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WILSON DAM BRIDGE DECK REFURBISHMENT
FINAL ENVIRONMENTAL ASSESSMENT
Lauderdale and Colbert Counties, Alabama

Prepared by:
TENNESSEE VALLEY AUTHORITY
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Acronyms and Abbreviations

ADEM	Alabama Department of Environmental Management
AL	Alabama
ALDOT	Alabama Department of Transportation
APE	Area of Potential Effect
BMP	Best Management Practices
CAA	Clean Air Act
CBMPP	Construction Best Management Practices Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
CWA	Clean Water Act
dB	Decibel
dBA	A-Weighted Decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act of 1973
FHWA	Federal Highway Administration
GHG	Greenhouse Gas
HUD	U.S. Department of Housing and Urban Development
LBP	Lead-Based Paint
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOx	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NPS	U.S. National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
pcf	Per Cubic Foot
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Tennessee Valley Authority (TVA) proposes to refurbish and repair the Wilson Dam Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, and repaint the fly-over handrails (see Figure 1-1). The repairs would be limited to the concrete arches on the dam above the spring line, bridge deck, fly-over, curbs, parapets, and sidewalks between the control building and the north end of the fly-over. The dam below the spring line, the equipment operating deck on the upstream side of the bridge, and the lock are outside the project scope.

Construction of Wilson Dam began in 1918, and it was dedicated in 1926. At the time that the dam was dedicated, a primary roadway crossing the Tennessee River over the top of the dam, as well as the original lock, was opened between Muscle Shoals and Florence, Alabama. In May 1933, TVA acquired the dam from the U.S. Army Corps of Engineers (USACE). TVA owns the Wilson Dam while the USACE Nashville District operates the Wilson Dam locks for TVA. Both the dam and bridge are listed in the National Register of Historic Places (NRHP) as a National Historic Landmark (NHL).

The original wearing surface of the bridge deck was brick pavers, which were removed in the late 1950s, and replaced with the current concrete deck and the steel superstructure fly-over was constructed over the lock. The arches appear to be constructed of mass unreinforced concrete. The bridge deck also appears to be unreinforced concrete.

Over the years, the downstream face where the concrete arches interface with the parapet have developed widespread spalls (areas where chips, splinters or fragments are broken off) with efflorescence (whitish powdery substance due to migration of mineral rich water through the porous concrete where it evaporates) and visible water movement. In addition, the sidewalk, curb, and deck have developed widespread cracking.

The bridge fly-over that crosses over the locks adjacent to the dam consists of 30 steel spans. The epoxy overlay with a flint aggregate wearing surface on the fly-over was installed in the 1980s but is showing signs of wear and tear with areas where the epoxy overlay has been worn down or completely disappeared. In addition, expansion joints on the fly-over installed in the 1950s are deteriorating and the handrails need repainting.

