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FINAL
ASH IMPOUNDMENT CLOSURE PROGRAMMATIC EIS

PART II – SITE-SPECIFIC NEPA REVIEW: WIDOWS CREEK FOSSIL PLANT

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Symbols, Acronyms, and Abbreviations

ADEM	Alabama Department of Environmental Management
BMP	Best Management Practice
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
COC	Constituents of Concern
DMR	Discharge Monitoring Reports
dBA	Decibels A-Weighted
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
FGD	Flue Gas Desulfurization
HUD	Department of Housing and Urban Development
Ldn	Day-Night Sound Level
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
mi^2	Square Miles
MW	Megawatt
NEPA	National Environmental Policy Act
NLEB	Northern Long-Eared Bat
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
RIF	Relative Impact Framework
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
WCF	Widows Creek Fossil Plant
WCG	Water Quality Goals
yd^3	Cubic Yards

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

Widows Creek Fossil Plant (WCF) is a now-retired fossil plant located in Jackson County, Alabama adjacent to the Tennessee River (Figure 1-1). The Tennessee Valley Authority (TVA) operated WCF from 1952 to September 21, 2015. The plant is situated on a 2,542-acre (ac) reservation on the right (north) bank of the Tennessee River at its confluence with Widows Creek. WCF is located approximately 5 miles (mi) east of the town of Stevenson, Alabama. At its peak, WCF had eight coal-fired units generating power. Initially, six 140-megawatt (MW) units were built between 1952 and 1954. Two more units (575 MW and 550 MW capacity) were added in 1961 and 1965, respectively.

Units 1 through 6 were idled in 2011 and were then retired in stages between May 2012 and July 2013. Unit 8 was idled in October 2014. Due to a changing regulatory and economic environment, the last of its original eight units, Unit 7, stopped producing power on September 21, 2015. Unit 7 had a generating capacity to supply approximately 200,000 homes.

When WCF was operating, coal combustion residuals (CCR) were conveyed by slurry pipeline to the Ash Impoundment Complex (Figure 1-2). The complex received sluiced bottom ash, fly ash, gypsum, effluent from the Coal Yard Runoff Impoundment, and Metal Cleaning Impoundments, as well as sump pump flows from the WCF plant. The WCF Ash Impoundment Complex includes the Main Ash Impoundment, Upper and Lower Stilling Impoundments, and Dredge Cell. Table 1-1 summarizes characteristics of the Ash Impoundment Complex.

View of Main Ash Impoundment

In addition, the Dredge Cell contains fly ash, bottom ash, and gypsum. The Dredge Cell was inactive prior to retirement of the plant's coal-fired units with occasional use as a staging area for construction activities in other parts of the Ash Impoundment Complex.

Primary sources of flows to the Ash Impoundment Complex included ash sluice water (20.4 million gallons per day [MGD], flue gas desulfurization (FGD) wet stack (7.8 MGD), Units 7-8 sumps (5.0 MGD) and Units 1-6 sumps (1.9 MGD). Other minor sources (less than 1 MGD) include coal pile runoff, pumping basin inputs, metal cleaning wastes, and other sources. Process wastewater flows on-site have ceased due to the closure of the facility, but some storm water flows are still managed through the permitted outfall for the Ash Impoundment.

EPA's CCR Rule does not apply to power plants like WCF that have ceased producing electricity prior to October 19, 2015 [40 Code of Federal Regulations (CFR) § 257.50(e)]. Nevertheless, TVA anticipates conducting closure activities at this site over the next 2 years. TVA will comply with all applicable state requirements during the closure process.

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

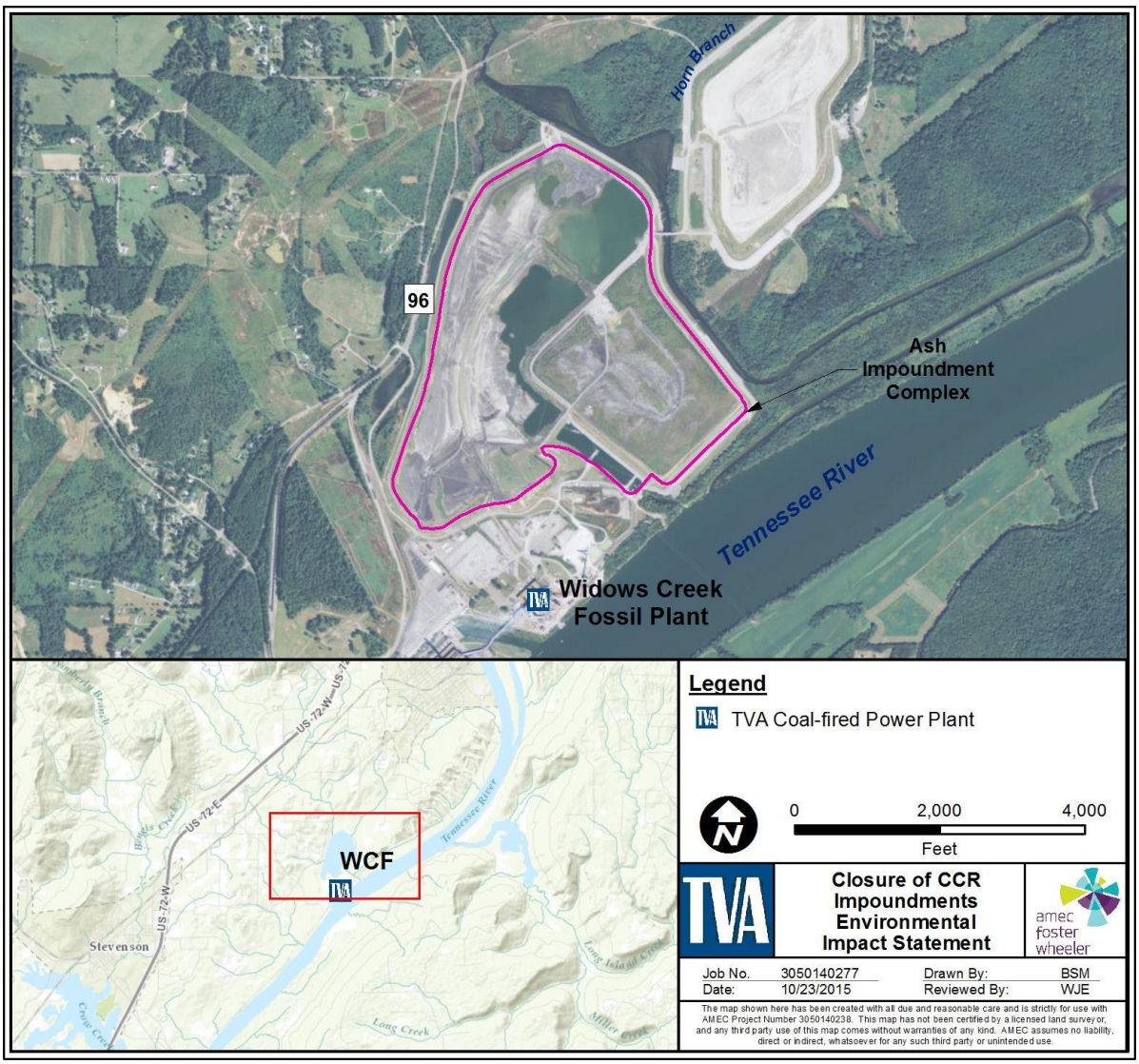

Figure 1-1. WCF Project Location

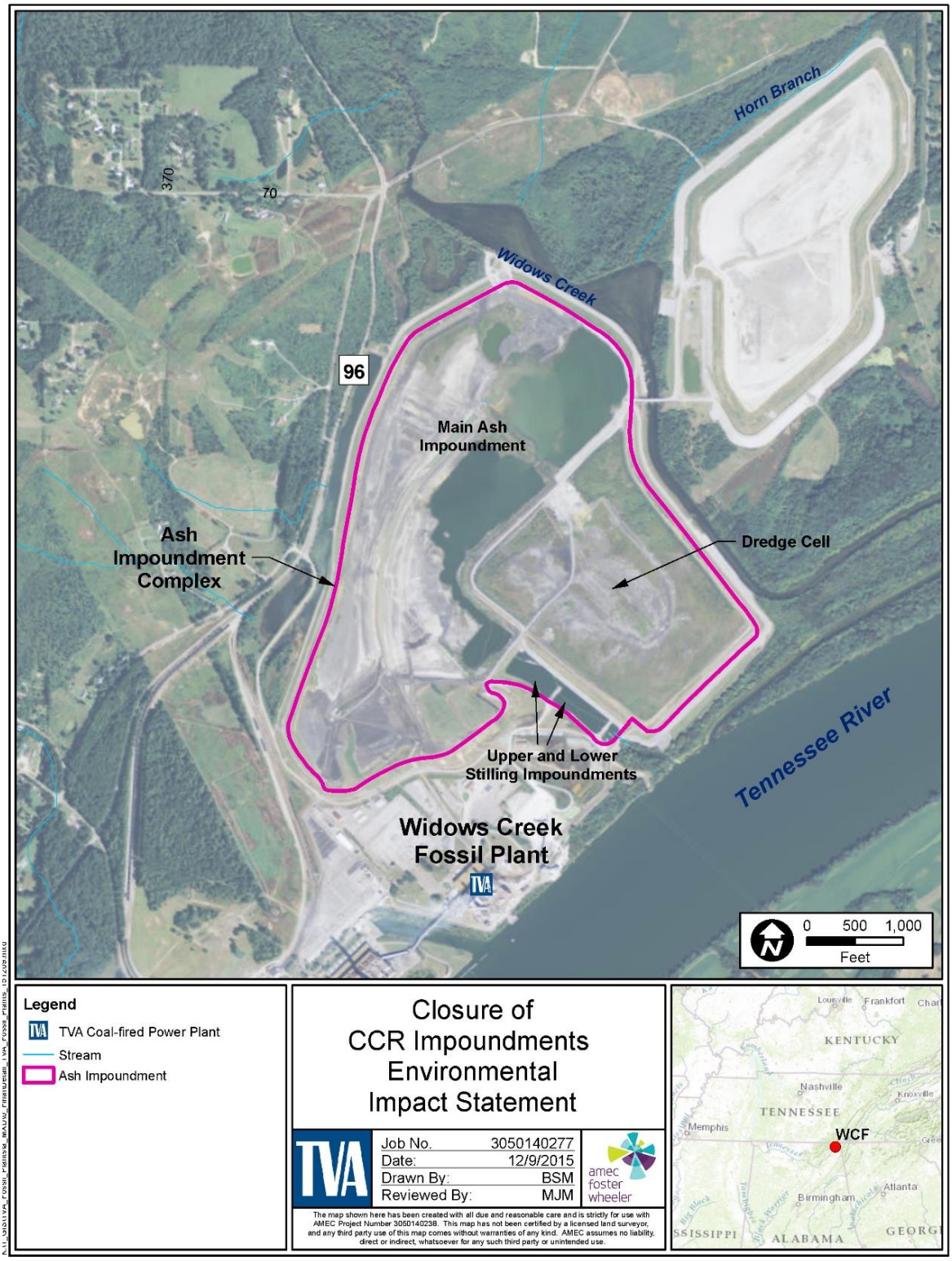

Figure 1-2. Ash Impoundment Closure Utilization Areas at WCF

Table 1-1. Summary of Ash Impoundment Complex Characteristics

Attribute	Description
Location	Jackson County, Alabama
Impoundment Name	Ash Impoundment Complex: Main Ash Impoundment, Dredge Cell, Upper and Lower Stilling Impoundments
Impoundment Status	Inactive
Size	350 ac
CCR Material	Bottom Ash/Fly Ash/Gypsum
CCR Volume	25 million cubic yards (yd^3)
Borrow Material Volume	1.5 million yd^3
Temporary Laydown Areas	5 to10 ac
Proposed Closure Completion Date	Within 5 years

1.2 Decision to be Made

TVA must decide how to close the 350-ac wet management CCR (Ash Impoundment Complex) at WCF. TVA's decision will consider factors such as potential environmental impacts, economic issues, availability of resources and TVA's long-term goals.

1.3 Purpose and Need

The purpose of this site-specific action is to support the implementation of TVA's stated goal of eliminating all wet CCR storage at its coal plants by closing the Ash Impoundment complex at WCF in a safe and effective manner and to assist TVA in complying with the U.S. Environmental Protection Agency (EPA)'s CCR Rule.

1.4 Summary of Proposed Action

TVA proposes to close the inactive Ash Impoundment Complex at WCF by converting the wet CCR storage to dry storage on-site using an approved closure methodology. The proposed action is summarized below and described in detail in Chapter 2.

The Ash Impoundment Complex is not considered a static stability risk (Dewberry 2012). Construction of an approximately 4,800 feet (ft) of stone buttress and inverted filter/stone buttress along the Main Ash Impoundment occurred between 2010 and 2011 to improve dike stability. TVA has determined the existing dikes of the Main Ash Impoundment, Dredge Cell, and Upper and Lower Stilling Impoundments are stable and do not require additional stabilization measures.

CHAPTER 2 – ALTERNATIVES

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

2.1 Existing Stilling Impoundment and Sluice Trench Operations

National Pollutant Discharge Elimination System (NPDES) Permit number AL0003875 (Alabama Department of Environmental Management [ADEM] 2008) regulates water discharges at WCF. Drainage from the WCF site discharges to the Tennessee River. Process wastewater discharges from the facility are permitted under the NPDES permit and include outfalls that are sampled, monitored, and reported on monthly discharge monitoring reports (DMR). These include Outfall 001a, Main Ash Impoundment Discharge, Outfall 001 Ash Impoundment Discharge, and Outfall 002, once-through condenser cooling water. ADEM, the agency that administers the State of Alabama's environmental laws, has administratively continued Permit No AL0003875 as the agency reviews TVA's permit renewal application.

Process wastewater flows on-site have ceased due to the closure of the facility. All metal cleaning impoundments are no longer receiving process water and have been closed. Precipitation-driven flows and possibly some surface water flows dewatering the Ash Impoundment Complex should be all that continue.

