.0268
Thallium	<0.0005	0.000679	0.0268	0.0727
Zinc	0.0366	0.0713	3.9193	7.6352
**Mass Discharge and Loadings below detection were calculated using 0.5 of the Minimum Detection Limit				
lbs/day = conc. in mg/L X flow in MGD X 8.34 lbs/gal.				
Bottom Ash	12.8	MGD	Bottom Ash Flow from CUF 2016 NPDES Permit renewal applicaiton	

4.2.4 Ash Impoundment Closure Operational Impacts

Existing flows to the Main Ash Impoundment would be rerouted prior to closure. The proposed plan to close the existing bottom ash impoundment, main ash and stilling impoundments would not take place until the proposed bottom ash dewatering facility and a wastewater treatment plant are in service. The Bottom Ash Impoundment comprises approximately 6.8 acres and 334,000 cubic yards of CCR. The Main Ash impoundment comprises 53.7 acres and contains approximately 1.1 million cubic yards of CCR. Dewatering of the impoundments and stabilization of the ash would be required in areas where ponding is currently present. The closure of the northern slope of the divider dike between the impoundment and the Fly Ash Stack would be included in each alternative. Closure of the southern slope of this dike to the crest would be included with the Fly Ash Stack closure cap system.

The main operational change that would take place with the closure of the impoundments at CUF is the change in management of the onsite storm water and process waste water that is currently treated. The main ash and stilling impoundments would be closed and a portion converted to process water basins to treat flows before

discharge to the CCW channel via IMP 001, then discharge to the Cumberland River via Outfall 002. The wastewater treatment facility would be designed and operated to ensure compliance with all TDEC regulations and limits and TN Water Quality Standards.

Changing from the existing system to the proposed bottom ash dewatering facility and wastewater treatment system would require replacing the assimilative capacity currently used for treating storm water, air pre-heater washes (APHW), low volume waste streams, and station sump discharges with equivalent or greater treatment in the new facilities.

Existing outfall structures associated with the Main Ash Impoundment would be removed and/or replaced with new ditches and/or outfall structures as needed to manage the runoff from the closed impoundments. Precipitation driven runoff from closed landfill areas should have much lower loadings of suspended solids, metals, and other constituents than certain process wastewaters. Final drainage would be routed to existing or new discharge points and comply with the modified NPDES and/or the TMSP permits to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified, as needed, to ensure the discharges meet permit limits which may or may not require a permit modification. Additionally, future storm water that comes in contact with CCR would be routed to the future process water basins.

4.2.4.1 Ash Impoundment Closure – in – Place

As identified in the Programmatic EIS (TVA 2016), Closure- in-Place of the ash impoundments would minimize surface water flow to the impoundment which would enhance stability of the berms due to a reduction of hydraulic inputs. As all work would comply with applicable regulations, permits and BMPs, potential impacts of this alternate to surface water would be negligible. TVA would ensure these actions are performed in a manner protective of water quality. This could include monitoring for solids, metals, and whole effluent toxicity.

This alternative would consist of dewatering and stabilizing ponded areas followed by redistributing CCR material within the footprint of the impoundments. The existing perimeter dike around the Main Ash Impoundment would be lowered and the excavated material would be used as protective cover soil in the final cap system. The divider dike between the Main Ash Impoundment and the Dry Ash Stack would remain and would be closed with a geomembrane cap system. The CCR material would be regraded to promote drainage and a portion of the pond would be lined and repurposed as a storm water and process water basin. The remaining portion of the impoundment would be covered in place with a geomembrane cap system. A geomembrane cap would reduce infiltration more than an alternative soil cap system, (0.1 inch per year compared to 0.57 inch per year). The proposed geomembrane cap system would consist (from bottom to top) of a 40-millimeter geomembrane, a geocomposite drainage layer, 18 inches of protective cover soil, and 6 inches of vegetative cover soil.

The proposed storm water and process water basins would be lined with a geosynthetic clay liner, followed by a geomembrane, a non-woven geotextile cushion, and 18 inches of stone as a protective layer.

The replacement of the existing ash impoundments with a capped, dry disposal area should reduce the quantity of solids and total and dissolved metals discharged through IMP 001 to Outfall 002 and ultimately to the Cumberland River. The proposed lined storm water and process water basins should also provide added treatment potentially reducing the quantities discharged even further. Therefore, closure of the existing ash impoundments with the CCR remaining in place should reduce the loadings to the Cumberland River and potentially provide a beneficial impact.

Storm water drainage would be directed as appropriate to ensure compliance with all applicable regulations and permits. New storm water outfalls would be installed to direct storm water runoff either west to Wells Creek or east to the existing Discharge Channel and discharges would either be covered by the site NPDES permit or the TDEC Multi-Sector General Storm Water Permit.

4.2.4.2 Ash Impoundment Closure-by-Removal

This alternative would also require rerouting plant flows that currently go to the Bottom Ash and Main Ash Impoundments. This alternative would also consist of dewatering and stabilizing ponded areas and installing a liner to convert part of the area to a storm water and process water basins. Then this alternative would require removing CCR and plus one foot of underlying soil material, perimeter dike material and support structures within the footprint of the impoundments. The dike material could be stockpiled onsite if segregated properly. The divider dike between the Main Ash Impoundment and the Dry Ash Stack would remain in place and would be closed with a soil cap system consisting of four feet of 10^{-5} cm/sec permeability clay. Once CCR and underlying soil materials are removed, the cleared areas would be graded, drained, and vegetated.

Prior to excavation of the Bottom Ash Impoundment, a retaining wall would need to be constructed along the perimeter of the bottom ash impoundment to support the approximate 40-foot excavation. Once CCR and underlying soil materials are removed, the cleared areas would be graded to drain and vegetated.

Storm water drainage would be directed as appropriate to ensure compliance with all applicable regulations and permits. New storm water outfalls would be installed to direct storm water runoff either west to Wells Creek or east to the existing discharge channel and discharges would either be covered by the site NPDES permit or the TMSP.

Under this alternative, all removed CCR material would be hauled to a permitted offsite landfill. Material placed within the receiving landfill is assumed to be fully contained by an approved liner system such that no impacts to surface water would occur.

4.2.5 CCR Landfill for Future Ash - Operational Impacts

The CCR by-products that would be placed in the landfill are expected to include fly ash, bottom ash, and commercial grade gypsum. By-product generation and characterization would be dependent on the coal source. The design coal for the CCR landfill considerations would be based on the current CCR production utilizing 100 percent Illinois Basin (ILB).

The wastewater streams which could be generated or change substantively under this alternative are:

- The addition of the landfill leachate stream and storm water run-off.
- Non-contact surface runoff from the proposed landfill drainage area.

Each of the three by-products were evaluated using the synthetic groundwater leaching procedure (SGLP) water extraction to evaluate the metals that would potentially leach from the proposed new landfill's leachate collection system. This information was utilized to predict waste water impacts from the landfill operation. Please note that the landfill will also include waste water treatment sludge and that was not able to be simulated in this evaluation, however the amount of the sludge compared to the CCR would likely be *de minimis*.