Deterioration of Parapet and Curb

Bridge Deck Cracks

Bridge Deck Cracks

Concrete Arch Showing Spalling and Efflorescence

Failing Epoxy Overlay and Deteriorating Bridge Joint on Fly-over

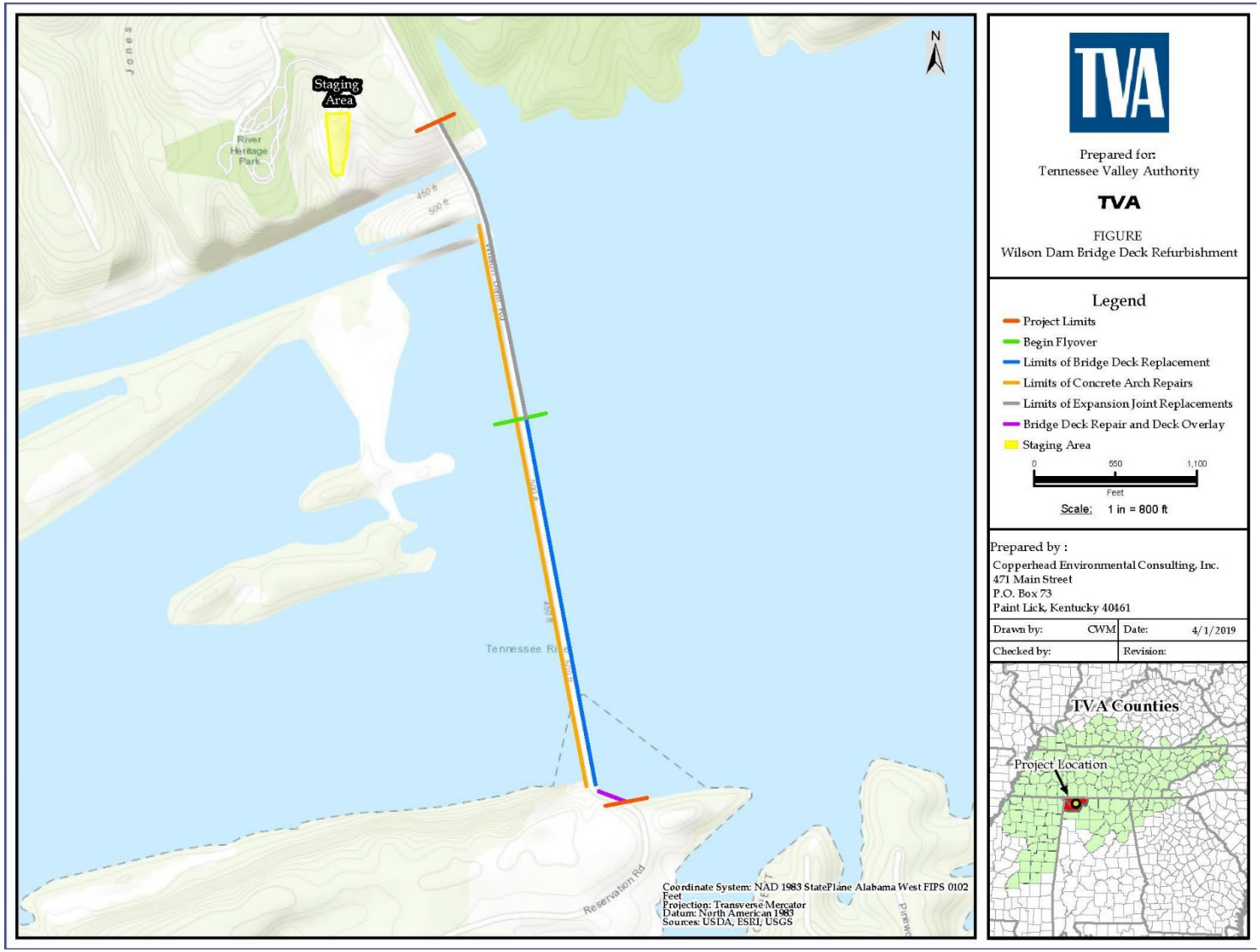

Figure 1-1. Project Location

1.2 Purpose and Need

The purpose of the proposed action is to refurbish and repair the Wilson Dam Bridge deck and other concrete surfaces, such as the arch faces, and to stop the flow of water through the deck and parapets. The bridge deck and sidewalk are cracking due to water entering the space (void layer) between the original arch concrete and the newer concrete deck. The concrete arches exhibit a large amount of concrete spall near the top surface due to water passing through the existing deck and deteriorating the arch face. Due to age and wear and tear, the epoxy overlay, expansion joints, and handrails on the fly-over section of the bridge are deteriorating.

If the bridge is left unrepaired, deterioration of keyways, arches, fly-over overlay, and expansion joints may worsen over time, which would increase the potential for public safety risks including falling debris.

1.3 Decision to Be Made

TVA must decide whether to refurbish the Wilson Dam Bridge deck, fly-over, and other surfaces. TVA's decision would consider factors such as potential environmental impacts, economics, availability of resources, and TVA's long-term goals. This Environmental Assessment (EA) has been prepared to support the decision-making process and determine whether an Environmental Impact Statement (EIS) should be prepared.

1.4 Related Environmental Reviews

The following environmental reviews have been prepared for actions near the project location:

- *Muscle Shoals Power Service Shop Warehouse EA (TVA 2019a).* The EA evaluated the proposed construction of a new warehouse to support the relocation of spare turbine rotors and other generating components to a central location.
- *Muscle Shoals Outdoor Education and Recreation Area Improvements EA (TVA 2015).* The EA addressed proposed improvements to the trail/recreation system located north of Reservation Road on the Muscle Shoals Reservation, including three trailheads and the Reservation Road Trail.
- *Muscle Shoals Reservation Redevelopment Final EIS (TVA 2011).* The EIS documented the potential environmental effects of the proposed sale of 1,400 acres of land on the Reservation in Colbert County, Alabama. After the final EIS was published, TVA worked with the local community to develop a comprehensive master plan to guide development of the land. During this process, TVA identified 400 acres of land that should be retained by TVA due to ongoing TVA business needs and limited development opportunities due to prior industrial operations. The TVA Board of Directors subsequently approved the disposal of approximately 1,000 of the 1,400 acres analyzed in the final EIS.
- *Wilson Dam Bascule Bridge Replacement EA (USACE 2008).* The EA addressed a proposed construction of a fixed bridge over the lower end of the auxiliary lock at Wilson Dam to provide safe, reliable access to the main lock.
- *River Heritage Hotel EA (TVA 2002).* The EA addressed a 12-acre permanent easement for the proposed construction of a 150 to 200-room hotel adjacent to

the Wilson Dam. The TVA Board of Directors approved the easement and the hotel was constructed in 2005.