2.2 Project Alternatives

TVA evaluated three alternatives for closing WCF's Ash Impoundment Complex: Alternative A – No Action, Alternative B – Closure-in-Place, and Alternative C – Closure-by-Removal. Screening analysis to determine the reasonability of the "action" alternatives was undertaken by evaluating a range of key issues and factors related to each impoundment and the feasibility of undertaking closure activities (Figure 2-1). Key factors that TVA considered are identified in Part I, Section 2.2.5 and include the following:

- *Volume of CCR Materials*. The size of an impoundment and volume of CCR may affect closure activities and appropriateness of an alternative. The Ash Impoundment Complex at WCF is estimated to contain 25 million yd^3 of CCR materials.
- *Schedule/Duration of Closure Activities*. Time necessary to complete closure activities at a CCR impoundment will affect the reasonability of closure alternatives.

  EPA initially structured its CCR Rule to encourage utilities to cease disposing of CCRs in impoundments by October 19, 2015, and completed closure activities by April 2018 (EPA 2015). As promulgated, EPA excluded impoundments closed by April 2018 from the rule's other substantive requirements. In spring 2016, however, EPA agreed to remove this exemption from the rule because the agency failed to provide an opportunity for notice and comment on the exclusion. This change does not affect EPA's technical determination that removing the hydraulic head by dewatering and closing impoundments substantially reduces the risks of structural failures and groundwater contamination. Because of this pending regulatory change, TVA decided not to use the April 2018 incentive closure date as a significant factor in its consideration of the reasonableness of Closure-in-Place or Closure-by-Removal. Instead, TVA takes into account the 5-year timeframe that EPA set for completing impoundment closures, 40 CFR §257.102(f). Closing earlier

rather than later is preferable from an environmental standpoint and this still remains an important consideration in TVA's analyses.

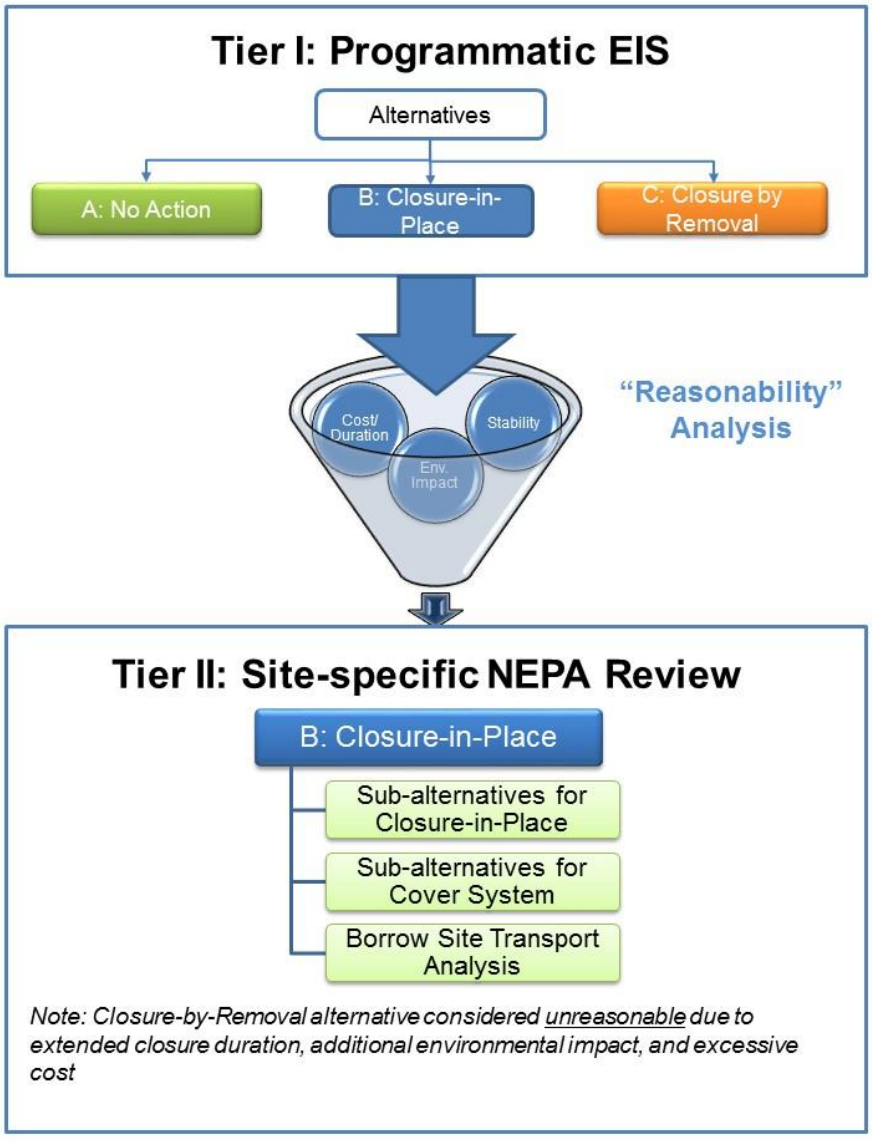

Figure 2-1. Reasonable Alternatives Analysis for WCF Ash Impoundments

- *Stability*. Stability of the CCR facilities was evaluated by Dewberry Consultants (2012). Safety ratings under static conditions were determined to be adequate for the Ash Impoundment Complex. TVA is currently evaluating the seismic stability of all CCR facilities (including the Ash Impoundment Complex) and will make appropriate modifications to ensure that the dike stability is at a level that meets or exceeds industry acceptable factors of safety using conservative assumptions. The Ash Impoundment Complex ceased receipt of CCR materials on September 21, 2015 and is currently undergoing water level reductions in accordance with existing NPDES permit allowances. As the plant is shut down, process waters no longer are

routed to the Ash Impoundment Complex further reducing hydraulic inputs and enhancing stability.

- *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. Worker safety is a particular concern as heavy equipment and difficult working conditions would occur for any closure activities. However, deep excavations into the CCR impoundment required under the Closure-by-Removal Alternative are particularly dangerous as noted by reports of accidents leading to injury or death in the industry. As discussed in Challenges of Closing Large Fly Ash Ponds, accidents, near misses and fatalities have been reported at impoundments during operations and closure activities (Seymour et al. 2013 and Johnson 2014). Equipment, such as bulldozers and trucks, can become bogged down, disabled and engulfed. For example, while removing fly ash from an impoundment in Kentucky, an excavator was operating approximately 200 ft from the side of the impoundment when the exposed surface of the fly ash slid over an underlying soft, apparently saturated area killing the excavator and its operator.
- Closure-by-Removal also would require a substantially greater number of more truck movements into and out of the site which would increase the risk of injuries and fatalities associated with truck crashes (see Part I, Chapter 2). As the number of truck movement miles increase, both for Alternatives B and C, the risk of traffic crashes, including personal injuries and fatalities, increases.
- *Mode and Duration of Transport Activities.* As described in Part I, Section 3.16, the activities related to transport of borrow (Alternative B) and CCR removal and transport (Alternative C) by truck or rail require the use of large numbers of vehicles and operators. For those sites with CCR volumes exceeding 600,000 yd^3, TVA determined that insufficient time is available within the construction schedule to effectively remove the CCR materials by truck or rail and achieve closure of inactive impoundments within the 5-year period for closure. While the WCF impoundments are not subject to the CCR Rule, the large volumes of CCR (approximately 25 million yd^3) would require approximately 170 years to transport the CCR by truck to a permitted landfill. For those impoundments containing greater volumes of CCR, the duration of removal activities by trucking would extend for prolonged periods and would likely result in greater environmental impacts associated with noise and emissions, degradation of roadway infrastructure, increased risk of injuries and death, and increased potential for accidental release.

  Transport of CCR by rail transport must consider the volume of CCR materials to be removed (cost-effectiveness and duration of removal operations), logistics related to supporting infrastructure (loading and unloading facilities), and the availability of rail service at receiving landfills. It is estimated that it would take approximately 84 years to transport WCF's CCR by rail to a permitted landfill. Due to the available space at WCF within the Ash Impoundment Complex, excavation, drying activities and movement to a rail loading facility would allow for faster removal of CCR from WCF than by truck.
- *Potential Effects to Wetlands.* Under the Clean Water Act, wetlands are considered "special aquatic sites" deserving of special protection because of their ecologic significance. Wetlands are important, fragile ecosystems that must be protected, and EPA has long identified wetlands protection as a high priority. Initial screening analysis by TVA determined that for both Alternatives B and C, proposed actions

would not cause or contribute to significant degradation of wetlands; and appropriate measures could be taken to avoid and minimize impacts to wetlands and ensure no net loss of wetlands.

- *Potential Effects to Water Resources.* Potential human health risk was also considered by reviewing the results of groundwater monitoring and the incidence of surface water releases from the Sluice Channel and Fly Ash Impoundment to receiving waterbodies. 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.
- *Risk to Adjacent Environmental Resources.* Risk of potential release and degradation of sensitive environmental resources (groundwater, surface water, ecological receptors, and factors related to the human environment) with a defined nexus to the CCR impoundment is an important consideration for alternative development.
- *Excessive Cost.* Excessive closure costs may affect the reasonableness of an alternative.

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

2.2.1 Alternatives Eliminated from Further Consideration

2.2.1.1 No Action Alternative

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

2.2.1.2 Alternative C – Closure-by-Removal

As described above, two action alternatives were evaluated by TVA for potential consideration in a site-specific review of reasonable alternatives at WCF.

Initial screening analysis by TVA showed that both Alternatives B and C, proposed actions would not cause or contribute to violations of any applicable state water quality standard, violate any applicable toxic effluent standard or prohibition, or jeopardize the continued existence of endangered or threatened species or critical habitats.

However, Alternative C: Closure-by-Removal was eliminated from detailed consideration for the Ash Impoundment Complex as it was determined to be unreasonable for logistical, environmental, and economical reasons. Key factors contributing to this determination included:

- Excessive volume of CCR materials (25 million yd^3).
- Removal of CCR by rail was considered by TVA for Closure-by-Removal of Ash Impoundment Complex. In Part I, Chapter 2.0, TVA identified factors to determine whether transport of CCR by rail would be reasonable. Those factors include volume of material; distance from the impoundment to a permitted landfill; availability of the infrastructure to manage the transfer of material; cost

effectiveness; and schedule. Applying these factors to the removal of CCR from the Ash Impoundment Complex, transport by rail is unreasonable due to the cost and closure schedule (See Table 2-1). Rail transport would require the installation of loading infrastructure, and a rail transportation service in the form of a rail carrier. Additional rail infrastructure may need to be constructed at or very near a Subtitle D landfill. The components of a rail unloading infrastructure may include: clamshell buckets to move the CCR off the train to a stockpile area prior to being placed on trucks and conveyors or loaders to load the CCR onto trucks; and infrastructure to support trucking to the landfill site. The necessary environmental and construction permits to construct these facilities could easily take 18 to 24 months to acquire. Rail cars may need to be lined to prevent spills or releases as was the case for the removal of CCR at KIF. After the Kingston Fossil Plant spill in 2008, rail was used to ship CCR to Arrowhead Landfill in Perry County, Alabama. Arrowhead Landfill can accept up to 15,000 yd^3 per day (Arrowhead 2015). At WCF, there are approximately 25 million yd^3 of CCR, and the average loading rate is expected to be approximately 2,000 yd^3 per day. Given the large volume of CCR materials at this impoundment, the costs and environmental impacts associated with development and permitting of the required loading and unloading infrastructure, use of rail to transport CCR from this site would not be feasible.

- Therefore, the amount of available working days is a limiting factor in the ability to transport CCR by rail and this transport option is not feasible.
- While the CCR Rule specifies a 5-year closure window, it is anticipated that up-front permitting and planning will take 6 months and post-closure site restoration and permit close-out will take 6 months. Thus, a 4-year window is used for the timeframe for hauling of CCR from the site. So the number of trucks to accomplish removal within a 4-year closure period would result in 2,500,000 truckloads (4,167 truckloads per day, Figure 2-1**Error! Reference source not found.**) to the nearest Subtitle D landfill. It is estimated that this would equate to approximately 463 loaded trucks passing by a given location each hour (7.7 trucks per minute).
- Extended duration of normal removal operations (estimated to be 171 years of trucking at 100 trucks per day).
- Potential safety concerns associated with increased motor vehicle crashes as described above and in Part I, Chapter 2.
- Potential impacts related to increased air and noise emissions associated with transport of CCRs to the nearest permitted Subtitle D Landfill.
- Potential impacts to environmental justice populations located along the haul or rail route to the nearest permitted Subtitle D Landfill.
- Deep excavations into the ash impoundment required under the Closure-by-Removal Alternative are particularly dangerous as noted by reports of accidents leading to injury or death in the industry as discussed above in Section 2.2. As described above, Closure-by-Removal also would require large numbers of trucks to transport CCR to an off-site landfill. This high rate of truck movements would only increase the potential for risk accident and injury to truckers and other motorists along the haul routes. There would also be a potential safety hazard if removal of CCR causes stability issue with the berms/dike.

- Excessive removal cost (includes CCR excavation and transport, borrow transport and placement) ($2.3 billion for truck and $2.06 billion for rail) (see Table 2-1).
- In addition, under Alternative C, CCR would be removed and placed in an appropriate receiving landfill. This may include a Subtitle D Landfill or a former mine. This activity introduces uncertainty into the schedule due to the possibility of environmental justice or permit challenges concerning the destination landfill. For example, when TVA removed CCR to the Arrowhead landfill after the Kinston coal ash spill, some residents opposed the placement of CCR in that landfill even though Alabama's and Tennessee's environmental agencies (ADEM and TDEC respectively) EPA, and the Perry County Commissioner approved it. Local residents subsequently filed a complaint at EPA's Office of Civil Rights, alleging that the landfill disproportionately harmed the surrounding minority property owners. Similarly, despite receiving state approval to move ash from its impoundments to former clay mines and agreeing to line the mines, Duke Energy has encountered local resistance and legal challenges from residents living near the mines.