The Hydrologic Evaluation of Landfill Performance (HELP) Model was utilized to evaluate the proposed leachate collection system disposal facility. Based on this HELP model, the estimated average leachate flow from the proposed landfill was estimated to be approximately 0.090 MGD with a maximum peak flow of 1.12 MGD (Stantec 2017) The storm water run-off, based on the design storm of 24-hour and 100-year event, could be expected to have peak inflows ranging from 176 to 294 cubic feet per second (cfs) to each of the three newly proposed lined storm water impoundments that would be included as part of the design for the proposed landfill project. The outlet discharges of these impoundments under the same conditions would be expected to range from approximately 12.6 to 16.2 cfs per impoundment. An estimated daily flow for each impoundment would range from 0.173 to 0.435 MGD per impoundment based on the current level of design. Storm water flows from the site would be discharged from the proposed impoundments and would each discharge through separate outfalls via gravity feed pipes out new Tennessee Multi-Sector Permitted Storm Water outfalls to Scott Branch a Tributary of Wells Creek and Wells Creek to the north, west and south of the proposed new dry CCR landfill site. Wells Creek has a 1Q10 in Erin of 5.4 cfs, and a flow was calculated for Cumberland City based on the drainage area to be 8.72 cfs which converts to 4.69 MGD based on a USGS Study from1992 (USDS 1992). Scott Branch is considered a zero-flow stream. It would be assumed that in-stream water quality standards would need to be met at the outfall prior to mixing with this stream. Depending on the nature of this run-off stream mitigation measures that may include waste water treatment may be required prior to discharge to this stream.

4.2.5.1 On Site Landfill Leachate and Run-off

The CCR solids not beneficially reused would be trucked and placed in the proposed new landfill. This proposed landfill system would have a liner system and a leachate collection system. The leachate would be discharged to a leachate impoundment and then would either be gravity feed via a pipe to Wells Creek (Option 1) or would be pumped to the current ash impoundment system or the proposed new storm water and process water basin (Option 2). The basin would discharge via an existing IMP 001 or a new outfall to the CCW and ultimately out Outfall 002 to the Cumberland River. Ammonia concentrations in the landfilled materials would be dependent on SCR process and plant specifics. To limit ammonia loads from the dry fly ash stack, the amount of CCR exposed could be restricted to 10 acres or less. Please note for Option 2, under low flow conditions, the Units would either need to be derated or would not be able to

operate due to thermal issues and the need for more intake water than is available. However, these circumstances are evaluated because they are deemed conservative and alternative cooling flows are not available.

Option 1 – Leachate Discharged to Wells Creek

The leachate stream would be discharged to leachate impoundment and then gravity feed via a pipe and discharged out a new outfall structure to Wells Creek. The modeled leachate waste stream was evaluated after mixing with Wells Creek to ascertain if in-stream mixing would meet Tennessee acute WQC. The leachate waste stream would have the potential to be a low flow stream, acidic in nature with the potential of having some detectable metals and ammonia levels. See the Metal Loading Section for more details.

Option 2 – Leachate Discharged to the proposed Stormwater and Process Water Basins

The leachate stream would be discharged to leachate impoundment and then pumped to the proposed Process Water Basins for treatment. The effluent from these basins could then discharge through either IMP 001 or a new outfall to the CCW and ultimately would be discharged out Outfall 002 to the Cumberland River. All waste streams would comply with NPDES permit limits and regulations. However, the leachate would be treated as required to meet all applicable permit requirements and in-stream water quality criteria, therefore potential impacts to surface water under this alternative would be expected to be minor.

4.2.5.2 Metals Loading

To estimate the concentration of metals in both Options 1 and 2 after receiving discharges from the proposed by-product landfill, the maximum synthetic groundwater leaching procedure data was used. The SGLP data was used instead of the toxicity characteristic leaching procedure (TCLP) data because the SGLP data was deemed more appropriate to model leachate discharges because of the use of non-acidified water in the method. Additionally, this method allows for analysis of more parameters than the TCLP method. The leachate data from the CCR products was identical in both Option 1 and Option 2.

In addition to the leachate loading and mixing evaluation, an evaluation was also performed to evaluated the contact storm water runoff from the proposed landfill to Scott Branch and Wells Creek. In this evaluation storm water model flows were utilized. However, rain water concentrations were used and assumed to be de minimis and were evaluated at half the laboratory minimum detection limit (MDL) concentration.

The HELP Model was utilized to evaluate the proposed leachate collection system disposal facility. The drainage layers for the cap and liner systems as well as the leachate drainage pipe system would be designed to maintain less than 1 foot of leachate head above the liner system (Stantec, 2017). Per the Final CCR Rule, the design of the leachate collection system would account for anticipated differential settlement of the liner. Leachate generation volumes would be used to size leachate

storage impoundment(s). The design of the leachate storage impoundment(s) would also involve design of the following items:

- Compacted clay and geosynthetic membrane liner system
- Pump station and force main to convey leachate to proposed Process Water Basins
- Groundwater monitoring plan to detect potential leaks through the liner system

For Option 1 – As evaluated in Table 4-3, the added loadings from the by-product leachate collection system (LCS) discharge to Wells Creek would have the potential to have constituents with concentrations above the TN WQC. When in-stream mixing was evaluated with the modeled leachate stream and Wells Creek, cadmium, copper, selenium and thallium were found to have the potential to be higher than the acute criteria for the Wells Creek most stringent designation. This may indicate that there may be a need for mitigation measures, which may include waste water treatment, prior to discharge from these outfall(s) and should be taken into consideration in future designs and storm water discharges.

Table 4-3. Option 1 Cumulative Impact of By-product Storage Leachate Total Mixed Concentration Estimate With Wells Creek

Parameter	Background River Conc. (mg/L)	River Loading (lbs/day)	Wells Creek Conc. (mg/L)	Dry FGD SGLP Conc. (mg/L)	BAS SGLP Conc. (mg/L)	Fly Ash SGLP Conc. (mg/L)	Landfill Leachate Conc. Estimates (mg/L)	Instream Mixed Conc. in Wells Creek 1Q10 (mg/L)	Instream Water Quality Criteria Conc., (mg/L)*
Antimony	<0.0005	4.37	0.0020	0.0022	0.0002	0.0052	0.008	0.00309	0.64000
Arsenic	<0.0005	4.37	0.0026	0.0024	0.0011	0.0116	0.015	0.00496	0.01000
Barium	0.0211	369.02	0.0450	0.0135	0.0009	0.7830	0.797	0.18794	NC
Beryllium	<0.001	8.74	0.0020	0.00010	0.00001	0.0000	0.00015	0.00165	NC
Cadmium	<0.0004	3.50	0.0030	0.00017	0.00003	0.0001	0.00028	0.00248	0.00200
Chromium	0.0421	736.30	0.0034	0.0007	0.0004	0.0252	0.026	0.00775	NC*
Copper	0.00249	43.55	0.0430	0.0051	0.0001	0.0052	0.010	0.03683	0.01300
Iron	0.133	2326.07	1.1000	0.0096	0.0568	0.0044	0.071	0.90446	NC
Lead	<0.0002	1.75	0.0070	0.0013	0.0004	0.0261	0.028	0.01096	0.06500
Manganese	0.0254	444.23	0.1400	0.2885	0.0007	0.0001	0.289	0.16834	NC
Mercury	0.00000201	0.04	0.000004	0.000033	0.000004	0.000015	0.00005	0.00001	0.00005
Nickel	0.00161	28.16	0.0060	0.0040	0.0001	0.0015	0.006	0.00592	0.47000
Selenium	<0.0006	5.25	0.0040	0.2244	0.0002	0.0812	0.306	0.06132	0.02000
Silver	<0.0005	4.37	0.0026	0.0004	0.0000	0.0002	0.001	0.00224	0.00320
Thallium	<0.0005	4.37	0.0250	0.0009	0.0001	0.0004	0.001	0.02052	0.00047
Zinc	<0.01	87.45	0.0700	0.0019	0.0006	0.0261	0.029	0.06212	0.12000

lbs/day = conc. in mg/L X flow in MGD X 8.34 lbs/gal.