- *Muscle Shoals/Wilson Dam Reservation Land Use Plan EA (TVA 1996).* TVA prepared this EA to evaluate land on the Reservation needed for TVA program uses and to identify areas that would be made available for external uses.
- *Patton Island Bridge and Approaches Crossing the Tennessee River and Connecting the Cities of Florence and Muscle Shoals EIS* (FHWA 1991). The Federal Highway Administration prepared this EIS to consider the proposed construction of a multi-lane highway bridge over the Tennessee River downstream of the Wilson Dam. The Patton Island Bridge was opened in 2002 and was renamed the Singing River Bridge in 2010.

The description of the affected environment and the assessment of impacts contained in the documents listed above were used in support of the analyses of environmental resources in Chapter 3.

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

TVA prepared this EA to comply with the National Environmental Policy Act (NEPA), associated regulations promulgated by the Council on Environmental Quality (CEQ; 40 CFR Parts 15000-1508), and TVA's procedures for implementing NEPA. TVA considered the possible environmental effects of the proposed action and determined that the resources listed below are potentially impacted by the alternatives considered.

- Air Quality
- Climate
- Surface Water
- Wildlife
- Threatened and Endangered Species
- Solid and Hazardous Waste
- Visual Resources
- Cultural and Historic Resources
- Recreation
- Transportation
- Noise
- Socioeconomics and Environmental Justice

Given the nature of the project, the following resources are not found in the study area or would not be impacted by any of the project alternatives. These include:

- *Aquatic Resources* – The TVA Natural Heritage Database indicated that there are federally listed aquatic animals and several state-listed mussels within 10-miles of Wilson Dam. In addition, the tailwater below Wilson Dam has been designated nonessential experimental population status by the U.S. Fish and Wildlife Service (USFWS) for 13 federally listed mussels and one federally listed snail. However, no work would be performed in the river. Completion of the repairs on the arch faces would require a work platform of some type to be placed along the bridge by the Contractor. The Contractor would be required to install appropriate netting to prevent debris from falling into the water. The Contractor would also be required to install measures to prevent waste materials such as concrete from washing into storm drains. Containment measures would be required during replacement fly-over expansion joint activities and preparation of the fly-over handrails for repainting.

- *Dam Safety* – The bridge refurbishment activities would not have an impact on the water barrier structures or operation of the dam.

- *Navigation* – The bridge refurbishment activities would not have an impact on the lock or commercial navigation.

- *Additional Resource Areas* - Potential effects related to land use, vegetation, floodplains, managed areas, prime farmland, aquatic species, and wetlands were considered. However, due to the nature of the action and project footprint, potential effects were found to be absent, and these resources have not been brought forward for further evaluation.

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

1.6 Public and Agency Involvement

TVA issued a draft EA for public review and comment. Its availability was announced in a TVA news release and in an advertisement in the *Florence Times Daily* newspaper. The draft EA was also posted on TVA's website. Notifications of its availability were sent by mail or email to local, state, and federal agencies and to individuals and organizations that had previously expressed an interest in the Wilson Dam or the Muscle Shoals Reservation. TVA has consulted with the Alabama State Historic Preservation Office (SHPO), and federally recognized tribes under Section 106 of the NHPA.

TVA received one comment during the public comment period. The commenter recognized the need to repair the dam to maintain its historical and practical value and only asked whether the proposed refurbishment activities were sufficient or whether more extensive repairs are needed. TVA and an outside engineering firm evaluated repair alternatives as part of the Wilson Dam Bridge Deck Refurbishment Study (see Appendix C). Alternative E, the preferred alternative, met the purpose and need of the project and achieved the best longevity of repair (see Section 2).

1.7 Necessary Permits or Licenses

The proposed action would be subject to the Alabama Department of Environmental Management (ADEM) General National Pollutant Discharge Elimination System (NPDES) Permit for stormwater discharge associated with construction activity. This permit requires that a Construction Best Management Practices Plan (CBMPP) be implemented. Stormwater discharges would need to comply with ADEM NPDES permit (ALG 36-0012) for the Wilson Dam.

CHAPTER 2 – ALTERNATIVES

2.1 Alternatives Development Process

A total of six alternatives were identified during initial project scoping (see Appendix C) including:

- *Alternative A – No Action*. Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck or other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails.