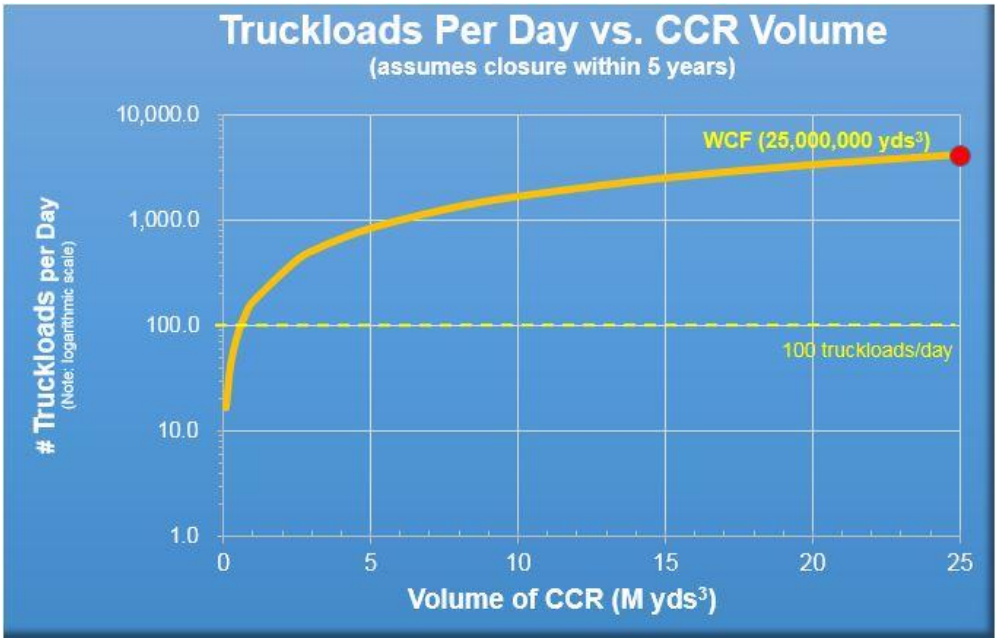

Figure 2-2. Number of Truckloads vs. CCR Removal Volume

2.2.2 Reasonable Alternatives Retained for Further Analysis

Alternative B was determined to be the only reasonable alternative for detailed consideration of closure of the Ash Impoundment Complex.

Alternative B – Closure-in-Place

Construction activities associated with the closure of the Ash Impoundment Complex will entail direct disturbance of the CCR impoundment (see Figure 1-2). The laydown area would be within the Ash Impoundment Complex and TVA anticipates temporarily using approximately 5 to 10 ac for vehicle and equipment parking, materials storage, and construction administration. Under this alternative approximately 1,500,000 yd^3 of borrow material would be hauled using 40-ton articulated dump trucks from an on-site borrow source (Figure 2-3).

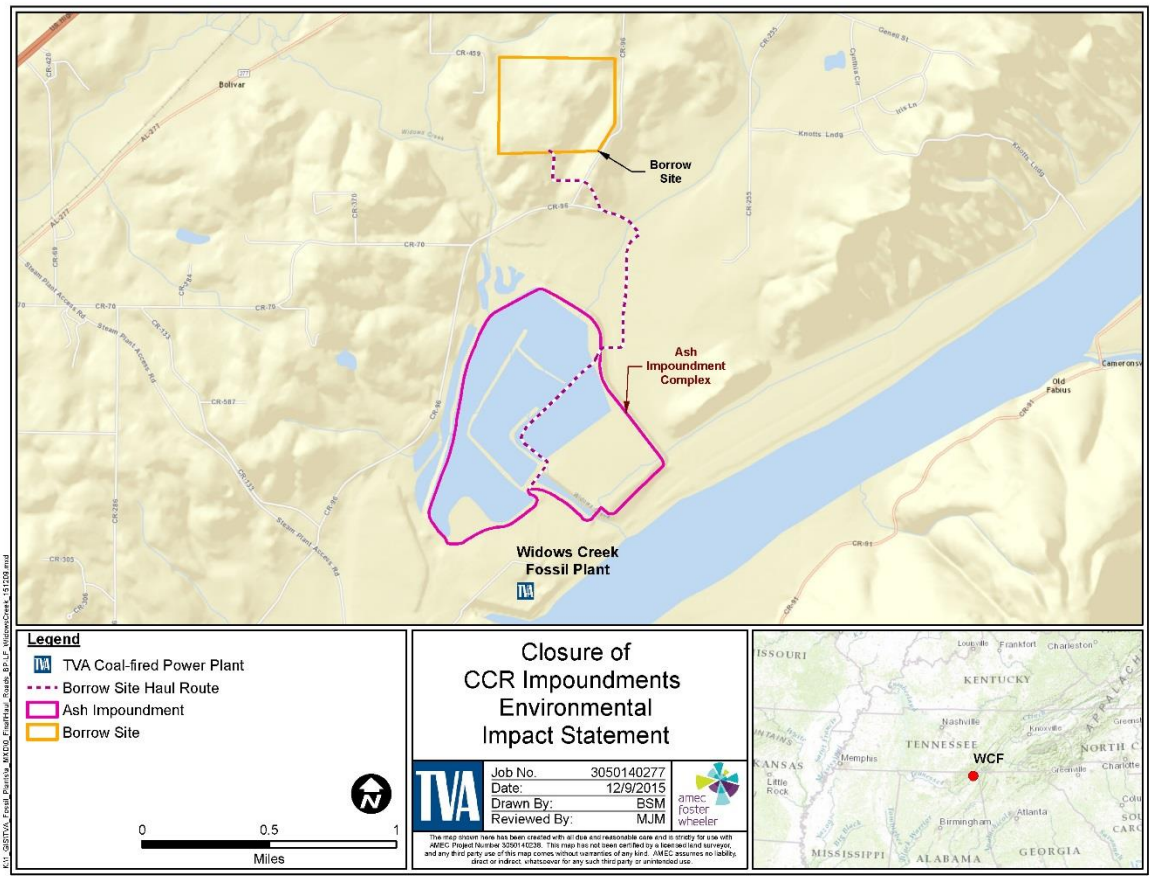

Figure 2-3. Proposed Borrow Site Location and Haul Route

Conceptual designs for the in-place closure of the Main Ash Impoundment, Dredge Cell, and Upper and Lower Stilling Impoundments are provided in Appendix A. Activities associated with this action would include the following:

1. Dewater surface water
2. Reroute conveyances sending stormwater to Ash Impoundment Complex
3. Grade and reconfigure CCR (Category C) to consolidate CCR (e.g., CCR from Upper and Lower Stilling Impoundments will be consolidated in Main Ash Impoundment), reduce footprint, and promote site drainage
4. Acquire and transport borrow material to help grade and cover site, depending on the extent to which bottom ash is used in the final closure design.
5. Install geosynthetic liner cover system (Geosynthetic-Protective Soil Cover System)
6. Install protective soil cover and establish non-invasive vegetation
7. Install and operate groundwater monitoring system per state requirements
8. Complete and submit closure documentation

Under this alternative, residual CCR materials within the Upper and Lower Stilling Basins will be excavated and relocated to the Main Ash Impoundment where they will be handled with other CCR materials as part of the closure process. Subsequent to closure, the Upper and Lower Stilling Basins will be used for overall site stormwater control.

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

Because the Ash Impoundment Complex is not considered to have a stability risk, no measures to improve stability are anticipated during the closure process (Dewberry 2012).

Alternative B is estimated to cost $200 million.

This closure alternative is evaluated in the Environmental Consequences Section as it is an alternative that could meet the purpose and need of the project. It could be accomplished within 5 years.

Table 2-1 Cost and Duration for Closure of the Ash Impoundment Complex at WCF

Closure-in-Place		Closure-by-Removal (Truck)			Closure-by-Removal (Rail)		
Cost (millions)	Duration (years)	Cost (millions)	Increase in Cost from Closure-in-Place (percent)	Duration (years)	Cost (millions)	Increase in Cost from Closure-in-Place (percent)	Duration (years)
$200	2.7	$2,300	1050%	170.6	$2.060	930%	84.3

2.3 EPRI Relative Impact Framework

As was described in Part I, Section 2.3, Electric Power Research Institute (EPRI) has developed a comprehensive analytical tool, the “Relative Impact Framework” (RIF) to assess and compare the potential health and environmental impacts of the two CCR impoundment closure alternatives, Closure-in-Place and Closure-by-Removal (EPRI 2016c). The RIF provides a systematic approach to quantify potential relative impacts to

environmental media associated with each closure scenario, including constituents in groundwater, surface water, and ambient air. In addition to environmental media, the RIF also provides an approach to quantify potential relative impacts to safety of workers and nearby residents from construction activities, including the transportation of materials to and from the site, in addition to the potential relative impacts to the sustainability of natural resources (e.g., energy, water and materials) associated with each closure alternative.

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

EPRI qualitatively applied its RIF to specific CCR facilities that TVA is proposing to close. Those analyses are discussed here in Part II for each of the sites for groundwater and surface water. In every instance, potential impacts on air quality, green and sustainable remediation, and safety were the same across all sites and not discussed in further detail. TVA's conclusions drawn from these more site-specific analyses confirm TVA's programmatic conclusions about the merits of and relative differences between the two closure methods.

2.4 Summary of Alternative Impacts

The environmental impacts of Alternative B are analyzed in detail in Chapter 3 and are summarized in Table 2-1. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Part I and Chapter 3.

2.5 Identification of Mitigation Measures

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

- Fugitive dust emissions from site preparation and construction will be controlled by wet suppression and BMPs (Clean Air Act Title V operating permit incorporates fugitive dust management conditions).
- Erosion and sedimentation control BMPs (e.g., silt fences and a truck wash) will ensure that surface waters are protected from construction impacts.
- Consistent with Executive Order (EO) 13112, disturbed areas will be revegetated with native or non- native, non-invasive plant species to avoid the introduction or spread of invasive species.
- BMPs will be used during construction activities to minimize and restore areas disturbed during construction.
- Under the CCR Rule and state requirements, TVA will be required to install or updgrade groundwater monitoring systems for WCF CCR facilities. Data from these systems will be used to assess groundwater contamination and, could trigger corrective action. State requirements provide an additional layer of groundwater protection to minimize risk.

Table 2-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative B – Closure-in-Place
Closure Cost	$200 million
Air Quality	Temporary minor impacts during construction from fugitive dust and emissions from equipment and vehicles.
Climate Change	Construction and trucking operations of borrow material contributes to emissions of GHG.
Land Use	No impact as no change in industrial land use.
Prime Farmland	No impact
Geology and Seismology	Stable under static conditions. Stability increased by removal of hydraulic head. Seismic stability under evaluation and mitigatable.
Groundwater	Reduction of hydraulic input reduces risk of migration of constituents to groundwater.
Surface Water	Risk to surface water would be reduced. Construction-related impacts would be negligible.
Floodplains	Reduces risk and extent of CCR migration into surface water during potential flooding event.
Vegetation	Minor and adverse impact in the short term to largely industrialized environmental settings that lack notable plant communities, but minor and positive in the long term.
Wildlife	Minor impact to previously disturbed low quality habitats. Potentially minor beneficial impacts in the long term.
Aquatic Ecology	No impact
Threatened and Endangered Species	No effect on threatened or endangered species
Wetlands	No impact
Socioeconomic Resources	Short-term beneficial increases in employment, payroll, and tax payments during construction.
Environmental Justice	No disproportionate adverse impacts to low income or minority communities.
Natural Areas, Parks and Recreation	No impacts
Transportation	Temporary minor impacts from transport of borrow material.
Visual Resources	Minor impacts during construction. Beneficial in the long term.
Cultural Resources	No impacts due to use of previously disturbed lands.
Noise	Minor construction noise impacts from equipment and vehicles.
Solid and Hazardous Waste	Minimal amounts generated during construction activities and managed in permitted facilities.
Public Health and Safety	Minor potential for impacts during construction activities and transportation of borrow material.
Cumulative Effects	Minor cumulative effects

2.6 Preferred Closure Alternative

TVA has identified Alternative B – Closure-in-Place as the preferred alternative. Alternative B would achieve the purpose and need of the project and close the Ash Impoundment Complex within the 5-year closure period. Alternative B can be completed in a much shorter time frame than Alternative C, requires substantially less cost, and avoids off-site transfer of CCR.

2.7 Necessary Permits or Licenses

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

- NPDES Construction Storm Water Permit for storm water runoff from construction activities.
- Modification of WCF's existing NPDES permit to reflect the decommissioning of Outfall 001a: Main Ash Impoundment and changes to discharges from Outfall 001: Ash Impoundment Complex.
- Modification to the Alabama NPDES Permit for Industrial Storm Water discharges would be made for the addition of new storm water outfalls.
- WCF's Construction Best Management Practices Plan would be revised to include the closed Ash Impoundment Complex.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

At the site-specific level, only a few of the resource areas addressed in the Part I programmatic review have the potential to be meaningfully different and these are the focus of the detailed analyses in this part. Resource area impacts that are not meaningfully different are:

- Air Quality and Climate Change
- Land Use
- Prime Farmland
- Geology and Seismology
- Socioeconomics
- Visual Resources
- Solid and Hazardous Waste
- Public Health and Safety

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

3.1 Groundwater

3.1.1 Affected Environment

3.1.1.1 Physiographic Setting and Regional Aquifer

WCF is located in the Valley and Ridge Physiographic Province, a northeast-southwest trending series of parallel ridges and valleys composed of folded and faulted Paleozoic sedimentary rock. The primary geomorphological features are mainly the result of differential weathering of various rock types, which include: limestone, dolomite, shale, sandstone, and siltstone. Residual soil typically ranges in thickness from about 10 to 150 ft. Larger valleys may have a comparatively thin mantle of alluvial soils ranging in size from clay to coarse sand to boulders, and deeply weathered alluvium in the vicinity of streams and rivers may be found both in low-lying areas and on hills, reflecting the dynamic geologic nature of the province. In areas underlain by limestone, solution weathering may result in karst development, with sinkholes as the primary and commonly recognizable feature.

As described in Part I, Section 3.6, the CCR Rule allows for the differentiation of the uppermost aquifer and the point at which groundwater is first encountered. Currently, the groundwater monitored at WCF has not been confirmed to be from the uppermost aquifer.

In 40 CFR § 257.60(a), the term uppermost aquifer is defined as including a shallow, deep, perched, confined or unconfined aquifer, provided it yields usable water, which may include considerations of water quality and yield (EPA 2015). TVA is in the process of studying groundwater characteristics near WCF for the purposes of better identifying the uppermost aquifer. Based upon the findings of these studies, and in consultation with ADEM, TVA will evaluate usable groundwater as it evaluates the depth to the uppermost aquifer at WCF.