Intake Flow	2097.032	MGD	River flow and data from CUF 2010 NPDES Permit renewal application, Data from 2C sampling
Leachate worse case Phase 3 Flow	1.1	MGD	Leachate estimates for flow and chemical parameters taken from SGLP data - Flow from Stantec Help Model
1Q10 Wells Creek	4.69	MGD	Flow for Wells Creek based on USGS 1992 Report, so no mixing is not permitted - Wells Creek Data is Maxium Concentr

*Mass Discharge and Loadings were calculated using 0.5 the Minimum Detection Limit

*TDEC Criteria, Rule 0400-40-03 - CMC used for flows expected to flow less than 4 days a week and reflects stream designation for FAL/REC/LWW/IRR

Leachate data taken from SGLP data from FGD waste, fly ash and bottom ash taken individually.

Wells Creek - Erin	5.4	for 34.5 acres drainage area
Wells Creek - Ccity	8.71826087	cfs
Wells Creek	4.69	MGD

For Option 2 – As seen in Table 4-4, the added loadings from the by-product LCS discharge would be unlikely to increase the metals concentrations at the Cumberland River where this stream would discharge. Additionally, the concentrations would not exceed NPDES permit limits or TN WQC, except for Thallium. These results, however, are due to limitations in testing methods and do not represent true impacts to water quality due to thallium concentrations. The mass balance analysis indicates that the overall impact of current and future leachate operations would not cause impacts to surface water quality in Option 2. This analysis represents the estimated maximum discharges from this site, since the leachate flow used would be the peak flow during Phase III of the landfill operation. In addition, water quality standards are typically applied as an in-stream concentration after mixing.

Additionally, TVA would conduct a characterization of the leachate and run-off streams to confirm no significant impacts to the Cumberland River. The waters would be analyzed for metals and other parameters. If determined to be necessary, appropriate mitigating measures would be evaluated and implemented to ensure that the discharge NPDES permit requirements for the water quality parameters are met.

Table 4-4. Option 2 Cumulative Impact of By-product Storage Leachate Total Mixed Concentration Estimate With Cumberland River

Parameter	Background River Conc. (mg/L)	River Loading (lbs/day)	Dry FGD SGLP Conc. (mg/L)	BAS SGLP Conc. (mg/L)	Fly Ash SGLP Conc. (mg/L)	Landfill Leachate Conc. Estimates (mg/L)	Landfill Leachate Loading Estimates (lbs/day)	CCW Outfall 002 Conc. (mg/l)	CCW Loading Conc.(lbs/day)	Projected Mixing Conc. of Outfall 002 and Estimated Leachate (mg/L)	Instream Mixed Conc. in Cumberland River 1Q10 (mg/L)	Instream Water Quality Criteria Conc., (mg/L)*
Antimony	<0.0005	4.37	0.0022	0.0002	0.0052	0.008	0.07	<0.0005	4.37	0.0003	0.0003	0.00560
Arsenic	<0.0005	4.37	0.0024	0.0011	0.0116	0.015	0.14	<0.0005	4.37	0.0003	0.0003	0.01000
Barium	0.0211	369.02	0.0135	0.0009	0.7830	0.797	7.32	0.0254	444.22	0.0258	0.0247	2.00000
Beryllium	<0.001	8.74	0.00010	0.00001	0.0000	0.00015	0.0014	<0.001	8.74	0.0005	0.0005	0.00400
Cadmium	<0.0004	3.50	0.00017	0.00003	0.0001	0.00028	0.0025	<0.0004	3.50	0.0002	0.0002	0.00025
Chromium	0.0421	736.30	0.0007	0.0004	0.0252	0.026	0.24	0.00099	17.31	0.0010	0.0111	0.10000
Copper	0.00249	43.55	0.0051	0.0001	0.0052	0.010	0.10	0.00109	19.06	0.0011	0.0014	0.00900
Iron	0.133	2326.07	0.0096	0.0568	0.0044	0.071	0.65	0.162	2833.20	0.1620	0.1549	NC
Lead	<0.0002	1.75	0.0013	0.0004	0.0261	0.028	0.26	0.00023	4.02	0.0002	0.0002	0.00250
Manganese	0.0254	444.23	0.2885	0.0007	0.0001	0.289	2.65	0.0309	540.41	0.0310	0.0297	NC
Mercury	0.00000201	0.04	0.000033	0.000004	0.000015	0.00005	0.00048	0.00000375	0.07	0.000004	0.000003	0.00005
Nickel	0.00161	28.16	0.0040	0.0001	0.0015	0.006	0.05	0.00870	152.15	0.0087	0.0069	0.05200
Selenium	<0.0006	5.25	0.2244	0.0002	0.0812	0.306	2.80	<0.0006	5.25	0.0005	0.0004	0.00500
Silver	<0.0005	4.37	0.0004	0.0000	0.0002	0.001	0.01	<0.00050	4.37	0.0003	0.0003	0.00320
Thallium	<0.0005	4.37	0.0009	0.0001	0.0004	0.001	0.01	<0.00050	4.37	0.0003	0.0003	0.00024
Zinc	<0.01	87.45	0.0019	0.0006	0.0261	0.029	0.26	<0.01	87.44	0.0050	0.0050	0.12000

lbs/day = conc. in mg/L X flow in MGD X 8.34 lbs/gal.

Intake Flow	2097.032	MGD	River flow and data from CUF 2010 NPDES Permit renewal application, Data from 2C sampling
Leachate worse case Phase 3 Flow	1.1	MGD	Leachate estimates for flow and chemical parameters taken from SGLP data - Flow from Stantec Help Model
CCW Flow	2096.987	MGD	CCW Flow from CUF NPDES Permit renewal application 2016, data was taken from intake data and from NPDES sample data for Outfall 002
1Q10 River Flow	678.8	MGD	Flow to evaluate Human Health SHF Permit 2005
	146	mg/L	Intake hardness as CaCO3 from 2010 permit renewal 2C samples

The evaluation for the storm water loading from the proposed landfill does have the potential to increase the metals and ammonia concentrations in the Scott Branch, a Tributary of Wells Creek. A loading calculation was performed utilizing preliminary storm water flow data (Table 4-5). The peek peak flow data was utilized from the 100-year, 24-hour storm. Flows were utilized going into each storm water impoundment and the concentration was evaluated coming out of each storm water impoundment. Additionally, this loading and mixing calculation did not consider any treatment in the storm water impoundments. It would be assumed that in-stream water quality standards would need to be met at the storm water outfall prior to mixing with the stream, since the stream is a zero-flow stream. The evaluation showed that all constituents evaluated would be below WQS, except for arsenic, mercury, selenium and thallium. This may indicate that there may be a need for mitigation measures, which may include waste water treatment, prior to discharge from this outfall and should be taken into consideration in future designs and storm water discharges.