- *Alternative B – Repair Scheme A*. This alternative would include the following: stabilize and repair the bridge deck by pressure injecting urethane polymer or an equivalent product into the space or void between the arch concrete and the existing concrete overlay. It would repair existing deck cracks by epoxy injection. This alternative also includes performing spot grinding of the deck to improve rideability and patch deteriorated concrete arch faces. Alternative B is the least-cost alternative to meet the minimum needs of the proposed bridge refurbishment.

- *Alternative C – Repair Scheme B*. This alternative would perform the same repairs as Alternative B but would also include the patching of deteriorated concrete surfaces on the rails and sidewalks.

- *Alternative D – Repair Scheme C*. This alternative would include the following: stabilize and repair the bridge deck and construct a new latex modified concrete overlay; and patch deteriorated surfaces of arch face, rails, and sidewalks.

- *Alternative E – Repair Scheme D*. This alternative would include the following: remove and replace existing bridge deck; patch deteriorated surfaces of arches, rails, and sidewalks; reseal the fly-over epoxy overlay; remove and replace the fly-over expansion joints; and recoat/repaint the fly-over handrails. Alternative E is the highest cost alternative.

- *Alternative F – Hybrid Repair Scheme*. This alternative would combine Repair Schemes A through D on a span-by-span basis. This alternative may provide cost saving opportunities; however, it could result in a longer schedule for completion of the bridge refurbishment as additional assessment of each bridge span would be needed to assign a repair scheme to each span.

TVA has determined that from the standpoint of NEPA, there are two alternatives that would be carried forward in the EA: Alternative A – No Action Alternative; and Alternative E – Repair Scheme D. The environmental impacts of Alternative A and Alternative E are analyzed in detail in this EA 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 Chapter 3.

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

Issue Area	Alternative A – No Action	Alternative E – Repair Scheme D
Air Quality	No impact.	Temporary, minor increase in local air emissions due to construction activities.
Climate	No impact.	No impact.
Surface Water	Minor impact.	Potential temporary, minor impacts during removal of bridge deck, deteriorated concrete from arch faces, fly-over expansion joints, and preparation of fly-over handrails.
Wildlife	No impact.	No impact.
Threatened and Endangered Species	No impact.	No impact.
Solid and Hazardous Waste	No impact.	Minor impact due to construction.
Visual	Minor impact.	Temporary, minor adverse impact but long-term visual benefit.
Cultural and Historic Resources	Minor impact.	No adverse effect.
Recreation	No impact.	Minor, short-term impacts on recreation due to temporary construction detour. No long-term impacts.
Transportation	Minor impact.	Temporary, short-term impacts to vehicle and pedestrian traffic due to bridge closure during construction. Long-term beneficial impacts as bridge and fly-over can accommodate current and forecasted traffic.
Noise	No impact.	Temporary, minor impact due to construction noise. No long-term impact.
Socioeconomic and Environmental Justice	No impact.	Short-term, minor, beneficial increases in employment, payroll, and tax payments during construction. Beneficial impacts would extend to environmental justice if workers are hired from minority or low-income populations.

2.2 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish or repair the Wilson Dam Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or recoat/repaint the fly-over handrails. The spalling, efflorescence, and cracking would not be addressed, and the deterioration of keyways and arches may worsen over time, which would increase the potential for public safety risks associated with falling debris. The epoxy overlay, expansion joints, and handrails would not be resealed, replaced, or repainted which could lead to worsening public safety conditions on the fly-over. Additionally, deterioration of the bridge could lead to additional water infiltration affecting the integrity of the bridge and dam below.

2.3 Alternative E – Repair Scheme D

As described above, this alternative would include the following: remove and replace existing bridge deck; and patch deteriorated surfaces of arches, rails, and sidewalks (see Appendix A). The repairs would be limited to the concrete arches on the dam above the spring line, bridge deck, fly-over, curbs, parapets, and sidewalks between the control building and the north end of the fly-over (see Figure 1). The dam below the spring line, the equipment operating deck on the upstream side of the bridge, and the lock are outside the project scope. The project area includes an approximately 1.6-acre staging area located within the lock operations area. The proposed staging area is an existing gravel and fenced staging area used as part of the Wilson Dam Bascule Bridge Replacement project.

The existing concrete bridge deck and deteriorated material between the arch faces and existing concrete bridge deck would be removed. The method to remove concrete would be hydrodemolition which utilizes high-pressure water to remove the concrete. A skid steer loader would be used to put concrete debris in a dump truck. A new reinforced concrete bridge deck would be constructed, and joints would be sealed. Deteriorated concrete arch faces, bridge rails, and sidewalks would be patched. Construction traffic would include private vehicles for 35 workers along with large delivery or construction trucks including dump trucks and concrete mixer trucks. Project construction would occur over an estimated 8-month period.