3.1.1.2 Groundwater Quality

The existing monitoring well network consists of one upgradient well (W-10) and three down gradient wells (10-48, 10-49, and 10-50) (Figure 3-1).

For the purpose of the site-specific approach, the assumption can be made that groundwater flow direction is reflected of topographic and local geology and is anticipated to discharge to the adjacent Tennessee River. A potentiometric map developed for the site under impoundment operational conditions depicts mounding of groundwater within the impoundments resulting in groundwater flow directions radially from the center of the Dredge Cell. Based on the potentiometric map, groundwater flow direction in the stilling impoundments is southward towards the Tennessee River.

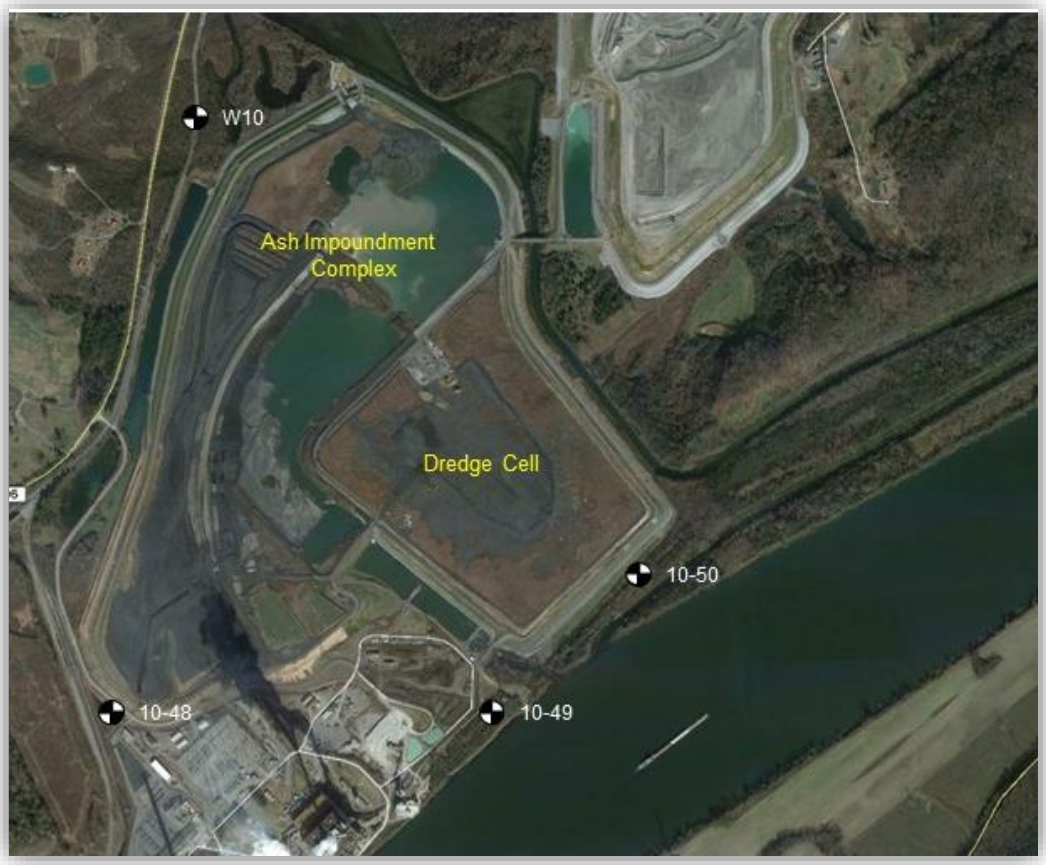

Figure 3-1. Array of Groundwater Monitoring Wells at WCF

The groundwater flow direction of the Main Ash Impoundment is northward to Widows Creek and away from the Tennessee River. Groundwater flow from the Dredge Cell is southward towards the Tennessee River.

Analysis has been performed on monitoring wells WCF-10, WCF-10-48, WCF-10-49 and WCF-10-50 using laboratory analytical results from March and August 2011. A time series analysis of monitoring data was developed for antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc. The metals series are developed using the total metals analysis results.

Groundwater concentrations do not exceed the maximum contaminant levels (MCL) or Water Quality Goals (WCG) for any parameter analyzed. Overall the trends appear stable or non-detectable, but with limited data available a trend is not apparent.

3.1.2 Environmental Consequences

As part of Alternative B, the dewatering of surface water and subsequent stabilization of the CCR materials in the Ash Impoundment Complex would provide an immediate reduction in the potential subsurface flow from the impoundment. Under Alternative B, surface water and all contributing surface inputs would be minimized or reduced, resulting in a reduction of any groundwater mounding below the Ash Impoundment Complex, and general improvement in groundwater. Additionally, the installation of an approved closure cover system would further reduce subsurface flow to the groundwater. This conclusion is supported by TVA's on-going monitoring of similar ash management facilities at WCF. Groundwater concentrations do not exceed promulgated MCLs or WCGs for any parameter analyzed.

Groundwater analytical data from the most recent sampling event are available on TVA's project Web site https://www.tva.com/Environment/Environmental-Stewardship/Environmental-Reviews/Closure-of-Coal-Combustion-Residual-Impoundments show no evidence of groundwater contamination from the Ash Impoundment Complex. Concentrations of the sampled constituents were below applicable MCLs, WCGs or were non-detectable.

In addition to any federal requirements that may apply to the Ash Impoundment Complex after closure is completed, TVA will implement supplemental mitigative measures as required by ADEM, as well as its approved closure plan which could include additional monitoring, assessment, or corrective action programs. These measures would further minimize any risk from closed impoundments.

The impacts of Alternative B – Closure-in-Place indicate that this alternative is beneficial to groundwater, as compared to Alternative A – No Action. Reduction of the hydraulic head by decanting surface water, couple with the removal of potential additional hydraulic inputs from precipitation, surface water run off or other water additions to the impoundment through the capping process would effectively reduce potential subsurface flow to groundwater. These measures would further minimize groundwater risk related to these closed impoundments.

With respect to groundwater, EPRI's qualitative analysis of WCF indicated that the Closure-in-Place Alternative was similar to the analysis of its hypothetical site. In particular, the Closure-in-Place Alternative resulted in a greater beneficial impact than the Closure-by-

Removal Alternative with respect to high mobility constituents under the non-intersecting groundwater and CCR condition (high mobility and low mobility constituents are defined in Part I, Section 2.3). This means that where the CCR is not in contact with groundwater, Closure-in-Place is predicted to reduce groundwater constituent concentrations more than Closure-by-Removal. For low mobility constituents, the differences between the Closure-in-Place and Closure-by-Removal were negligible under non-intersecting conditions. Under the intersecting groundwater and CCR condition, however, the Closure-in-Place alternative resulted in a less beneficial impact for high mobility constituents but not low mobility constituents. This means that where the CCR is in contact with groundwater, Closure-in-Place is predicted to reduce groundwater constituent concentrations less than Closure-by-Removal. l.

Therefore, in consideration of the beneficial effects of removal of the hydraulic head from inactive impoundments, the associated reduction in subsurface flows from CCR impoundments, and the commitment to supplemental mitigative measures, the impacts of the Closure-in-Place Alternative on groundwater associated with the Ash Impoundment Complex is beneficial and considerable, as compared to the No Action Alternative.

3.2 Surface Water

3.2.1 Affected Environment

WCF is named for a creek that flows through the plant site and is located on the Guntersville Reservoir on the Tennessee River in Jackson County in northeast Alabama.

WCF is located on the right (western) bank of Guntersville Reservoir at Tennessee River Mile (TRM) 407.5 (Figure 3-2). Guntersville Reservoir extends 76 river miles from Guntersville Dam in northeast Alabama (TRM 349.0), across the Alabama-Tennessee state line (TRM 416.5), to Nickajack Dam in southeast Tennessee (TRM 424.7). Guntersville Reservoir has a drainage area of 24,450 square miles (mi^2), of which 2,589 mi^2 are not regulated by upstream dams. The reservoir has a shoreline length of 890 mi and a water surface area of 69,100 ac at full pool. The width of the reservoir ranges from 900 ft to 2.5 mi. Average flow at Guntersville Dam is 41,100 cubic feet per second.

Consistent with the TVA Act, Guntersville Dam and Reservoir are operated for the purposes of flood protection, navigation, and power production, as well as to protect aquatic resources and provide water supply and recreation. During normal operations, the surface elevation of Guntersville Reservoir varies between 593 ft above mean sea level in winter and 595 ft above mean sea level in summer.

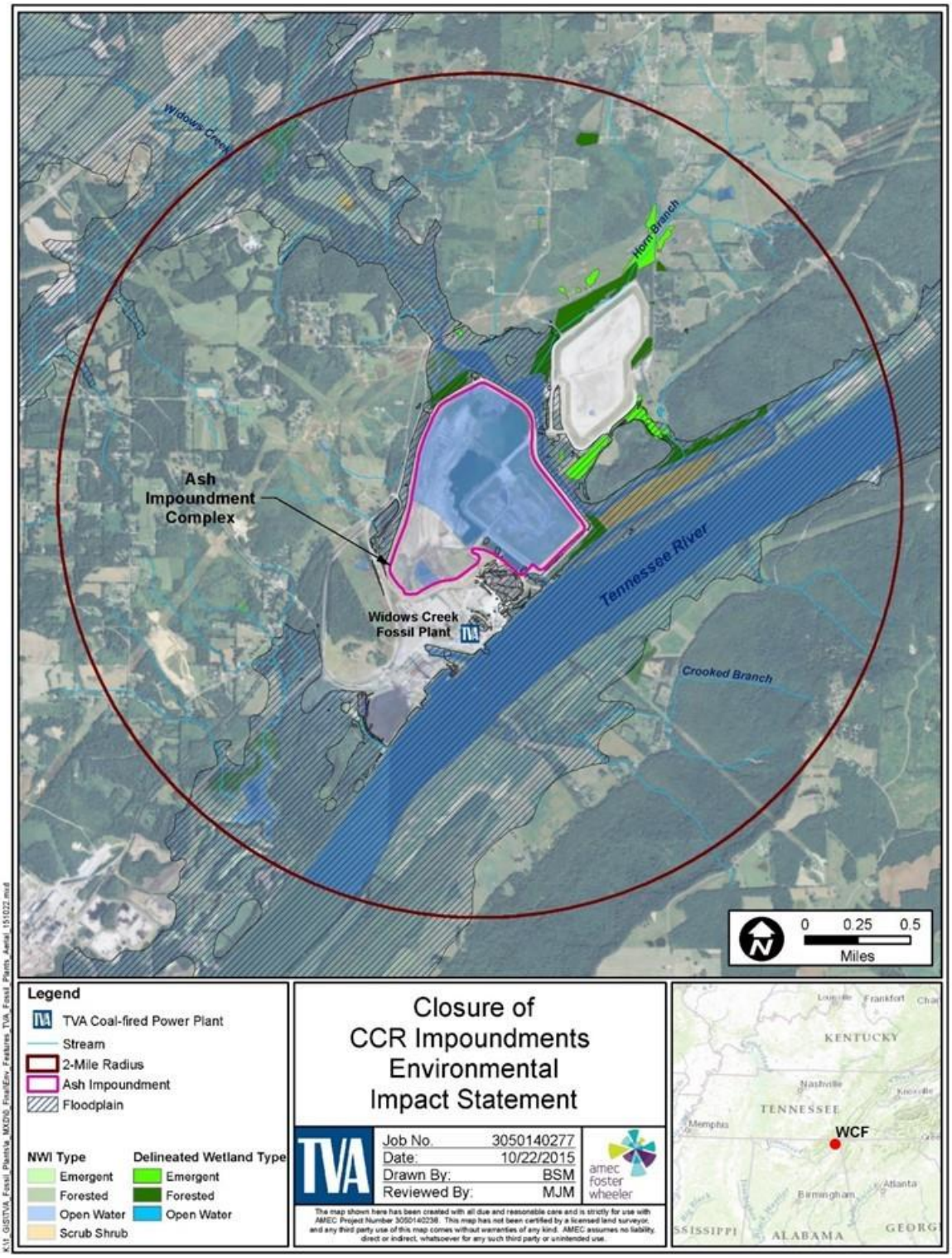

Figure 3-2. Environmental Features in the Vicinity of WCF

The ecological health condition of Guntersville Reservoir was rated “good” in 2012. Guntersville’s ecological health scores have fluctuated within the good range all years except 2008 and 2010, when Guntersville rated “fair.” The fair ratings were largely because several ecological indicators (dissolved oxygen, chlorophyll, and bottom life) at the forebay concurrently rated at the lower end of their historic ranges, which likely resulted from the generally dry weather pattern and low flow conditions during most of the summer months (TVA 2012b).

The State of Alabama has designated most of Guntersville Reservoir for public water supply, swimming and other whole body water-contact sports, and fish and wildlife use classifications. The segment from approximately TRM 363 to TRM 832.5 (upper end of Buck Island to mouth of Roseberry Creek) does not carry the public water supply classification.

The state also assesses the water quality of streams in the state. Those stream not meeting water quality standards are listed in a federally mandated report, referred to as a 305(b) report (from the section of the Clean Water Act). This report is published in alternate years. Major surface water bodies near the project area have impaired water quality that does not support designated beneficial uses (e.g., swimming, public water supply, aquatic habitat) (ADEM 2014). Widows Creek and Guntersville Reservoir (Lake Guntersville) are both listed as impaired because of elevated mercury levels from atmospheric deposition. Widows Creek is considered impaired from its confluence with the Tennessee River to 5 mi upstream; this includes the stretch of Widows Creek adjacent to the project area. Guntersville Reservoir is considered impaired over an approximately 2,700-ac area between Pump Spring Branch (approximately 4 mi downstream from the project area) and the Alabama-Tennessee state line (approximately 8 mi upstream of the project area).

Both listings are a result of a fish consumption advisory issued by the Alabama Department of Public Health in 2015 (Alabama Department of Public Health 2015). Widows Creek and Guntersville Reservoir were listed on the 2014 Alabama Final 303(d) list, but total maximum daily levels for mercury have not been established for either water body (ADEM 2014).