Table 4-5. Impacts of Contact Storm Water discharges from Proposed New Landfill

Parameter	FGD SGLP Conc. (mg/L)	BAS SGLP Conc. (mg/L)	Fly Ash SGLP Conc. (mg/L)	Landfill SGLP Conc. Estimates (mg/L)	Landfill Storm Water Loading Estimates (lbs/day)	Rain Water Conc - Assume De Minimis (mg/L)	Projected Mixing Conc. Rain Water with Landfill SGLP Pond 1 (mg/L)	Projected Mixing Conc. Rain Water with Landfill SGLP Pond 1 (mg/L)	Projected Mixing Conc. Rain Water with Landfill SGLP Pond 1 (mg/L)	Instream Water Quality Criteria Conc., (mg/L)
Antimony	0.0022	0.0002	0.0052	0.008	1.44716	0.0005	0.00758	0.00763	0.00766	0.64000
Arsenic	0.0024	0.0011	0.0116	0.015	2.82164	0.001	0.01477	0.01488	0.01493	0.01000
Barium	0.0135	0.0009	0.7830	0.797	149.62911	0.001	0.78228	0.78846	0.79131	NC
Beryllium	0.00010	0.00001	0.0000	0.00015	0.02820	0.0005	0.00016	0.00015	0.00015	NC
Cadmium	0.00017	0.00003	0.0001	0.00028	0.05195	0.00025	0.00028	0.00028	0.00028	0.00200
Chromium	0.0007	0.0004	0.0252	0.026	4.93467	0.001	0.02582	0.02601	0.02610	NC*
Copper	0.0051	0.0001	0.0052	0.010	1.96978	0.001	0.01032	0.01039	0.01042	0.01300
Iron	0.0096	0.0568	0.0044	0.071	13.27905	0.001	0.06944	0.06998	0.07023	NC
Lead	0.0013	0.0004	0.0261	0.028	5.22354	0.001	0.02733	0.02754	0.02763	0.06500
Manganese	0.2885	0.0007	0.0001	0.289	54.26322	0.001	0.28371	0.28594	0.28697	NC
Mercury	0.000033	0.000004	0.000015	0.000052	0.009777	0.000100	0.00005	0.00005	0.00005	0.00005
Nickel	0.0040	0.0001	0.0015	0.006	1.04587	0.001	0.00549	0.00552	0.00554	0.47000
Selenium	0.2244	0.0002	0.0812	0.306	57.36977	0.001	0.29995	0.30231	0.30340	0.02000
Silver	0.0004	0.0000	0.0002	0.001	0.12974	0.00025	0.00068	0.00069	0.00069	0.00320
Thallium	0.0009	0.0001	0.0004	0.001	0.26324	0.0005	0.00139	0.00139	0.00140	0.00047
Zinc	0.0019	0.0006	0.0261	0.029	5.35441	0.0125	0.02823	0.02835	0.02841	0.12000

lbs/day = conc. in mg/L X flow in MGD X 8.34 lbs/gal.

SW worse case 100 yr, 24 hr	22.5	MGD	Storm water estimates for flow from SW Ponds - Flow from Stantec Help Model
Avg Dis SW 1 Pond	0.4	MGD	Storm water estimates for flow from SW ponds discharges - Flow from Stantec Help Model
Avg Dis SW 2 Pond	0.3	MGD	Storm water estimates for flow from SW ponds discharges - Flow from Stantec Help Model
Avg Dis SW 3 Pond	0.2	MGD	

Acute standards used because it is assumed that discharges from landfill will not exceed 4 days per week per EPA basis, except where no CMC standard is given.

In addition to the theoretical evaluation, actual storm water samples were collected from the current dry stack at CUF just prior to discharge into the ash impoundment. This analysis displayed that all metal constituents were below WQC, except for arsenic and thallium. The increased concentrations of the mercury and selenium observed in the theoretical evaluation were not observed in the actual storm water samples from the dry stack and are therefore, considered to have a reduced risk of impacts from selenium and mercury. All thallium concentrations were below detection and were considered to be a function of the fact that the method‘s detection limit is higher than the criteria and therefore, has the potential to not be a foreseeable impact. In addition to the metals listed below in Table 4-6, total dissolved solids were above water quality criteria, which could be an indicator of potential water quality issues due to dissolved solids.

Table 4-6. CUF Dry Stack Storm Water Concentrations

Parameter	MDL (mg/L)	Dry Stack SW Conc. - (mg/L)	Instream Water Quality Criteria Conc., (mg/L)
Antimony	0.002	<0.002	0.64000
Arsenic	0.002	0.0111	0.01000
Barium	0.002	0.0733	NC
Beryllium	0.002	<0.002	NC
Cadmium	0.0005	<0.001	0.00200
Chromium	0.002	<0.002	NC*
Copper	0.002	<0.002	0.01300
Iron	0.001	0.122	NC
Lead	0.002	<0.002	0.06500
Manganese	0.015	0.0321	NC
Mercury	0.0000005	0.000013	0.00005
Nickel	0.002	<0.002	0.47000
Selenium	0.002	<0.002	0.02000
Silver	0.002	<0.002	0.00320
Thallium	0.002	<0.002	0.00047
Zinc	0.025	<0.025	0.12000

Acute standards used because it is assumed that discharges from la

Currently, a treatability study is being conducted to better project the water quality of the leachate and storm water discharges from the proposed landfill and the treatment options that could be employed as needed. TVA would conduct a characterization of the leachate and runoff streams post-construction to confirm no significant impacts to the Cumberland River, Wells Creek or Scott Branch. The waters would be analyzed for metals and other parameters. If determined to be necessary, appropriate mitigating measures would be evaluated and implemented to ensure that the discharge meets NPDES permit requirements for the water quality parameters. These mitigation methods could possibly include, rerouting discharge waste streams to facility outfall(s) or the Cumberland River; the addition of water treatment; and/or implementing BMPs as potential examples.

4.2.5.3 Ammonia Criteria

Ammonia slip, the emission of unreacted ammonia (NH_3), is caused by the incomplete reaction of the ammonia with NOx present in the flue gas. The unreacted NH_3 could react with available gaseous sulfuric acid to form ammonium bisulfate (NH_4HSO_4), a very sticky substance. Ammonia slip tends to adhere to or commingle with the fly ash, and/or build up on the air preheaters (APHs) interior surfaces. Formation of NH_4HSO_4 could accelerate the buildup inside the APHs, and make the periodic cleaning of the APHs more difficult.

$NH_3 + H_2O + SO_3 \Leftrightarrow NH_4HSO_4$

Approximately 20 percent of the NH_3 slip is expected to adhere to the heating surfaces in the APH, and about 80 percent adhered to the fly ash. The partitioning of ammonia slip between fly ash and APH heating surfaces will be determined by the specific equipment installed, actual fuel blends, and their operating characteristics.

The discharge concentrations to the receiving stream or the concentration at the edge of an approved mixing zone in the receiving streams should meet applicable water quality standards. The USEPA acute aquatic life criterion (ALC) for ammonia in fresh water is termed the criterion maximum concentration, or CMC. The CMC is the one-hour average concentration of total NH3-N (in mg of nitrogen per liter [N/L]) which is not to be exceeded at the discharge more than once every three years on average. he CMC is pH dependent: as the pH increases, the ammonia CMC decreases to remain protective of aquatic organisms (Table 4-7). The CCC is the 30-day average concentration of total NH3-N/L, which is not to be exceeded more than once every three years on average. The CCC is pH and temperature dependent: as pH and/or temperature increase, the ammonia CCC decreases to remain protective of aquatic organisms. The landfill leachate and storm water discharge are expected to be precipitation driven and would be required to meet the CMC criteria (TVA 2008).