During refurbishment activities, existing curbs, deck drain plates, and light fixtures set into the guard rails of the bridge would be removed, retained, and reinstalled as a part of the project. Repair of any damaged lights is not a part of this project, however, the damaged lights or those that are missing globes would be reinstalled for potential future repair or restoration. In places where curbs are missing, in-kind replacements would be installed. Additionally, any concrete or paint applied textural finishes would be matched to Wilson Dam's current appearance.

In addition, the epoxy overlay with a flint aggregate wearing surface on the fly-over would be replaced. As part of the process, a small, surface preparation milling machine would scarify the surface, the surface would be pressure washed, and then the epoxy would be applied using a trailer mounted mixer/applicator. This epoxy resurfacing would take approximately two weeks with the most time involving surface preparation activities. To replace the six expansion joints, a cut would be made in the concrete a few inches behind the joint and then the joint would be chipped out with small pneumatic hammers. A replacement joint would be set from the bottom and concrete would be poured around the new joint (see Appendix B). Each expansion joint would take approximately a week to replace. To remove the paint/coating on the handrails, an abrasive pressure wash would be used. Operations to remove the expansion joints and prepare the handrails would be fully contained to avoid or minimize releases of materials.

Wilson Dam Bridge Fly-over

2.4 Alternatives Eliminated From Further Discussion

TVA carefully considered a range of rehabilitation options for repairing the Wilson Dam Bridge, fly-over, and arches. The alternatives identified above were evaluated based on a set of criteria including: longevity of the repair, efficiency, safety, design, impacts to the public, and environmental impacts (see Appendix D). Apart from the No Action Alternative, all the alternatives partially meet the project purpose and need. TVA determined, however, that the urethane polymer injection proposed under Alternatives B, C, and D may not entirely stabilize the deck of the bridge. Urethane stabilization is also a newer technology, and the longevity of the repair is uncertain. Alternatives D and E scored equally as the highest for safety concerns, and all action alternatives scored equally for environmental concerns. Based on the presumed duration of road closure, Alternative E scored best for limiting inconvenience to the public and extending estimated service life for the bridge. Therefore, Alternatives B, C, D, and F have been eliminated from further consideration.

2.5 TVA's Preferred Alternative

Alternative E is the alternative that has the best potential to fully meet TVA's asset management and structural preservation goals. Alternative E scored highest for achieving the purpose and need of the project and the longevity of the repair.

2.6 Summary 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 Alternative E includes mitigation, as required, to reduce or avoid, minimize, or reduce adverse effects. Project-specific best management practices (BMPs) are also identified.

- *Cultural Resources*. As specified in the 100% Wilson Dam Bridge Deck Refurbishment Design (see Appendix A), TVA and the contractor would ensure that the character-defining features of the bridge would be retained in accordance with *Secretary of the Interior's Standards for Rehabilitation*.

- *Surface Water*. TVA would implement BMPs and control measures detailed in a CBMPP to prevent the discharge or loss of potential pollutants into the Wilson or Pickwick Reservoirs and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants. TVA would comply with applicable environmental laws and regulations, including ADEM NPDES permit (ALG 36-0012) for Wilson Dam and ADEM's General Permit for Construction Activities.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Air Quality

3.1.1 Affected Environment

The Clean Air Act regulates the emission of air pollutants and, through its implementing regulations, establishes National Ambient Air Quality Standards (NAAQS) for several "criteria" pollutants that are designed to protect the public health and welfare with an ample margin of safety. The criteria pollutants are ozone, particulate matter, carbon monoxide (CO), nitrous oxides (NO_x), sulfur dioxide (SO_2), and lead.

Specified geographic areas are designated as attainment, nonattainment or unclassifiable for specific NAAQS. Areas with ambient concentrations of criteria pollutants exceeding the NAAQS are designated as nonattainment areas and new emissions sources in or near these areas are subject to more stringent air permitting requirements.

Colbert and Lauderdale counties are in attainment with applicable NAAQS (USEPA 2016) and ambient air quality standards referenced in the ADEM Administrative Code, Title 335-3 (ADEM Administrative Code 2016).

The proposed project would be subject to both federal and state regulations that impose permitting requirements and specific standards for expected air emissions. These include ADEM Administrative Code, 335-3-4-.02 Fugitive Dust and Fugitive Emissions.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no changes to the existing air quality conditions and no new impacts on air quality.