Widows Creek runs along the eastern side of the WCF site. The current creek channel through the plant site to the mouth underwent major rerouting in the 1970s to allow ash storage in the lowest areas of the plant site. The drainage area of Widows Creek is 43.5 mi^2. The watershed has many karst features (sinkholes, caves, and springs). Dry Creek, which flows into a cave, may resurface in springs in the Widows Creek drainage, which would add another 14 mi^2 to the drainage area. The upper part of the watershed is on the wooded slopes of the Cumberland Plateau escarpment. The downstream portions are in the rolling Sequatchie Valley, where land is mostly in pasture with some cultivated areas.

3.2.1.1 Process and Storm Water

NPDES Permit number AL0003875 (ADEM 2008) covers water discharges at WCF. Drainage from the WCF site discharges to Tennessee River. Process wastewater discharges from the facility are permitted under the permit and include outfalls that are sampled, monitored, and reported on monthly DMRs. These include Outfall 001a, Ash Impoundment Discharge to Units 7&8 Intake, Outfall 001 Ash Impoundment Discharge, and Outfall 002, once-through condenser cooling water. Permit AL0003875 has been administratively continued as ADEM reviews TVA’s permit renewal application.

The majority of the process wastewater flows on-site have either ceased completely due to the closure of the facility or the quantity of the flows have greatly reduced. All metal cleaning impoundments are no longer receiving process water and have been closed. Precipitation-driven flows and possibly some dewatering flows should be all that continue.

3.2.1.2 Surface Water Withdrawal and Discharge

As per the affected environment, other than precipitation-driven flows, the majority of flows from the facility would have ceased. There are no active withdrawal rates for this facility and this would not likely change with the closure of these impoundments. Raw and potable waters and storm water flows associated with this project would remain at ambient temperatures; therefore, no additional thermal impacts would be anticipated.

3.2.1.3 Ash Impoundment

CCRs were conveyed by slurry pipeline to the Ash Impoundment Complex. The WCF Ash Impoundment Complex includes four areas:

- Main Ash Impoundment (fly ash, bottom ash, gypsum)
- Dredge Cell (fly ash, bottom ash, gypsum)
- Upper and Lower Stilling Basins (de minimis CCR)

The discharge from the Ash Impoundment Complex is released through an NPDES discharge to the Tennessee River. Primary sources of flows to the Ash Impoundment Complex previously included ash sluice water (20.4 MGD), FGD wet stack (7.8 MGD), Units 7-8 sumps (5.0 MGD) and Units 1-6 sumps (1.9 MGD). Other minor sources (less than 1 MGD) include coal pile runoff, pumping basin inputs, metal cleaning wastes, and other sources.

3.2.2 Environmental Consequences

Under Alternative B, the Ash Impoundment Complex would be dewatered and all remaining CCR material would be consolidated and compacted. An approved cover system consisting of a geosynthetic liner coupled with cover soil would be installed as described in Part I, Chapter 2. In conjunction with impoundment closure activities, all systems currently discharging to the impoundment would be rerouted to other areas of the site.

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

The main operational change that would take place with the closure of the impoundments would be the change in management of the on-site storm water and process wastewater that is currently treated in impoundments and discharged from the Ash Impoundment Complex and Stilling Impoundments. Since the units have all ceased operation, the other process streams also will be discontinued. Any remaining minor flows would be redirected to other treatment systems as necessary to comply with a modified NPDES permit. This re-routing would conceptually use on-site, non-CCR impoundments and new ditches or piping to enable the proper handling and treatment of the waste streams. BMPs and wastewater treatment would be employed, as needed, to mitigate any pollutant discharge.

With the coal-fired units no longer in operation, the only significant remaining flows should be surface runoff stormwater flows. Closing the plant and Ash Impoundment Complex would eliminate a discharge averaging 31.4 MGD, containing various levels of suspended solids, metals, and other pollutants.

This alternative would reduce the potential for constituents of concern (COCs) in flow from either groundwater or from lateral movement (seepage) from berms to affect receiving surface waters. Pathways for transport of COCs as a result of these processes would be minimized.

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

EPRI also qualitatively compared its hypothetical site analysis to WCF using site-specific data (EPRI 2016a). With respect to surface water, EPRI's sensitivity analysis indicated only a negligible difference between the Closure-in-Place and Closure-by-Removal Alternatives with respect to both low and high mobility constituents under both the non-intersecting groundwater condition and the intersecting groundwater condition. It is expected that both closure alternatives would have similar benefits for surface water.

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

Because surface water flow and potential lateral movement and groundwater flow to surface waters would be minimized and because all work would be done in compliance with applicable regulations, permits and best management practices, potential direct and indirect impacts of this alternative to surface waters would be negligible.

3.3 Floodplains

3.3.1 Affected Environment

The Ash Impoundment Complex at WCF is located on Widows Creek, in Jackson County, Alabama. Widows Creek enters Guntersville Reservoir at Tennessee River Mile 408.2. Flood elevations on Widows Creek in this area are influenced by flood elevations on the Tennessee River. The 100- and 500-year flood elevations on Widows Creek at this location would be 608.0 and 610.6 ft, respectively.

According to Jackson County, Alabama, Flood Insurance Rate Maps, the Dredge Cell and portions of the Main Ash Impoundment are located within the limits of the 100-year floodplain of Widows Creek. However, the low crest elevation of the Dredge Cell is 636.9 ft,

which is well above both the 100- and 500-year flood elevations of Widows Creek. The low berm crest elevation of the Ash Impoundment Complex is 635.4 ft, which is also well above both the 100-year and 500-year flood elevations of Widows Creek. Consequently, none of the impoundments at WCF are located within the 100-year floodplain (Figure 3-2).

3.3.2 Environmental Consequences

Under this alternative, CCR material would be relocated within the existing footprints of the Ash Impoundment Complex. These facilities are located within the 100-year floodplain of Widows Creek, and the low berm crest elevations are above the 100-year flood elevation. Laydown areas would be located within the footprint of the existing Ash Impoundment Complex. Because the ash material would be relocated within the existing footprints of these facilities, and because the low berm crest elevations are above the 100-year flood elevation, there would be no impacts to floodplains or floodplain resources due to construction of the final closure systems at WCF.

3.4 Vegetation

3.4.1 Affected Environment

The project area lies within the Sequatchie Valley, a sub region of the Southwestern Appalachian Ecoregion. The Sequatchie Valley extends from the Tennessee border nearly 100 mi southwest into Alabama. In the vicinity of WCF, the open, rolling, valley floor (600 ft in elevation) is nearly 1,000 ft below the top of the Cumberland Plateau and Sand Mountain. Overall, this is an agriculturally productive region, with areas of pasture, hay, soybeans, small grain, corn, and tobacco (Griffith et al. 2001).

Vegetation in the proposed project area is primarily disturbed bare ground, however, it includes areas of lawn and early successional/ruderal vegetation. Common species observed at WCF include Bermuda grass, blackberries, butterfly weed, chicory, daisy fleabane, Johnson grass, narrow-leaf plantain, perennial ryegrass, orchard grass, Queen Anne's lace, smooth brome grass, tall fescue, yellow sweet clover, and white sweet clover (TVA 2015).

Land cover within a 2-mi radius of the plant is primarily deciduous forest (2,298.0 ac), hay/pasture (1,369.2 ac), and open water (872.8 ac) (Table 3-1). Land cover mapped within the permanent and temporary use areas is dominated by barren land (176.9 ac) (Figure 3-3). The Ash Impoundment Complex is characterized by open water and low intensity "developed" land cover type that are predominantly exposed and barren lands within the impoundment. Sparse weedy vegetated areas exist within the Ash Impoundment Complex. By comparison, plant communities within the Dredge Cell are more established (particularly along the perimeter) and consist of a range of early successional herbaceous species and sapling tree species (e.g. cottonwood). No unique plant communities are present within the proposed project footprint at WCF.

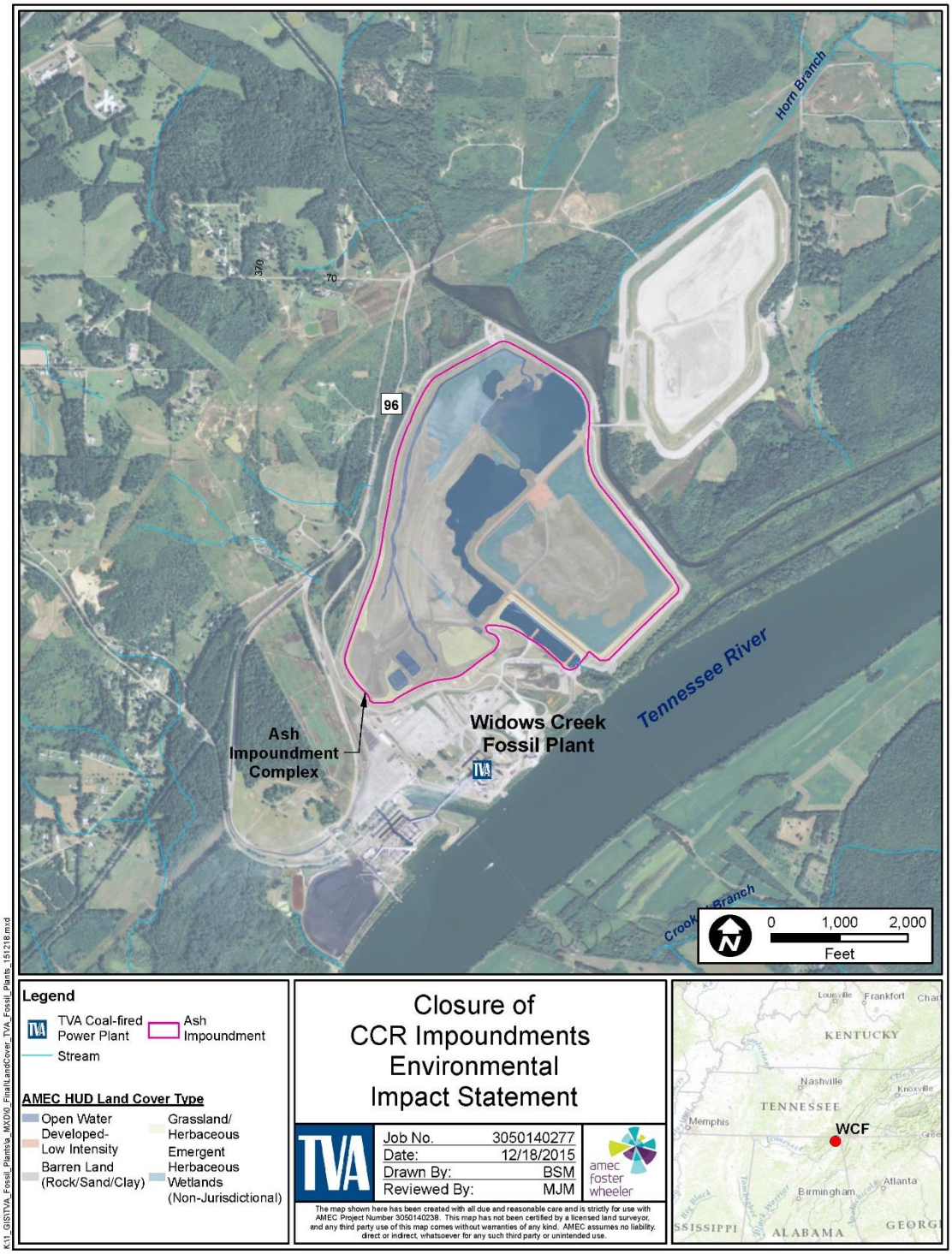

Figure 3-3. Land Cover Types Associated with Ash Impoundment Closure at WCF

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

Land Cover Type	Impact Area[1] (ac)	2-Mi Radius (ac)
Barren Land	176.9	35.8
Cultivated Crops	0	207.7
Deciduous Forest	0	2298.0
Developed, High Intensity	0	146.6
Developed, Low Intensity	9.6	282.8
Developed, Medium Intensity	0	369.0
Developed, Open Space	0	750.0
Emergent Herbaceous Wetlands	64.3	28.1
Evergreen Forest	0	349.7
Hay/Pasture	0	1369.2
Herbaceous	23.6	225.2
Mixed Forest	0	469.7
Open Water	76.1	872.8
Shrub/Scrub	0	469.2
Woody Wetlands	0[2]	168.5
Total	**350.6**	**8042.3**

Source: USGS 2011.
[1] Permanent Use Area: existing CCR Impoundment; Temporary Use Area: Laydown Areas
[2] Woody wetlands included based on inaccuracies of land use/land cover mapping. Not actually present within impact area.

3.4.2 Environmental Consequences

As discussed in Part I, Section 3.9, impacts to vegetation would result from earthmoving activities related to shaping and the CCR within the impoundments, inward reconfiguration of berms, and grubbing of laydown areas (if required). Because plant communities are more established within the Dredge Cell, impacts to vegetation would be greatest within this impoundment. However, because potential impacts are small relative to the abundance of similar cover types within the vicinity, direct impacts on vegetation are considered minor. No tree removal would be required under this alternative.

Under Alternative B, impoundments will be filled with soil from the previously permitted on-site location immediately north of WCF. Borrow material will be hauled to the CCR impoundments using an off-road route that was previously developed for use in supporting plant deconstruction. Potential indirect impacts of the transport of borrow material are associated with the deposition of fugitive dust on adjacent vegetation. However, this potential impact would be minimized by use of BMPs that include dust control measures on haul routes.

Lands within the Ash Impoundment Complex will also be restored with a cover system that includes the establishment of an herbaceous cover. Temporary use areas will be revegetated with herbaceous vegetation. Although transportation of borrow material has the potential to introduce invasive plants, BMPs consisting of erosion control measures and use of approved, non-invasive seed mixes designed to establish desirable vegetation would mitigate that risk. Therefore, impacts to vegetation under the Closure-in-Place Alternative would be minor. It is anticipated that post-construction vegetation impacts would have a minor long-term beneficial impact as cover would have more desirable vegetation where currently limited or no vegetation.

3.5 Wildlife

3.5.1 Affected Environment

The area evaluated for wildlife impacts at WCF includes the Ash Impoundment Complex, and their immediate surroundings, which include roads, maintained grassed berms, facility infrastructure, and limited areas of woody vegetation.