Table 4-7. Maximum Allowable Ammonia Concentrations to Protect Aquatic Life From Acute Effects at Typical pH Levels

Acute Criterion (mg NH_3-N/L)						
pH 6.0	**pH 6.5**	**pH 7.0**	**pH 7.5**	**pH 8.0**	**pH 8.5**	**pH 9.0**
54.99	48.83	36.09	19.89	8.41	3.20	1.32

Note: Assumes salmonids are absent

As mentioned previously, CUF currently burns 100 percent ILB coal. Due to the presence of acid species in ILB coal ash and flue gas relative to PRB coal ash and flue gas, it is likely that the ammonia slip could react with gaseous acids or acids in the fly ash, causing an increase of ammonia on the ash and potentially forming ammonium fluoride, ammonium chloride, and/or ammonia-sulfur salts (ammonium bisulfate likely predominating) among other species. This acid-base neutralization reaction would likely keep the ammonia more stable in solid salt form or combined with fly ash and less susceptible to off-gassing as it would be in a more alkaline environment. If dissociated in water, the soluble ammonium would likely pair with soluble acids from the now more acidic fly ash and result in a more neutral pH, to the extent that such a small amount of gaseous ammonia slip can influence the pH of a much larger volume of water.

4.2.5.4 Nutrient Criteria

Because addition and conversion of ammonia increases the nutrient enrichment potential of impoundment aquatic discharges (total nitrogen, NO2+NO3-N, organic nitrogen), nutrient water

quality criteria for the receiving water bodies are important considerations. States' water quality standards contain criteria to protect surface waters from the adverse effects of nutrient enrichment. These criteria have historically been in the narrative form (prohibit the formation of objectionable accumulations of floating materials), but more recently, a major emphasis by USEPA and the states is to develop numeric, "not to exceed," concentrations of the nutrients nitrogen and phosphorous or of biological (i.e., algal biomass) or other (i.e., water transparency) values that protect against use impairment. USEPA is encouraging states to promulgate numeric nutrient criteria that will be protective of downstream, even far-field, uses such as in the Gulf of Mexico hypoxic zone. Should any receiving stream segment become listed as "impaired" on a state's 303(d) list due to exceedance of either existing or future ammonia and/or nutrient criteria, TVA would reduce or treat the amount of ammonia and/or nutrient discharged as required to comply with water quality standards and NPDES permit limits. (TVA 2008)

The leachate infiltration assumptions included the following:

- Twenty percent moisture content on the CCR.
- Particle density was assumed at 2.25 kg/L.
- One hundred percent of the ammonia would be released from the CCR.
- One pore volume of water dissolves all of the NH_3 in one unit volume of CCR.
- The average concentration of ammonia on the fly ash for 2016 was utilized.

An ammonia model was used to evaluate the expected ammonia releases from the landfill. The current NPDES permit requirements includes report only monitoring, however if the concentration is found to be over 2.08 mg/L than corrective actions are to be implemented. The model was based on conservative assumptions at the time of release and included mixing of the leachate stream with Wells Creek to meet the acute criteria when pHs of the waste streams ranged from 6 to 9 s.u. The leachate impoundment could be released in a batch process so that if any treatment is required this discharge flow can be isolated. No direct negative (toxic) impacts on water quality of surface waters are anticipated, based on modeled data.

Ammonia was also evaluated in the storm water run-off from the proposed new dry CCR landfill. This discharge may be discharged via new storm water outfalls to Scott Branch or Wells Creek. Flows were utilized going into each storm water impoundment and the concentration was evaluated coming out of each storm water impoundment. It would be assumed that in-stream water quality standards would need to be met at the storm water outfall prior to mixing with the stream, since Scott Branch is a zero-flow stream. he modeled concentration of the Total Ammonia as Nitrogen was found to below the chronic toxicity levels when pH was ranged from 6 to 9 s.u. and before accounting for mixing with Scott Branch.

TVA would conduct a characterization of the leachate and run-off streams to confirm no significant impacts to Wells Creek or Scott Branch. The waters would be analyzed for nutrients (including ammonia), metals and other parameters. If determined to be necessary, appropriate mitigation measures would be evaluated and implemented to ensure that the discharge NPDES permit requirements for the water quality parameters are met. (TVA 2017)

After accounting for the impacts of the by-product storage leachate and storm water, the impacts after mixing with the Cumberland River would be minor, however there would be for potential impacts in the Wells Creek and Scotts Branch. TVA would conduct a characterization of the leachate and run-off streams to confirm if there would be impacts to the Cumberland River, Wells Creek or Scotts Branch. The waters would be analyzed for metals and other

parameters. If determined to be necessary, appropriate mitigation measures would be evaluated and implemented to ensure that the discharge requirements for the water quality parameters are met.

4.3 Alternative C – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place and By Removal to Onsite Stacks), Onsite Landfill for Future CCR Produced at CUF

4.3.1 Construction Impacts Other than Onsite Landfill

These would be the same as for Alternative B.

4.3.2 Construction Impacts from Onsite Landfill for Future Ash

These would be the same as for Alternative B.

4.3.3 Operational Impacts

4.3.3.1 Bottom Ash Dewatering Facility Operational Impacts

Option 1 - Construction/Operation of a Process Dewatering Facility Utilizing a Continuous or "Once Through" System

These would be the same as for Alternative B.

Option 2 - Construction/Operation of a Process Dewatering Facility with a Recirculated Bottom Ash Sluice Stream

These would be the same as for Alternative B.

4.3.3.2 Ash Impoundment Closure Operational Impacts

Ash Impoundment Closure With Existing CCR Closed- in-Place

These would be the same as for Alternative B.

Ash Impoundment Closure With Existing CCR Removed to Onsite Stacks

All removed CCR material would be hauled to the onsite stacking areas. Runoff would be managed through the process water basins. Treatment of all runoff in compliance with applicable regulations and permits should result in any surface water impacts being minor.

4.3.3.3 CCR Landfill for Future Ash - Operational Impacts

These would be the same as for Alternative B.

4.4 Alternative D – Bottom Ash Dewatering Facility, Ash Impoundment Closure (In-Place and By Removal to Offsite Landfill), Offsite Landfill for Future CCR Produced at CUF

4.4.1 Construction Impacts

These would be the same as for Alternative B. With the implementation of appropriate BMPs only temporary minor, impacts to surrounding surface waters would be expected from construction activities associated with dewatering facilities and impoundment closure.

4.4.2 Operational Impacts

4.4.2.1 Bottom Ash Dewatering Facility Operational Impacts

Option 1 - Construction/Operation of a Process Dewatering Facility Utilizing a Continuous or "Once Through" System

These would be the same as for Alternative B.

Option 2 - Construction/Operation of a Process Dewatering Facility with a Recirculated Bottom Ash Sluice Stream

These would be the same as for Alternative B.

4.4.2.2 Ash Impoundment Closure Operational Impacts

Ash Impoundment Closure With Existing CCR Closed in place

These would be the same as for Alternative B.

Ash Impoundment Closure With Existing CCR Removed to Offsite Landfill

These would be the same as for Alternative B.

4.4.2.3 Offsite CCR Landfill (Bi-County Solid Waste Landfill) for Future CCR Produced at CUF- Operational Impacts

However, in contrast to Alternatives B and C, this alternative considers the transport of future ash to a previously permitted offsite landfill (Bi-County Solid Waste Management Landfill) for long-term storage. Minor impacts associated with construction and operation of the onsite landfill would not occur as both existing and future CCR produced by CUF would be transported to an existing offsite permitted landfill. It is assumed the pre-existing landfill would have necessary permits that would be protective of water quality. Because this is an existing permitted landfill, there would be no changes from the existing environment within the landfill boundaries under this alternative.