3.1.2.2 Alternative E – Repair Scheme D

Transient air pollutant emissions would occur during the 8-month construction phase. Construction-related air quality impacts would primarily result from the staging of construction vehicles, equipment, and supplies and the operation of construction vehicles and equipment and worker personnel vehicles. The daily workforce during construction is expected to be 35 workers. During construction, approximately 3,500 vehicles per day would detour from crossing the Wilson Dam Bridge to the Singing River Bridge, located 1.1 miles downstream. At the same time, worker personnel vehicles (approximately 35) would drive to the project site and park at the staging area.

Combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter, NO_x, CO, volatile organic compounds, and SO_2.

Equipment expected to be used include 1-2 truck-mounted cranes, 2 skid steer loaders, 1 forklift, 2-4 dump trucks, concrete trucks and pump trucks during deck pours, hand tools (small pneumatic hammer), generators, air compressors, vacuum cleaners, airless spray equipment, abrasive pressure washer, and other miscellaneous equipment. Emissions

associated with these vehicles and equipment are expected to result in negligible impacts to air quality because there would be relatively few emissions sources (e.g., trucks, private vehicles) used during construction and use would be temporary.

Removal of the bridge deck, milling the fly-over surface, cutting/chipping out the expansion joints, preparing the surface of the fly-over handrails, and vehicular traffic over paved roads at the site also would result in the emission of fugitive dust during active construction periods. Based on analyses conducted at other construction sites, it is expected that the largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. To minimize air impacts TVA requires all contractors to keep construction equipment properly maintained and to use BMPs (such as covered loads and wet suppression) to minimize fugitive dust.

Air quality impacts from construction activities would be temporary (approximately 8 months) and would depend on both human factors (e.g., intensity of activity, control measures) and natural factors such as wind speed and direction. However, even under unusually adverse conditions, these emissions from construction activities would have, at most, a minor transient impact on air quality and would be well below the applicable ambient air quality standards.

There would be indirect effects caused by the approximately 3,500 vehicles per day using the Wilson Dam Bridge that would shift to crossing the Singing River Bridge nearby. Air emissions generated from these vehicles would continue unchanged but are expected to temporarily shift to the nearby bridge. The slight increase in distance traveled due to the temporary detour may cause a small increase in air emissions.

Overall, the potential impacts to air quality from construction-related activities on local and regional air quality would be temporary and minimal.

3.2 Climate

3.2.1 Affected Environment

Data trends indicate increasing temperatures, decreasing precipitation, declining cloud cover, and increasing solar radiation in the TVA power service area. TVA has taken an active role in preparing for the potential impacts of Climate Change, by developing and maintaining its Climate Change Adaptation Plan (TVA 2016). Also, since 2011, TVA, in coordination with other federal agencies as well as state and local partners, has initiated a Climate Change Sentinel Monitoring program with 18 stations in the TVA power service area designed to assess potential biological, ecological, and hydrological responses of aquatic ecosystems related to climate change. TVA is also monitoring effects of climate change on agriculture, forest resources, and recreation. TVA also participates in the Department of Energy's Partnership for Energy Sector Climate Resilience, the aim of which is to improve the resilience of energy infrastructure to extreme weather and climate change impacts.

Gases that trap heat in the atmosphere are called greenhouse gases. Gases that contribute to the greenhouse effect include: water vabor, carbon dioxide, methane, and nitrous oxides. Global atmospheric concentrations of carbon dioxide, methane, nitrous oxide, and certain manufactured greenhouse gases have all risen significantly over the last few hundred years. Too much of these greenhouse gases can cause Earth's atmosphere to trap more and more heat and affect climate change. TVA power plant carbon dioxide emissions have

dropped by approximately 31 percent between 2011 and 2017 due to a multitude of emission reduction projects instituted by TVA in this period.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Implementing the No Action Alternative would not result in any new emissions of greenhouse gases and therefore, this alternative would not impact climate change.

3.2.2.2 Alternative E – Repair Scheme D

Carbon dioxide emissions would occur during the construction phase. Construction-related carbon dioxide emissions would be primarily related to the combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.). The total amount of these greenhouse gas emissions (GHG) would be small and would last for a short time (8 months). These emissions would not adversely affect regional GHG levels with no discernable link or effect to changes in global climate. Therefore, this alternative would not result in noticeable impacts on climate change.

The GHG emissions associated with operation of the bridge would be similar to current conditions and would not create a new impact on climate change.

TVA would continue to monitor climatic effects as they occur and continue to update its plans and policies as evidence of changing climate conditions continues to be gathered and as the forecasting capabilities continue to evolve.

3.3 Surface Water

3.3.1 Affected Environment

The project area drains to the Tennessee River both upstream and downstream of Wilson Dam. Upstream, Wilson Reservoir has been designated by the Alabama Department of Environmental Management for uses including public water supply, fish and wildlife, swimming and other whole-body water-contact recreation. Downstream, Pickwick Reservoir has been designated for uses including public water supply and fish and wildlife.