The Ash Impoundment Complex and associated grassed and rip-rapped berms offer little suitable habitat for wildlife species, but can be used by many common species. By comparison, the Dredge Cell is largely vegetated and is dominated by small cottonwood and other early successional species. Species observed during biological monitoring of the Tennessee River generally reflect typical species found in riparian areas and floodplain habitats. Identified species included eastern gray squirrel, spring peeper, American crow, belted kingfisher, blue jay, double-crested cormorant, downy woodpecker, European starling, great blue heron, mourning dove, northern cardinal, northern mockingbird, pileated woodpecker, red-bellied woodpecker, and wild turkey (TVA 2012a). Several of these species may intermittently utilize impoundments and associated habitats at WCF.

Bat surveys performed approximately 0.4 mi northeast of the project site between August 6 and August 10, 2013 found that several common bat species are also utilizing these areas over ponds (TVA 2014). Species reported via acoustic monitors and mist net captures were big brown, hoary, tricolored, and silver-haired bats. One federally listed bat species, gray bat, was captured in mist nets and recorded on acoustic devices during these surveys. Acoustic results also provided evidence that the federally listed Indiana bat also may use this habitat occasionally.

Review of the TVA Regional Natural Heritage Database in December of 2014 indicates that nine caves are reported within 3.0 mi of the project area. The nearest cave is 2.0 mi from the project area. Two historical records of colonial wading bird colonies also exist within 3.0 mi of the project area. One of these heronries was no longer present upon field inspection of the transmission tower that it was located on in December 2014. The other record also was a great blue heron rookery on the support beams of a transmission line tower within the Dredge Cell at WCF. However, TVA removed these nests and this structure in early 2015 as part of plant decommissioning activities.

3.5.2 Environmental Consequences

The project site occurs within a disturbed industrial landscape that offers minimal habitat for wildlife. Under this alternative, wildlife found in the project area would continue to opportunistically use available habitats within the project area. While clearing and removal of young trees would occur within the Dredge Cell, no larger or established trees would be removed. During construction, most wildlife present within the project site would likely disperse to adjacent and/or similar habitat.

Disturbance of caves that provide habitat for bats would not occur as these habitats are not present at WCF.

The closure of the Ash impoundment Complex would result in a loss of marginally suitable waterfowl and wading bird habitat. However, there is abundant waterfowl habitat elsewhere in the project vicinity along Lake Guntersville/Tennessee River. Thus, this loss of on-site bird habitat would be minor.

Following the construction period, some limited wildlife use of the closed impoundment may be expected. The Ash Impoundment Complex is proposed to be closed by using a geosynthetic and protective soil cover system and may, therefore, be expected to provide limited foraging and nesting habitat for grassland species. The resulting habitat would be of marginal quality and is not anticipated to support large populations of these species.

In consideration of the highly disturbed habitats present within the project area, the availability of higher quality wildlife habitat in the proximity, and the potential functional value of the installed vegetated cover system, potential direct and indirect impacts to associated wildlife are expected to be minor and potentially slightly beneficial in the long term.

3.6 Aquatic Ecology

3.6.1 Affected Environment

WCF is located in northeast Alabama on Guntersville Reservoir at TRM 407.5, approximately 58.5 mi upstream of Guntersville Dam and 17.2 mi downstream of Nickajack Dam. The Guntersville Dam impounds the 67,900-acre Guntersville Lake. The Ash Impoundment Complex is located north and northeast of the facility along Widows Creek near the Tennessee River.

TVA has systematically monitored the ecological conditions of its reservoirs since 1990 as part of its Vital Signs Monitoring Program. It is expected that aquatic resources within Widows Creek are similar to Guntersville Reservoir, given adjacency and the impounded nature in the lower portions of Widows Creek near the facility. To TVA's knowledge, no surveys of common aquatic animal species have been conducted in Widows Creek, with the exception of a habitat and snail survey conducted in 2009.

Shoreline and substrate sections were evaluated for aquatic habitat upstream and downstream of WCF in 2011. The shoreline sections had average scores of "fair", while limited aquatic macrophytes were noted along approximately 18 to 26 percent of the banks, on average, during the shoreline evaluation. The substrate was dominated by bedrock (38 percent) and gravel (27 percent) downstream of WCF, and by gravel (52 percent) and bedrock (22 percent) upstream of WCF. Sample depths downstream of WCF ranged from 15.1 to 37.5 ft, with an average depth per transect of 27.8 ft. Upstream, sample depths ranged from 18.1 to 57.8 ft and averaged 22.7 ft per transect (TVA 2012a).

TVA has evaluated the health of the fish community near TRM 405.0, downstream of WCF, and at TRM 410.0, upstream of WCF. The fish community rated "fair" at both of these locations in 2011. Historically, the fish community has rated "fair" or "poor" at these locations.

During the 2011 study, 22 indigenous species were collected at the downstream site and 22 at the upstream site; this includes 14 commercially valuable and 17 recreationally valuable species:

- Common centrarchid species present at WCF included redbreast sunfish, black crappie, bluegill, longear sunfish, redear sunfish and warmouth.
- Benthic invertivore species present included golden redhorse, logperch and freshwater drum.

- Top carnivore species present included longnose gar, largemouth bass, skipjack herring, smallmouth bass, spotted gar, bowfin, spotted bass, black crappie, sauger, white bass and flathead catfish.
- Intolerant species present included skipjack herring, longear sunfish, smallmouth bass and brook silverside. In addition, one thermally sensitive species, logperch, was present.
- Aquatic nuisance species included common carp, Mississippi silverside and yellow perch (TVA 2012a).

Benthic community data was collected from three sites, upstream and downstream of WCF, in 2011. Monitoring results for 2011 support the conclusion that a balanced indigenous population of benthic macroinvertebrates is maintained downstream of WCF. Sites had taxa averages of 5.8, 6.1, and 6.8 at TRM 406.0, 406.7 and 408.0 respectively. The Ephemeroptera, Plecoptera and Trichoptera taxa present were 0.6, 1.0 and 1.1 at CRM 1.5, 2.2 and 3.75 respectively, low- to mid-range numbers. However, the proportion of oligochaetes were 12.4 percent, 3.0 percent and 3.4 percent, which were mid- to high-range numbers (TVA 2012a).

A habitat and aquatic snail survey was conducted in March 2009. The survey revealed specimens of the native freshwater hornsnail and exotic Asiatic clam. No other native snail or mussel species were observed in the area. Both of these species are tolerant of a wide range of habitat conditions and are common in similar impounded areas of Guntersville Reservoir.

3.6.2 Environmental Consequences

Under Alternative B, no direct impacts to aquatic ecosystems are expected from the in-place closure of CCR impoundments at WCF. While some “inward” reshaping of the berms is expected to achieve the 3:1 slopes required by ADEM, no additional encroachment or filling is expected within the Tennessee River (backwater) or within Widows Creek.

Selected areas within the Ash Impoundment Complex will be used as a temporary laydown area to support closure activities. Consequently, no direct impacts to aquatic ecosystems would occur in conjunction with planned closure activities.

The wastewater discharges during dewatering will meet existing permit limits, and compliance sampling will continue to be performed at the approved outfall structure in accordance with the NPDES permit to demonstrate compliance. Additionally, any construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources in the Tennessee River and Widows Creek. Therefore, adverse effects to aquatic resources from the in-place closure of impoundments at WCF are expected to be minimal and temporary.

3.7 Threatened and Endangered Species

3.7.1 Affected Environment

A review of the TVA Natural Heritage Database in September 2015 revealed occurrence records for three listed species within a 2-mi radius of WCF as summarized in Table 3-2. Two additional federally-listed bat species, the Indiana bat and northern long-eared bat, are known to occur throughout the region and thus are included in Table 3-2. Occurrence

records for listed aquatic species and plant species do not occur within the 2-mi vicinity. In addition, four historical colonial wading bird rookeries are known to occur within 2-mi of WCF, at least two of which occur within TVA transmission lines. These rookeries consist primarily of great blue herons.

Green salamanders are found in damp areas, including rocky outcrops and ledges, beneath loose bark or cracks of trees, and under logs. Eggs are laid in similarly moist, dark places. The nearest record of this species documents an observation on a rock ledge within the vicinity of the project area (TVA 2014). Suitable habitat does not exist for this species in the project area.

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This species is associated with large mature trees capable of supporting its massive nests, which are usually found near larger waterways that offer suitable foraging habitats. Records document the occurrence of 17 bald eagle nests within Jackson County, Alabama, including one nest approximately 2.6 mi from the project area. However, this nest no longer exists. No large waterways occur in the project area and the nearest large waterway is the Tennessee River on the south side of WCF. In addition, the recent tornado in and near the project area damaged many large trees that may have otherwise been capable of supporting nests of this species. Finally, many other trees were logged from the area prior to TVA taking possession of the property. Potentially suitable habitats for bald eagle nests do not occur in the project area and no nests or resident pairs are known from the immediate vicinity (TVA 2014).

Cave obligate spiders are found in subterranean habitats in caves. As noted previously, no caves have been found in the immediate project area, and the nearest documented cave is 2.3 mi from the project area. No suitable habitat exists for the cave obligate spider in the project area.

Indiana bats hibernate in caves in winter and use areas around them for swarming (mating) in the fall and staging in the spring, prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead snags and living trees in mature forests with an open understory and a nearby source of water (Pruitt and TeWinkel 2007, Kurta et al. 2002). The closest caves currently occupied by Indiana bats are Saltpeter Cave (11.6 mi away, Jackson County, Alabama), Case Cave (14.8 mi away, Dade County, Georgia) and Sauta Cave (21.9 mi away, Jackson County, Alabama). No known caves or suitable winter roosting structures exist within the project footprint. Although open water areas of the ash impound may provide low-quality foraging habitat, suitable summer roosting habitat is not available in the project area.

Data currently available for northern long-eared bat suggests that this species occupies habitat similar to Indiana bat, although roost trees are just as likely to be live as dead, and the species is considered more common. Occurrence records exist for northern long-eared bat (NLEB) in Jackson County, Alabama but caves or other suitable winter roosting structures do not exist within the project footprint. Although open water areas of the impoundment may provide low-quality foraging habitat, suitable summer roosting habitat is not available in the project area.

Table 3-2. Listed Species in the Vicinity of WCF

Common Name	Scientific Name	Status Federal[1]	Status State[2] (Rank[3])
Invertebrates			
Cave obligate spider	*Nesticus barri*	--	TRKD(S3)
Amphibians			
Green Salamander	*Aneides aeneus*	--	PROT(S3)
Birds			
Bald eagle	*Haliaeetus leucocephalus*	DM	PROT(S3)
Mammals			
Northern long-eared bat[4]	*Myotis septentrionalis*[3]	LT	TRKD(S2)
Indiana bat[5]	*Myotis sodalis*[3]	LE	PROT(S2)

Source: TVA Regional Natural Heritage database, accessed 09/18/2015; Species documented within 2 mi of WCF

1 Federal Status Codes: DM = Delisted, Recovered, and Being Monitored; LE = Listed Endangered; LT = Listed Threatened; PE = Proposed Endangered; CAND = candidate for federal listing;

2 State Status Codes: END = listed endangered; NMGT = Listed in Need of Management; S-CE = special concern, commercially exploited; SPCO = species of special concern; THR = listed threatened; TRKD = tracked as sensitive but has no legal status; NOST = no status

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

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

3.7.2 Environmental Consequences

The area of permanent and temporary impact subject to project activities under this alternative is primarily comprised of developed or disturbed land that is generally unsuitable for the listed species in Table 3-2. There are no listed aquatic species known to occur within the project area and listed aquatic species would be unlikely to occur within the CCR impoundments at WCF. Because the terrestrial habitat on-site has been severely degraded and is populated primarily with early successional non-native species, suitable habitat is lacking within the CCR impoundments and the temporary laydown areas. Although low-quality foraging habitat may be available for Indiana bats and NLEB in open water areas of the CCR impoundments, suitable roosting habitat is absent from within the project area and tree clearing, except for some saplings in the Dredge Cell, is not anticipated with the proposed action. Suitable habitat for the cave obligate spider, green salamander, and bald eagle are absent from WCF project site.

Because suitable habitat for the species in Table 3-2 is either absent or degraded within the CCR impoundments at WCF, and because no tree removal would occur (except for some saplings in the Dredge Cell), no impacts to threatened and endangered species are expected with this alternative.

3.8 Wetlands

3.8.1 Affected Environment

WCF is located within the Sequatchie Valley, a sub region of the Southwestern Appalachian Ecoregion where wetlands are relatively uncommon (Griffith et al. 2001). Wetlands are primarily associated with low-lying, poorly drained areas, floodplains, and riparian zones.

The project area includes multiple impoundments with various roads and berms between them. There are some small areas of disturbed bare ground, however they are covered in

lawn and early successional/ruderal vegetation. The proposed construction footprint includes the Ash Impoundment Complex (see Figure 3-2). National Wetlands Inventory (NWI) mapping includes 163.3 ac of open water within the Ash Impoundment Complex. No additional laydown areas are required at WCF as activities supporting impoundment closure will be within the footprint of the Ash Impoundment Complex.

Two previous wetland surveys (December 2012 and August 2013) have been conducted at this facility for separate TVA projects. These surveys did identify wetland resources within TVA property, however none of them are located within the project area.

Although the USFWS mapped NWI features within the Ash Impoundment Complex, these features are WCF treatment systems and would not be regulated as waters of the U.S. under Section 404 of the Clean Water Act. The Ash Impoundment Complex consists of open water, exposed ash, riprap banks and some opportunistic wetland vegetation. Plant communities within the Dredge Cell are more established (particularly along the perimeter) and consist of a range of early successional herbaceous species and sapling tree species (e.g. cottonwood). The NPDES outfall from the Lower Stilling Impoundment discharges through an outfall structure to the old Widows Creek channel to the Tennessee River.

3.8.2 Environmental Consequences

Closure of the Ash Impoundment Complex would include filling the basins with earthen material, installation of a geosynthetic cover system, and earthen protective cover with herbaceous vegetation.

The open water features within the Ash Impoundment Complex are considered WCF treatment systems and are therefore, excluded from regulation under Section 404 of the Clean Water Act (see Part I, Section 3.13.2). Temporary laydown areas will be located within the Ash Impoundment Complex. Because there are no other jurisdictional wetlands within the Ash Impoundment Complex, permanent direct impacts to jurisdictional wetlands associated with construction activities are not anticipated.