5.0 Summary

5.1 Environmental Consequences of the Proposed Projects

Impacts to surface water associated with the CCR management projects are summarized in Table 5-1.

Table 5-1. Summary of Impacts to Surface Water –

Project	Impact	Severity
Bottom Ash Dewatering Facility	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor when appropriate BMPs are implemented.
	Long-term beneficial impact due to reduction of mass loading of constituents.	Option 1 would result in minor benefit to water quality. Option 2 would result in an increased benefit to water quality as compared to Option 1 due to the

Project	Impact	Severity
		expected decrease in metals concentrations with the removal of the bottom ash waste stream and reduction in water use.
Ash Impoundment Closure (Closure-in-Place and Closure-by-Removal)	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor when appropriate BMPs are implemented.
	Change in management of onsite storm water and process water. All discharges would comply with current or potential NPDES permit measures and other state and federal regulations.	No impact.
Landfill		
Onsite Landfill	Temporary impacts to surrounding surface water from storm water runoff during construction.	Minor temporary impacts due to runoff would be minimized through BMPs.
	Direct impact related to filling and/or culverting 3,573 feet of perennial stream and 1,211 feet of intermittent stream.	Impacts to surface water features onsite would be mitigated by adherence to permit requirements.
	Potential impacts to Wells Creek and or Scott Branch from leachate and storm water discharges.	Mitigation measures may be required and implemented to meet permit requirements.
Offsite Landfill	No direct or indirect impact to surface water resources anticipated.	No impact.

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Appendix E – Coordination

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U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 05/22/2017
Name of Project Cumberland Fossil Plant CCR Mgt	Federal Agency Involved TVA
Proposed Land Use Landfill	County and State Stewart County, Tennessee
PART II *(To be completed by NRCS)*	Date Request Received By NRCS / Person Completing Form: McMillen

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☐ NO ☐	Acres Irrigated	Average Farm Size 157
Major Crop(s) Corn	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: 64290 % 20	
Name of Land Evaluation System Used LESA	Name of State or Local Site Assessment System N/A	Date Land Evaluation Returned by NRCS 6/19/2017	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	173.7			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	173.7			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	14.2			
B. Total Acres Statewide Important or Local Important Farmland	0			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	78			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	14.6			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	0			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	15			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	10			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	65	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	14.6	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	65	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	79.6	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

received 10.24.2012

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

October 24, 2012

Mr. Clinton E. Jones
Tennessee Valley Authority
400 W. Summet Hill Dr.
Knoxville, Tennessee, 37902-1499

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

Dear Mr. Jones:

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

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

We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.

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

EPM/jyg

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

November 5, 2012

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

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

Dear Mr. Jones:

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

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

Your cooperation is appreciated.

Sincerely,

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

EPM/jmb

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

May 2, 2013

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

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

Dear Mr. Jones:

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

Your continued cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.

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

EPM/jmb

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

June 21, 2017

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

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

Dear Mr. Jones:

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

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

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

Sincerely,

E. Patrick McIntyre, Jr.

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

EPM/cjl

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

June 26, 2017

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

RE: TVA / Tennessee Valley Authority, Cumberland Fossil Plant, Coal Cumbustion Residual Management, Stewart County, TN

Dear Mr. Jones:

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

Considering available information, concur with your agency's definition of the undertaking's area of potential effect no eligible architectural resources will be affected by this undertaking. We further concur that the project as currently proposed will adversely affect National Register Listed site 40SW219, the Brunsoni Furnace. You should continue to consult with our office to resolve the adverse effect through a memorandum of agreement. Please direct questions and comments to Jennifer M. Barnett (615 687-4780). We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.

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

EPM/jmb

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

July 28, 2017

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), DRAFT MEMORANDUM OF AGREEMENT (MOA) BETWEEN TVA AND THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER (SHPO) REGARDING THE PROPOSED MANAGEMENT OF COAL COMBUSTION RESIDUALS (CCR) FROM THE CUMBERLAND FOSSIL PLANT (CUF), STEWART COUNTY, TENNESSEE (87°41'1.574"W 36°22'34.771"N)

Enclosed for your review and comment is one hard copy of the subject MOA and one digital copy (Word Doc) on CD.

If you have any questions or comments, please contact Michaelyn Harle by email, mharle@tva.gov or by phone, (865) 632-2248.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

MSH:ABM
Enclosures
cc (Enclosures):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue
Cole Building #3
Nashville, Tennessee 37210

INTERNAL COPIES ONLY, NOT TO BE INCLUDED WITH OUTGOING LETTER:
A. Michelle Cagley, KFP 1T-KST
Michaelyn S. Harle, WT 11D-K
Amy B. Henry, WT 11D-K
Susan R. Jacks, WT 11A-K
Anita E Masters, BR 4A-C
M. Susan Smelley, BR 4A-C
James Darrell II Tipton, LP 5D-C
ECM, WT CA-K

MEMORANDUM OF AGREEMENT
PURSUANT TO 36 CFR PART 800
AMONG THE TENNESSEE VALLEY AUTHORITY (TVA), THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER (TNSHPO), AND THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE)
REGARDING THE PROPOSED MANAGEMENT OF COAL COMBUSTION RESIDUALS (CCR) FROM THE CUMBERLAND FOSSIL PLANT (CUF), STEWART COUNTY, TENNESSEE

WHEREAS, TVA proposes to construct and operate a new 81.4-acre waste landfill for the long term storage of CCR coal combustion residuals (CCR) (e.g., fly ash, bottom ash, boiler slag, and flue gas desulfurization materials) at the Cumberland Fossil Plant; and

WHEREAS, TVA considers this action meets the definition of “undertaking” at 36 CFR § 800.16(y); and

WHEREAS, USACE is a signatory to this Memorandum of Agreement (MOA) by virtue of its potential action to issue a Section 404 permit for certain activities relating to the landfill project; and

WHEREAS, pursuant to 36 CFR part 800.2(a)(2) and 33 CFR part 325, Appendix C(2)(c), the TVA and USACE have agreed that TVA is the lead Federal agency for the proposed Undertaking; and

WHEREAS, TVA, in consultation with TNSHPO, has determined the archaeological area of potential effects (APE) to be the location of the project footprint where ground disturbance would occur (approximately 174 acres for landfill development that includes an 81.4-acre landfill footprint) and the architectural resources as the half-mile radius surrounding the project area that could alter the existing viewshed of a historic resource (Appendix A); and

WHEREAS, the Brunsoni Furnace (site 40SW219) located within the archeological APE is listed on the National Register of Historic Places (NRHP) under Criterion A, B, and D; and

WHEREAS, TVA, in consultation with TNSHPO, has determined that the construction of the landfill would adversely affect 40SW219 (Appendix B); and

WHEREAS, TVA, in consultation with TNSHPO, has determined that the Undertaking will not directly or indirectly affect architectural properties listed in or eligible for listing in the NRHP; and

WHEREAS, TVA consulted with the following federally recognized Indian tribes regarding historic properties within the proposed project’s APE that may be of religious and cultural significance and are eligible for the National Register of Historic Places: Absentee Shawnee Tribe of Oklahoma, Alabama-Quassarte Tribal Town, Cherokee Nation, The Chickasaw Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Muscogee (Creek) Nation of Oklahoma, Shawnee Tribe, Thlopthlocco Tribal Town, and the United Keetoowah Band of Cherokee Indians in Oklahoma; and

WHEREAS, the Eastern Band of Cherokee Indians has chosen to participate in the development of this MOA; and

WHEREAS, the USACE has been granted the status of Invited Signatory under this MOA; and

WHEREAS, pursuant to 36 CFR § 800.6(a)(1),TVA has notified the Advisory Council on Historic Preservation (ACHP) of the finding of adverse effect on 40SW219; and the ACHP has chosen not to participate in the consultation; and

WHEREAS, TVA, in consultation with the TNSHPO, had determined that Data Recovery is an appropriate treatment to address the adverse effect to site 40SW219 and a Data Recovery Plan, is made part of this agreement as Appendix C.