Water quality monitoring of the main stem reservoirs of the Tennessee River system is conducted by TVA through its Reservoir Ecological Health Monitoring Program. Objectives of the program are to provide basic information on the “health” or integrity of the aquatic ecosystem in each TVA reservoir and to provide screening level information for describing how well each reservoir meets the "fishable" and "swimmable" goals of the Clean Water Act. Sampling activities involve examination of appropriate physical, chemical, and biological indicators in the forebay, midregion, and headwater areas of each reservoir. In the most recent monitoring results, from 2016, Wilson Reservoir received an ecological health rating of “poor” with concerns related to dissolved oxygen, chlorophyll, and bottom life. Pickwick Reservoir’s ecological health rating is “fair” with concerns related to chlorophyll (TVA 2019b). The Tennessee River (Wilson Reservoir) is listed by the State of Alabama under Section 303(d) of the Clean Water Act as an impaired waterbody because of excessive nutrients from agriculture (ADEM 2018).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no change in operation of the bridge but minor impacts to water quality would occur due to continuing deterioration of keyways, expansion joints, and arches and the increased potential for falling debris from the structure. Continued aging and degradation of the structure could pose water quality issues over the long term should the existing drainage structure become compromised.

3.3.2.2 Alternative E – Repair Scheme D

Infrastructure disturbances associated with construction and demolition activities could potentially result in water quality impacts. Erosion and sedimentation could increase turbidity (water cloudiness) and threaten aquatic life. Construction activities with the potential to affect surface water include those that generate dust, debris, and stormwater runoff. Specific activities that could affect surface water include using high-pressure water (i.e., hydrodemolition) to remove deteriorated and sound concrete, cutting and chipping out the expansion joints, and using aggregate under high pressure to remove coating/paint on the fly-over handrails. Where possible, preparation activities would be contained (e.g., cutting/chipping out of expansion joints or removing coating/paint from handrails) to avoid/minimize potential impacts to water quality. Water used during cutting operations would be collected using shop vacuums. Even with the use of full containment, the possibility exists of minimal amounts of concrete dust/chipping debris, saw wash water, paint dust from the use of abrasive media on the handrails, and the abrasive media entering the surface water.

Water used during refurbishment preparation activities would help to suppress dust and would drain toward storm drains. TVA would comply with the NPDES permit, including Part 1.A, and would utilize best management and maintenance practices to minimize potential impacts and to prevent the discharge or loss of potential pollutants to the reservoir and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants. TVA would also comply with applicable local, state and federal laws and regulations. The use of the existing graveled area for staging equipment, materials, and vehicles would help minimize potential for erosion and sedimentation. Workers will use portable toilets (porta potties/porta johns) and a crew wash station that will be cleaned on a regular basis and removed after construction is completed.

With implementation of these minimization and control measures, there would be temporary, minor impacts on water quality because these measures would help to prevent and minimize the amount of contaminants entering stormwater drains on the bridge. The potential for impacts would be greatest during removal of the deck, an action that is anticipated to take several months. No long-term water quality impacts are anticipated and the proposed action would not affect the long-term water quality or ecological health of Wilson or Pickwick Reservoirs.

3.4 Wildlife

3.4.1 Affected Environment

The Tennessee River provides diverse habitat features and supports a wide range of wildlife. Habitat along the shoreline near Wilson Dam consists of deciduous-dominated woodlands, fields, maintained parks and open areas, and floodplain areas. These draw a

variety of birds including waterfowl and shorebirds; Alabama Birding Trail Sites 6 and 7 are immediately adjacent to the dam. Based on current eBird records, Lauderdale and Colbert counties are the 3rd and 4th most bird species-rich counties in the state, respectively (eBird 2012).

Bald eagles and golden eagles are both federally protected under the Bald and Golden Eagle Protection Act. Bald eagles utilize the Tennessee River corridor to nest and forage year-round. Golden eagles forage along the Tennessee River throughout the winter. Bald eagles are routinely observed from the dam and in the surrounding area (eBird 2012). Golden eagles are infrequent to the area and have not been documented within 10 miles of the project area in the past decade. A great blue heron (*Ardea herodias*) rookery is present on Jackson Island, just downstream of Wilson Dam. Although bats and birds are known to roost in bridges, buildings, and dams, TVA biologists completed a survey of Wilson Dam in 2018 and found no indications of roost use. Five caves have been documented within three miles of the project area.