Indirect impacts to nearby jurisdictional or non-jurisdictional wetlands could potentially result from the alteration of hydrologic inputs to the wetland system resulting from closure of the impoundments. Jurisdictional wetlands adjacent to the CCR impoundments have a hydrology that is dominated by water levels within the adjacent Tennessee River. Therefore, any modification of hydrologic inputs from the CCR impoundment is expected to have a negligible effect on these wetlands. Adjacent non-jurisdictional wetlands that may be perpetuated by lateral movement of water from the impoundment berms (seepage) (typically small, linear wetlands) may be reduced in size or eliminated by reductions in hydrology associated with impoundment closure. This cannot be avoided if these facilities are closed under either closure method. In terms of EO 11990, there is no practicable alternative that would avoid impacting such wetlands.

Potential indirect impacts resulting from construction activities could include erosion and sedimentation from storm water runoff during construction into off-site or nearby jurisdictional and non-jurisdictional wetlands. BMPs in accordance with site-specific erosion control plans would be implemented to minimize this potential. Indirect impacts to wetland areas due to construction activities would be short-term and minor. These impacts cannot be avoided if these facilities are closed under either closure method. In terms of EO 11990, there is no practicable alternative that would avoid impacting such wetlands.

3.9 Natural Areas, Parks and Recreation

3.9.1 Affected Environment

As illustrated on Figure 3-4, there are no parks, recreational areas, ecologically significant sites or Nationwide Rivers Inventory Streams on or in the vicinity of WCF. One natural area, the Raccoon Creek Wildlife Management Area is situated along the east bank of the Tennessee River across from WCF.

Raccoon Creek WMA is part of the Jackson County Waterfowl Management Areas and is managed by the Alabama Department of Conservation and Natural Resources Division of Wildlife and Freshwater Fisheries. The Raccoon Creek WMA is located along the east bank of the Tennessee River and encompasses approximately 8,500 ac and is used for waterfowl and small game hunting (ADCNR 2015).

3.9.2 Environmental Consequences

Under Alternative B, TVA would close the impoundments by reconfiguring the footprint and installing the selected cover system. Borrow material to complete the closure would be obtained from the previously permitted on-site borrow site. This site is also being used to obtain borrow to support the deconstruction of WCF. There would be no direct impact to managed areas as the impoundments to be closed are located on an industrial area and borrow material would be obtained from a previously permitted site.

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

Transport of borrow material would utilize a haul route on TVA property. There are no on-site recreation areas and no managed areas, parks or recreation areas in the vicinity of the haul route. Therefore, there would be no indirect impact to managed areas under this alternative from transport of borrow material.

3.10 Transportation

3.10.1 Affected Environment

WCF is served by roadway, railway and waterway modes of transportation. Traffic generated by WCF is expected to be composed of a mix of cars and light duty trucks, as well as medium duty to heavy duty trucks. Immediate access to and from the CCR impoundment is to and from Steam Plant Access Road, which ultimately leads to SR 277. CR 96 runs along the north and west end of WCF. The area immediately around WCF is very rural and is not served by a four-lane roadway.

The proposed haul route is identified in Figure 2-3 only incorporates one public roadway (CR 96). There are no published daily traffic records for Steam Plant Road and CR 96. However, it is expected that the volume on each of these roadways is less than 1,000 vehicles per day. However, as a conservative estimate, 1,000 vehicles per day is assumed.

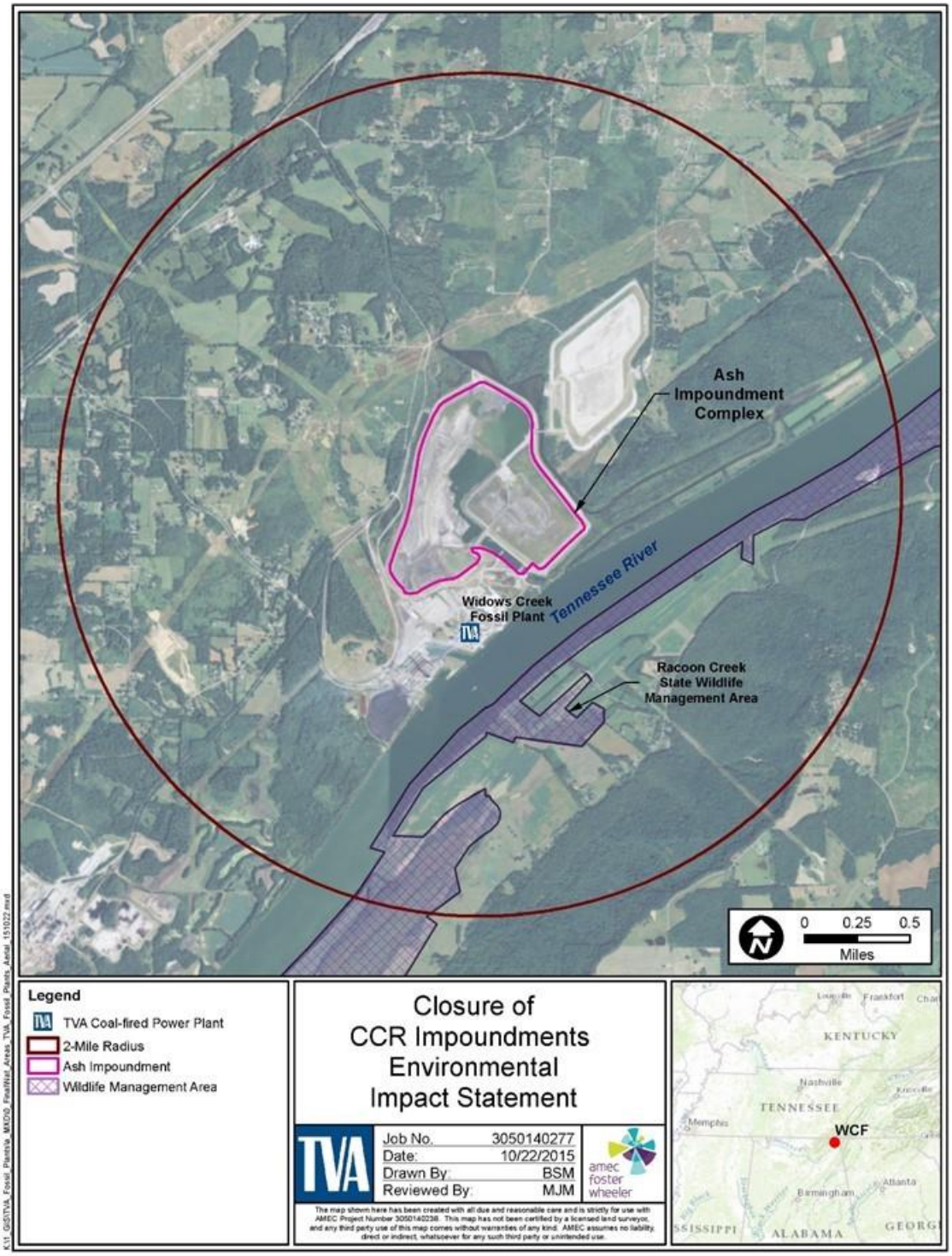

Figure 3-4. Natural Areas, Parks and Recreational Facilities Near WCF

3.10.2 Environmental Consequences

Traffic generated by the closure of the Ash Impoundment Complex would consist of the construction workforce, shipments of goods and equipment, and the transport of borrow material to the site to be used in the closure-in-place activities. It is estimated that the daily construction workforce will consist of approximately 75 to 100 workers. The construction workforce traveling to and from WCF would contribute to the traffic on the local transportation network. This workforce traffic volume would occur at the beginning and ending of the work day. Additional construction-related vehicles (dozers, backhoes, graders, loaders, etc.) would be delivered to the Ash Impoundment Complex on flatbed trailers under both the mobilization and demobilization stages of the project. With some multiple-occupancies in the construction workforce vehicles, a one-way estimate of 90 vehicles per day is assumed, which results in a traffic count of 180 vehicles per day. The number of daily shipments of goods and equipment is assumed to be 10, which results in a traffic count of 20 vehicles per day. Overall, the traffic volume generated by the construction workforce and the construction-related vehicles would be relatively minor and it is assumed that these motorists would disperse throughout the transportation network and use interstate highways or major arterial roadways as much as possible.

Transport of borrow material would be by 40-ton articulated (off-road) dump trucks from the on-site borrow area and would not contribute to roadway traffic volumes on County Road 96 and would occur over an approximate 3-year period. A 40-ton articulated dump truck has a heaped capacity of approximately 30 yd^3. Therefore, the estimated total construction traffic generated on Steam Plant Access Road is 111 forty-ton articulated truckloads per day or a traffic count of 222 truck trips per day. On this private road, the traffic count would be 25 forty-ton trips per hour or 0.41 trips per minute to transport borrow material.

Because the existing traffic volume on Steam Plant Road and CR 96 is assumed to be very low (approximately 1,000 vehicles per day) and because the total construction traffic increase is also projected to be very minor, the effects of the closure-in-place alternative are negligible. The potential impacts of construction on roadway transportation are expected to be minor.

3.11 Cultural Resources

3.11.1 Affected Environment

Parts of WCF have been previously surveyed for cultural resources. These surveys were conducted to satisfy the requirements of Section 106 of the National Historic Preservation Act of 1966 (Part I, Section 3.18).

No archaeological sites or architectural properties listed or eligible for listing in the National Register of Historic Places (NRHP) were identified within the footprint of the CCR impoundments or borrow site. WCF plant has been determined eligible for listing in the NRHP. The CCR impoundments, however, are not included as contributing elements in the eligibility recommendation.

3.11.2 Environmental Consequences

Under Alternative B, TVA would close the impoundments by reconfiguring the footprint and installing the selected cover system. The laydown area would be in the Ash Impoundment Complex. Borrow material to complete the closure would be obtained from the previously permitted on-site borrow site where cultural resources had been evaluated. No

archaeological or architectural sites listed or eligible for listing were identified on the site. This site is also being used to obtain borrow to support the deconstruction of WCF.

No direct impact to cultural resources is anticipated as the impoundments to be closed are located on a disturbed industrial area, the laydown area is within the Ash Impoundment Complex, and the borrow material is from a previously permitted site.

No indirect impacts from on-site construction activities given the existing industrial setting of the project location and the absence of known cultural resources near the proposed construction sites. Construction related noise and vibration for transporting borrow material to Ash Impoundment Complex would be temporary and would not impair or have an adverse effect on historic properties.

The Alabama Historical Commission concurred that the project will have no effect on any cultural resources listed on or eligible for the NRHP (Alabama Historical Commission 2016) (see Part I, Appendix C).

3.12 Noise

3.12.1 Affected Environment

WCF is located in a semi-rural area with a relatively low number of residential receptors. The residence closest to the CCR impoundment complex and Dredge Cell is located approximately 935 feet to the east on the east side of County Road 96. Other residences in the area are located more than 1000 feet from the CCR impoundments.

Operational changes have reduced the overall noise generated at WCF. The coal plant was retired on September 21, 2015 and current generation of noise is minimal. Ambient noise in the area is anticipated to range between a Day-Night Sound Level (Ldn) of 35 and 50 decibels (dBA, A-weighted), which are typical background day/night noise levels for rural areas (USEPA 1974).

There are no federal, state, or local regulations for community noise in Jackson County; Alabama, however, EPA (1974) guidelines recommend an Ldn not to exceed 55 dBA. The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

3.12.2 Environmental Consequences

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

Typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 ft from the construction site. Based on straight line noise attenuation, it is estimated that noise levels from these sources would attenuate to 59.5 dBA at the nearest residence east of the CCR impoundments. However, the actual noise would probably be lower in the field, where objects and topography would cause further noise attenuation. This level exceeds the EPA noise guideline for Ldn of 55 dBA but is less than the HUD guideline for Ldn of 65 dBA. Given the temporary and intermittent nature of construction noise, the impact of noise generated from on-site closure activities is expected to be minor.

There is a potential for indirect noise impacts associated with the increase in construction-related traffic and the transport of borrow material to the closure site. Construction-related traffic on local roads in the vicinity of WCF, specifically Steam Plant Road could increase traffic volumes and the associated traffic noise. Borrow material to complete the closure would be obtained from a previously permitted on-site location and the transport of borrow material would utilize a haul route on TVA property from the site (Figure 2-3).

There are no public traffic records for the local roadways, however, as stated in Section 3.10, it is assumed the volume is less than 1,000 vehicles per day and the total construction traffic increase is also projected to be very minor and consequently would not increase traffic noise by more than 3 dBA. Construction-related worker and delivery traffic would consist of a vehicle traffic count of approximately 200 that is dispersed along the surrounding road network. There are a minimal number of residences along these roads, and therefore these additional vehicles would result in only minor noise impacts. There are no residents or other noise-sensitive receptors along the proposed borrow material haul route, therefore there are no indirect noise impacts from the transport of borrow material.

3.13 Cumulative Effects

This section tiers from the analysis in Part I and is based on the resources of potential concern and the geographic area in which potential adverse effects from site-specific activities have the potential to alter (degrade) the quality of the regional environmental resource. The appropriate geographic area of analysis for WCF is therefore limited to the immediate project area and vicinity (2-mi radius) surrounding WCF and the associated borrow material haul route. For air quality, the geographic area is the county.

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

3.13.1 Identification of "Other Actions"

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

Actions that are listed as having a timing that is "past" or "present" inherently have environmental impacts that are integrated into the base condition for each of the resources analyzed in this chapter. However, these actions are included in this discussion to provide for a more complete description of their characteristics. Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis.

Table 3-3. Summary of Other Past, Present or Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Project

Actions Description	Description	Timing and Reasonable Foreseeability
Gypsum Stack Closure	Closure of gypsum stack and cover with soils excavated from adjacent property	Present
Retirement of WCF Fossil Plant	TVA retired WCF and ceased generation on September 21, 2015	Past
Deconstruction of WCF Fossil Plant	Deconstruction of WCF	Future
Disposal of Adjacent Property	TVA would make 360+ ac of property available for light industrial use	Present/Future

3.13.1.1 Gypsum Stack Closure

TVA is in the process of closing the Gypsum Stack at WCF. With the retirement of WCF, continued operation of the gypsum stack is no longer needed. The Gypsum Stack is a 160-ac facility used for the long-term storage of gypsum and some fly ash. Part of this closure effort involves constructing a cover over the stack. This cover would shed surface water, limit infiltration, and isolate the gypsum/fly ash from direct contact with the environment. TVA is using soils excavated from the on-site borrow area to construct the cover over the Gypsum Stack. Closing the stack would result in a stable facility that would reduce the infiltration of water into the gypsum/fly ash and the potential subsurface flow into the groundwater.