NOW, THEREFORE, TVA, USACE, TNSHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

TVA shall ensure that the following stipulations are carried out:

I. TREATMENT OF HISTORIC PROPERTIES

TVA and the TNSHPO agree that site 40SW219 will be treated in the manner listed below.

A. IMPLEMENTATION OF THE DATA RECOVERY PLAN

The Data Recovery Plan, developed in consultation with the TNSHPO, is included in Appendix C of this MOA and made a part of it by reference. TVA shall ensure that data recovery of site 40SW219 is conducted in accordance with this Data Recovery Plan.

The Data Recovery Plan will be implemented consistent with the Secretary's Standards and Guidelines for Identification (48 FR 44720-44724), the Secretary's Professional Qualification Standards (48 FR 22716), and the TNSHPO's Standards and Guidelines for Archaeological Resource Management Studies.

B. MANAGEMENT OF THE DATA RECOVERY PLAN

TVA shall ensure that the implementation of the Data Recovery Plan meets the following standards and requirements:

1) The TVA will ensure that the Archaeological Contractor for the Data Recovery will submit weekly updates/progress reports to TVA through the duration of the data recovery.
2) The TVA shall submit a Management Summary of the data recovery effort to the signatories and concurring parties within (30) days of conducting such data recovery. The summary will include, at a minimum, the number and location of excavation units and cultural features, a discussion of the cultural deposits, and maps showing all units, and cultural features;
3) The TVA shall submit a Draft archaeological report of the results of the data recovery to the signatories and concurring parties, providing them thirty (30) days for review and comment.
4) TVA shall provide the final archaeological report resulting from the data recovery to signatories and concurring parties. This Report shall conform to referenced professional standards, and to the Secretary's *Format Standards for Final Reports of Data Recovery Programs* (42 FR 5377-79); The final archaeological report will include *in situ* photographs, presented in an archival stable format;
5) The TVA will make provisions for professional, independent review by a third party, in the event that unusual or complex issues arise during the execution of the Data Recovery Plan that are beyond the expertise of archaeologists involved in implementing this MOA.

II. POST - REVIEW DISCOVERY

Pursuant to 36 CFR § 800.13(b), TVA, in consultation with the TNSHPO, shall make a reasonable and good faith effort to avoid or minimize any adverse effects to NRHP-eligible archaeological resources that may be discovered after the completion of the Section 106 process. In the unlikely event that the TVA, in consultation with the TNSHPO, cannot avoid or minimize adverse effects to previously undiscovered NRHP-eligible archaeological resources,

TVA shall consult with the TNSHPO and consulting parties to resolve these adverse effects through the execution of an amendment to this MOA as detailed in Stipulation VI.

III. SCHEDULE FOR IMPLEMENTING DATA RECOVERY

A. Fieldwork shall be completed prior to submittal of the management summary to TVA.

B. TVA shall provide the management summary to the signatories and the concurring parties within 30 days of the completion of the fieldwork.

C. The signatories and concurring parties shall provide comments on the management summary to TVA no later than 30 days from receipt of the management summary from TVA. If the reviewing parties do not respond within the 30-day period, TVA may presume their concurrence with the contents of the management summary. TVA shall not begin any physical work related to the undertaking within the 30-meter (100-foot) buffers of site 40SW219 prior to receiving the comments of the signatories and concurring parties on the detailed management summary, or the end of the 30-day review period, whichever comes first.

D. TVA shall provide copies of the draft data recovery report to the signatories and concurring parties within two years of the date of execution of this MOA. The signatories and concurring parties shall have 30 days after receipt to provide comments. If comments are provided and the draft report is revised accordingly, TVA shall provide copies of the final report to the signatories and concurring party within three years of the date of execution of this MOA. If no comments are provided to TVA within the 30-day comment period, TVA will provide the final report.

IV. Public Outreach

TVA, in consultation with the signatories and concurring parties, will prepare a plan to involve the public as discussed in the Data Recovery Plan. At a minimum, TVA, will prepare, on its own or through its consultant, a pamphlet for public dissemination along with at least one community presentation as outlined in Appendix C.

V. DISPUTE RESOLUTION

Should any signatory or concurring party to this MOA object at any time to any actions proposed or to the manner in which the terms of this MOA are implemented, TVA shall consult with such party to resolve the objection. If the objection cannot be resolved, any signatory may seek guidance from ACHP pursuant to 36 CFR § 800.2(b)(2). TVA will take into account ACHP comments in resolving the objection with respect to the subject dispute. The signatories are responsible for carrying out all other actions subject to the terms of this MOA that are not the subject of the dispute.

VI. AMENDMENTS

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the Council.

VII. TERMINATION

If either signatory to this MOA determines that the terms will not or cannot be carried out, that party shall immediately consult with the other party to attempt to develop an amendment in accordance with Stipulation VI, above. If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the undertaking, TVA must either (a) execute an MOA pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments provided by the Council under 36 CFR § 800.7. TVA shall notify TNSHPO as to the course of action TVA will pursue.

If Stipulation I has not been implemented within 3 years from the date of execution of this MOA, the MOA will be terminated unless TVA and TNSHPO mutually agree to extend the duration of the MOA.

If the MOA is terminated prior to TVA's completion of the undertaking and prior to TVA's completion of Stipulations II and III, TVA shall continue to follow the procedures outlined by Subpart B of 36 CFR Part 800 for the resolution of adverse effects on historic properties resulting from the undertaking.

Execution of this agreement by the TVA, the USACE, and the TNSHPO, and implementation of its terms, is evidence that the TVA and the USACE have taken into account the effects of the Undertaking on historic properties and that the TVA and the USACE have complied with their obligations under Section 106 of the National Historic Preservation Act.

SIGNATORIES:

TENNESSEE VALLEY AUTHORITY

By: Patricia B. Ezzell Date: 10-4-17
Patricia B. Ezzell, Federal Preservation Officer

THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: 10-10-17

E. Patrick McIntyre, Jr. State Historic Preservation Officer

UNITED STATES ARMY CORPS OF ENGINEERS, NASHVILLE DISTRICT

By: Danny R Turley Date: 19 Oct 2017

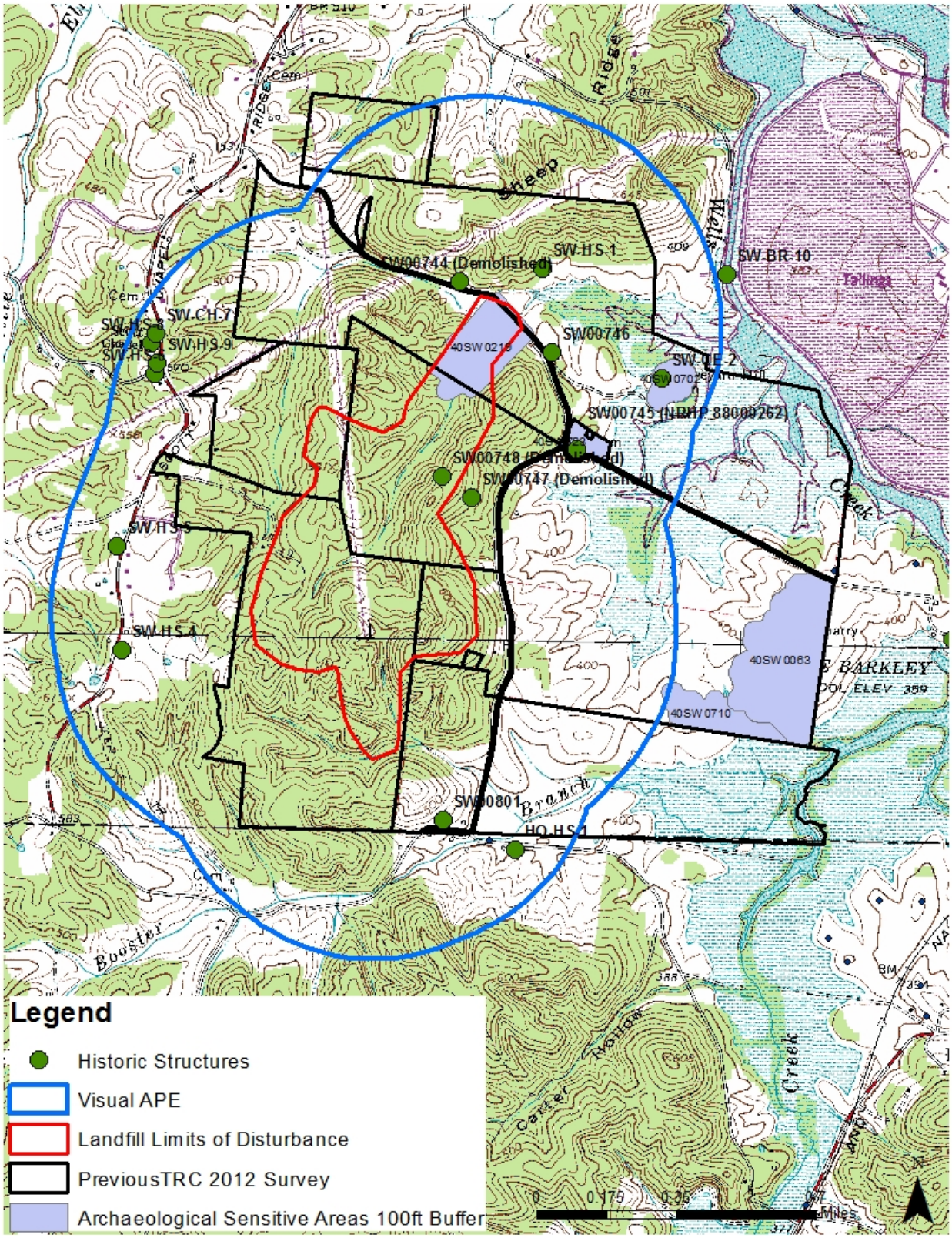
Cullen Jones, Lieutenant Colonel, District Commander

CONCURRING PARTY

Eastern Band of the Cherokee Indians

By: _____ Date: _____
Richard Sneed, Chief

APPENDIX A
Documentation of the Area of Potential Effects


SW00744 (Demolished)
SW-HS-1
SW-BR-10
Tailings
SW-CH-7
SW-HS-8
SW-HS-9
SW00746
40SW 0216
SW-DE-2
40SW 0702
SW00745 (NRHP 88000262)
SW00748 (Demolished)
SW00747 (Demolished)
SW-HS-5
SW-HS-4
40SW 0063
40SW 0710
SW00801
HQ-HS-1
Legend
Historic Structures
Visual APE
Landfill Limits of Disturbance
PreviousTRC 2012 Survey
Archaeological Sensitive Areas 100ft Buffer
0 0.175 0.35 0.7 Miles

APPENDIX B
Documentation of Section 106 Consultation
(Enclosed CD)

APPENDIX C
Data Recovery Plan

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

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

Project Name: _____ **Date**: 04/03/2018

Contact(s): Kevin Davenport, Ashley Pilakowski **CEC#**: _____ **RLR#:** _____ **Project ID**: _____

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Estimated number of trees or acres to be removed: 164 □ acres □ trees

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

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

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

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

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

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

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

STEP 6) Project includes the following:

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

STEP 7) Amount of SUITABLE tree/acreage removal or burned (may be different than total amount of removal): 164 ■ acres □ trees

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

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

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

STEP 10) Result of presence/absence surveys (if conducted), on _____ (date): □ **NEGATIVE** □ **POSITIVE** □ **N/A** *NOTES*: Acoustic surveys indicated potential presence of Indiana bat

STEP 11) ■ Conservation measures have been verified (and modified, if necessary) in Table 2. *NOTES*:
List at end has been reduced to those relevant to project.

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

STEP 12) Project ■ **WILL** □ **WILL NOT** require use of Incidental Take in the amount of 164 ■ acres or □ trees, proposed to be used during the ■ **VOLANT** ■ **NON-VOLANT** bat season (or □ **N/A**).

STEP 13) Available Incidental Take as of 04/03/2018 for Operate, Maintain, Retire, Expand, Construct Power Plants (Action):

TVA Action	Total 20-year acreage	Winter Burning/Removal	Volant Season Burning/Removal	Non-Volant Season Burning/Removal
#5	2200	1695	330	110

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

NOTES: Project is within 5 miles of documented northern long-eared bay hibernacula. Therefore, cost of removal is $750/acre if habitat is removed April 1 – May 31 or August 1 – November 14, and $1000/acre if habitat is removed June 1 – July 31.

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

Project Name: _____ **Project ID** (if applicable): _____
Project Contact(s): Kevin Davenport, Ashley Pilakowski **Today's Date**: 04/03/2018

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

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

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

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

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

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

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

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

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

		▪ Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy ▪ Maintain every site with well-equipped spill response kits, included in some heavy equipment ▪ Conduct Quarterly Internal Environmental Field Assessments at each sight ▪ Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. ▪ When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage o Construction Site Protection Methods ▪ Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites ▪ Storm drain protection device ▪ Check dam to help slow down silt flow ▪ Silt fencing to reduce sediment movement o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies ▪ Minimize storm water contact with disturbed soils at the construction site ▪ Protect disturbed soil areas from erosion ▪ Minimize sediment in storm water before discharge ▪ Prevent storm water contact with other pollutants ▪ Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1 acre) o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
☐	SSPC4	Woody vegetation burn piles associated with transmission construction will be placed in the center of newly established ROWs to minimize wash into any nearby undocumented caves that might be on adjacent private property and thus outside the scope of field survey for confirmation. Brush piles will be burned a minimum of 0.25 miles from documented caves and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.
☐	SSPC5	**Section** 26a permits and contracts associated with **solar projects**, **economic development projects** or land use projects include standards and conditions that include standard BMPs for sediment and contaminants as well as measures to avoid or minimize impacts to sensitive species or other resources consistent with applicable laws and Executive Orders.
☑	SSPC6	Herbicide use will be avoided within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes that are capable of supporting cave-associated species. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements.
☐	SSPC7	Clearing of vegetation within a 200-ft radius of documented caves will be limited to that conducted by hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.
☑	L1	Direct temporary lighting away from suitable habitat during the active season.
☑	L2	Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).