3.13.1.2 Retirement of Fossil Plant

TVA has retired the existing WCF plant and has ceased generation. Due to a changing regulatory and economic environment, the last of its original eight units, Unit 7, stopped producing power on September 21, 2015. Units 1 through 6 were retired in stages between May 2012 and July 2013 and Unit 8 was idled in October 2014. When WCF's eight coal-fired units were fully active, approximately 500 workers were employed on site. When only Unit 7 was in operation, approximately 90 workers were employed on site. Future land use options for the site could include light industrial development.

3.13.1.3 Deconstruction of WCF Fossil Plant

TVA is currently evaluating alternatives related to the deconstruction of WCF. Under this action, all facilities associated with WCF will be dismantled and disposed of in permitted waste management facilities. In conjunction with total facility deconstruction, all infrastructure associated with the Ash Impoundment Complex (ash sluice lines, other discharge infrastructure, transmission lines) will be removed and/or relocated. Additionally, all residual soils from the former coal pile will be excavated and disposed of within the Ash Impoundment Complex as part of closure activities.

3.13.1.4 Disposal of Adjacent Property

In 2010, TVA purchased approximately 600 ac immediately adjoining its WCF. The property was purchased to preserve the ability to convert wet coal combustion residuals at WCF to dry handling systems in the future. Since acquisition of the land, TVA's potential

need for this amount of property has changed. Due to the retirement of the coal-fired facilities, TVA no longer needs to preserve all of this property for its use. A total of 360 ac of the property is currently being developed for light industrial use. A data center is proposed for that location and it would operate as a hub for Internet traffic 24 hours a day, seven days a week. The data center is anticipated to create up to 100 jobs.

3.13.2 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the CCR impoundments was considered in conjunction with the environmental impacts presented in Chapter 3 and as described programmatically in Part I, Chapter 3. These combined impacts are defined by the CEQ as "cumulative" in 40 CFR 1508.7 and may include individually minor but collectively significant actions taking place over a period of time. The potential for cumulative effects of the identified environmental resources of concern are analyzed below for the preferred alternative.

Air Quality: Among the other identified actions within the geographic area the gypsum stack closure, retirement of the fossil plant, and disposal of the adjacent property have the potential to contribute to additional air quality impacts. Construction activities related to the closure of the gypsum stack and any future light industrial development on the adjacent TVA property would likely generate fugitive dust as a result of equipment and vehicle usage. These impacts would be minor and temporary and limited to the project area. Additionally, the closure of the WCF facility would have an overall beneficial impact to the region's air quality due to the cessation of operating the coal-fired generators.

As discussed in the programmatic evaluation for Closure-in-Place, Alternative B would involve several activities that would potentially result in temporary air emissions and dust. These activities include equipment removal, grading and compaction of CCR, transport of borrow material, and installation of approved closure systems. Since the other identified actions would have minor and temporary impacts on air quality, no cumulative effects to air quality are anticipated as a result of this alternative.

Transportation: The potential for cumulative effects to transportation may occur as a result of the concurrent traffic demand from other reasonably foreseeable actions in the project vicinity including the Gypsum Stack closure, retirement of WCF fossil plant, deconstruction of WCF fossil plant, and the development of the previously disposed property. These activities may concurrently contribute to traffic on the local roadway network. Closure of the Gypsum Stack however, is nearing completion and is not likely to represent a significant source of traffic during the CCR impoundment closure schedule.

The data center construction on the adjacent, former TVA land would generate short-term construction traffic and long-term traffic from approximately 100 employees as well as delivery trucks when the data center is operational.

Traffic generated by the construction force for the closure of the Ash Impoundment Complex would consist of the construction workforce, shipments of cover materials and equipment, and the hauling of borrow material to the site to be used for closure activities. Traffic for transporting borrow material to the site would occur on a private road. Long-term traffic associated with maintaining the closed Gypsum Stack and Ash Impoundment Complex would be negligible.

The temporary increase from construction traffic for Ash Impoundment Complex closure and development of the data center as well as workforce for the data center would be offset by the decrease in traffic by workers who operated the plant prior to closure. When the 8 coal-fired units were active, approximately 500 workers were employed at WCF. As such, it is anticipated that the existing roadway network would have sufficient capacity to absorb the expected temporary construction traffic increase as well as the data center workforce traffic. Therefore, potential impacts of construction on roadway transportation are expected to be minor and temporary. Any increases in traffic from the other identified actions are expected to be easily absorbed by the existing roadway network. Therefore, cumulative effects to transportation resources are not anticipated.

Noise: Among the other identified actions within the geographic area, the closure of the gypsum stack, deconstruction of the WCF fossil plant, and disposal of the adjacent property have the potential to contribute to additional noise impacts. Due to the temporary nature of construction activities, and the site's semi-rural location and distance to the nearest sensitive noise receptors, noise from construction associated with these activities is not expected to cause significant adverse impacts. Noise from data center employee and delivery vehicle traffic would occur but would be less than the noise from employee and delivery vehicle traffic when WCF was fully operational. Additionally, with the retirement of WCF in September 2015, noise emissions from the fossil-fuel plant would cease.

As discussed in Part I, Section 3.25, the potential for cumulative noise impacts from the proposed action would be associated with the transportation of borrow material. The proposed borrow site for WCF is on-site and borrow material would be transported on a private road. Impacts due to this alternative are limited as noise sensitive receptors are not located along the haul route or in close proximity to the proposed on-site construction activity. Cumulative effects associated with noise emissions therefore, are not anticipated.

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CHAPTER 4 – LITERATURE CITED

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Appendix A – Conceptual Closure Plans, Preferred Alternative

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SURVEY CONTROL NOTE:

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

TOPOGRAPHIC NOTE:

BASEMAP WAS DEVELOPED FROM LIDAR SURVEY CONDUCTED BY TUCK MAPPING, INC., FLOWN ON APRIL 8, 2015. THE LIDAR SURVEY WAS SUPPLEMENTED WITH HYDROGRAPHIC SURVEYS OF THE ASH POND AND STILLING PONDS CONDUCTED BY TVA ON MARCH 18, 2015 AND FEBRUARY 24, 2015, RESPECTIVELY AND HYDROGRAPHIC SURVEY OF THE REDWATER POND CONDUCTED BY TRANSASH ON APRIL 21, 2015. HORIZONTAL DATUM IS NAD83 ALABAMA EAST STATE PLANE. VERTICAL DATUM IS NGVD29.

LEGEND

- LIGHT POLE
- UTILITY POLE
- SIGN
- TREE
- POST
- MANHOLE
- GUYWIRE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE
- UNDERGROUND TELEPHONE LINE
- FENCE LINE
- ROAD
- TREE LINE
- EDGE OF WATER
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- RAILROAD TRACK
- PIEZOMETER
- SLOPE INCLINOMETER
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- LIMITS OF CAP
- BASELINE
- ×648.0 SPOT ELEVATION
- LIMITS OF GRADING
- LIMITS OF CONSTRUCTION

ISSUED FOR BID

SEE 10W533-102 FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

Stantec
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Lexington, Kentucky 40511-2024
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REV NO	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R –	–	–	–	–	–	–	–	–	–	–
R A	10/16/15	CNB	JRF	CJJ	RDF	JDM	MST	JCK	202241	–
ISSUED FOR BID										

SCALE: 1"=200' EXCEPT AS NOTED

YARD
ASH POND

ASH POND FINAL CLOSURE
FINAL GRADE PLAN

DESIGNED BY	DRAWN BY	CHECKED BY	SUPERVISED BY	REVIEWED BY	APPROVED BY	ISSUED BY
C.N. BARNES	J.R. FLYNN	C.J. JONES	R.D. FULLER	J.D. MULLINS	M.S. TURNBOW	J.C. KAMMEYER

WIDOWS CREEK FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

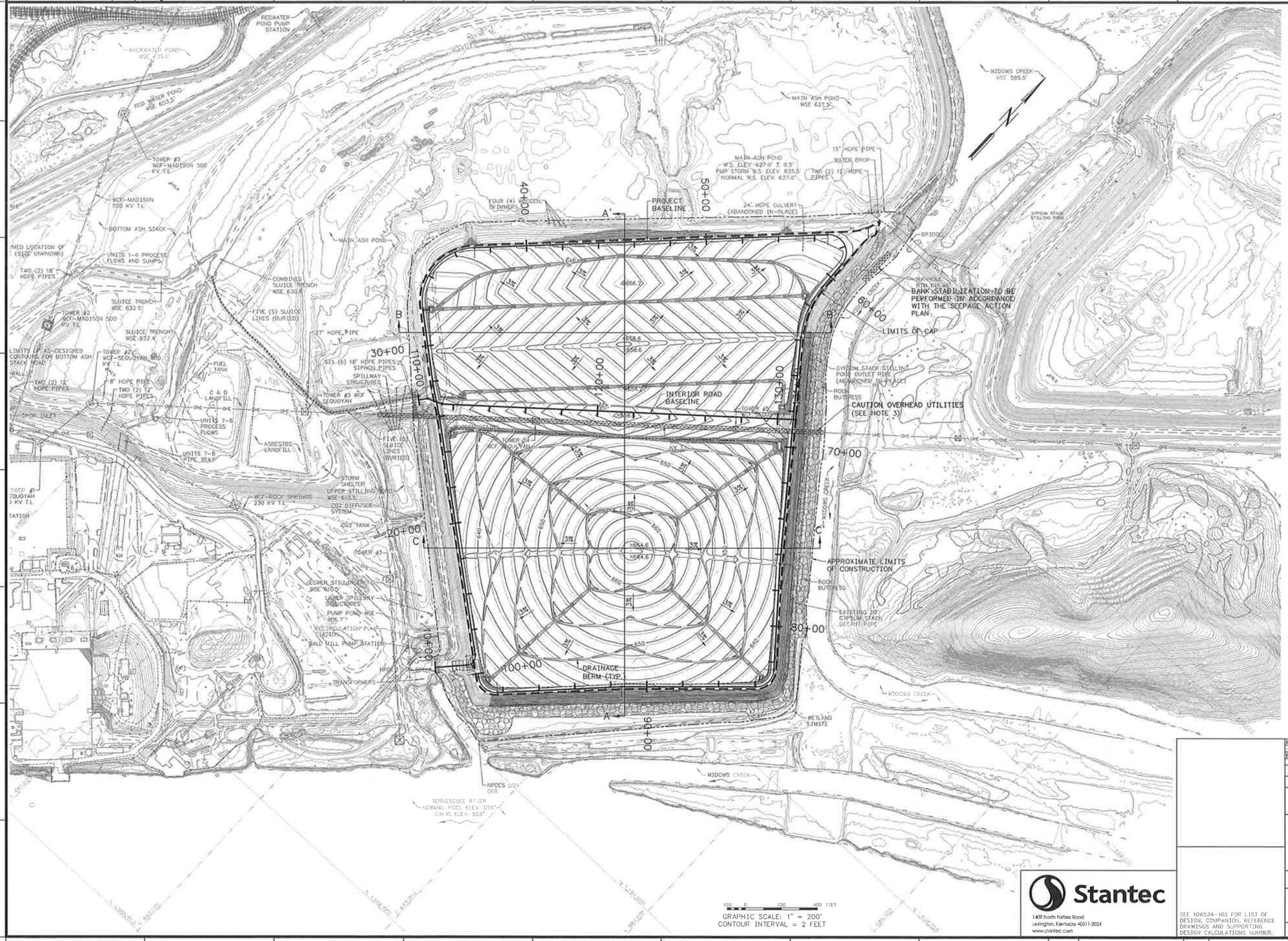
AUTOCAD R 2010 | DATE 10/16/15 | 34 | C | 10W533-307 | R A

PLOT FACTOR:1
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

STANTEC | A
TASK COMPLETED BY: | REV NO.

34 | C | 10W533-307



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:

1. FOR BASEMAP SOURCE INFORMATION, SEE DRAWING 10W534-201.
2. REFER TO DRAWINGS 10W534-106 AND 10W534-107 FOR PROJECT AND ROAD BASELINE LAYOUT.
3. **CONTRACTOR WARNING:** TAKE NOTE OF OVERHEAD ELECTRIC LINES. WORK BENEATH AND ADJACENT TO THESE LINES IS RESTRICTED AND SHALL BE IN ACCORDANCE WITH TVA SITE SPECIFIC AND OSHA SAFETY REQUIREMENTS.

LEGEND

- LIGHT POLE
- UTILITY POLE
- SIGN
- TREE
- POST
- MANHOLE
- GUYWIRE
- OHE — OVERHEAD ELECTRIC LINE
- UGE — UNDERGROUND ELECTRIC LINE
- UGT — UNDERGROUND TELEPHONE LINE
- FENCE LINE
- ROAD
- TREE LINE
- EDGE OF WATER
- 600 — INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 600 — PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- LIMITS OF CAP
- APPROXIMATE LIMITS OF CONSTRUCTION
- GEOCOMPOSITE COLLECTOR PIPE TYPE I
- GEOCOMPOSITE COLLECTOR PIPE TYPE II
- BASELINE

ISSUED FOR BID

REV	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APVD	ISSD	PROJECT ID	AS CONST
R A	10/16/15	WZH	ACC	MCV	RDF	JDM	MST	JCK	607606	-
ISSUED FOR BID										

SCALE: 1"=200' EXCEPT AS NOTED

YARD
DREDGE CELL

DREDGE CELL FINAL CLOSURE FINAL GRADE PLAN

DESIGNED BY	DRAWN BY	CHECKED BY	SUPERVISED BY	REVIEWED BY	APPROVED BY	ISSUED BY
Z. MAHMOND	A.C. CLINK	M.C. VAUGHAN	R.D. FULLER	J.D. MULLINS	M.S. TURNBOW	J.C. HAMMEYER

WIDOWS CREEK FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2010 | DATE 10/16/15 | 34 | C | 10W534-307 | R A

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SEE 10W534-102 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