Wilson Dam connects the communities of Florence and Muscle Shoals and the predominant land-cover within 10 miles of Wilson Dam is urban development (NLCD 2011). Portions of the natural environment that remain have been impacted by anthropogenic sprawl and are often maintained for recreation, designated natural areas, or other environmental amenities.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. As a result, this alternative would not adversely impact wildlife or their habitats.

3.4.2.2 Alternative E – Repair Scheme D

Activities proposed under Alternative E would occur on the bridge deck, fly-over, and arches and would require use of an existing temporary equipment and supply staging area.

Despite the prevalence of birds around Wilson Dam, Alternative E would not directly impact wildlife because work would be confined to the dam bridge, fly-over, arches, and existing gravel-lined staging area. Bridge construction has been shown to have limited influences on bird species groups found on the Tennessee River (Bonnington and Smith 2018) when no activities would be conducted in aquatic or terrestrial wildlife habitat. Construction is not expected to impact species using nearby caves or forested areas, such as Jackson Island (0.15 miles) or the nearest cave (1.1 miles). These habitats are sufficient distance from the Wilson Dam Bridge that construction noise at the habitat areas would be under 60 A weighted decibels (dBA) (a typical conversation occurs at 60 dBA and is not loud enough to cause hearing damage) (see Section 3.11 for information on noise levels associated with typical construction equipment). Implementation of BMPs would minimize indirect impacts from sediment mobilization and introduction of contact water into Wilson Reservoir and the Tennessee River. No indirect impacts are expected to wildlife species or habitat surrounding the project action area because the proposed action is too far removed in distance to affect these species or their habitat.

3.5 Threatened and Endangered Species

3.5.1 Affected Environment

In the United States, species may be federally listed as threatened or endangered under the ESA, which affords broad protections to the listed species. A species' status is critically reviewed prior to listing and, once listed, federal agencies are required to follow structured procedures to conserve endangered and threatened species when taking a federal action that may jeopardize these species. The State of Alabama also requires separate protections for species considered endangered or of special concern within the state. The state species listing is updated by the Alabama Department of Conservation and Natural Resources and these species are identified in the State Wildlife Action Plan.

A review of the USFWS Information for Planning and Consultation (IPaC) tool indicated that 3 mammals, 3 fishes, 10 mussels, and 1 snail could potentially be within 10 miles of the project area (Table 3-1). The wood stork (*Mycteria americana*) is federally listed as threatened and has been observed within 10 miles of Wilson Dam each of the past three years by multiple observers and corroborated with photo evidence (eBird 2012). Impacts to this species are also evaluated. Wood storks are a rookery nesting species with overlapping nesting requirements to great blue heron. Despite this, no wood stork observations near Wilson Dam have occurred during nesting season, nor has any nesting activity near this dam been reported.

Table 3-1. Federally Listed Species

Common Name	Scientific Name	Federal Status	Species Group
Gray Bat	*Myotis grisescens*	Endangered	Mammal
Indiana Bat	*Myotis sodalis*	Endangered	Mammal
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Mammal
Wood Stork	*Mycteria americana*	Threatened	Bird
Alabama Cavefish	*Speoplatyrhinus poulsoni*	Endangered	Fish
Slackwater Darter	*Etheostoma boschungi*	Threatened	Fish
Spotfin Chub	*Erimonax monachus*	Threatened	Fish
Dromehary Pearlymussel	*Dromus dromas*	Endangered	Mussel
Fanshell	*Cyprogenia stegaria*	Endangered	Mussel
Orangefoot Pimpleback	*Plethobasus cooperianus*	Endangered	Mussel
Pink Mucket	*Lampsilis abrupta*	Endangered	Mussel
Ring Pink	*Obovaria retusa*	Endangered	Mussel
Rough Pigtoe	*Pleurobema plenum*	Endangered	Mussel
Sheepnose Mussel	*Plethobasus cyphyus*	Endangered	Mussel
Snuffbox Mussel	*Epioblasma triquetra*	Endangered	Mussel
Spectaclecase	*Cumberlandia monodonta*	Endangered	Mussel
White Wartyback	*Plethobasus cicatricosus*	Endangered	Mussel
Slender Campeloma	*Compeloma decampi*	Endangered	Snail

Federally endangered gray bats (*Myotis grisescens*) and Indiana bats (*Myotis sodalis*) have been recorded in Lauderdale County. Northern long-eared bats and gray bats have also been documented in Colbert County. Gray bats reside primarily in caves while Indiana bats

and northern long-eared bats hibernate in caves and roost in trees throughout the summer. TVA biologists completed a survey of Wilson Dam in 2018 and found no indications of bat use or potential roosting sites on the deck of the dam, arches, or fly-over. Five caves have been documented within three miles of the dam, the closest of which is approximately 1.1 miles from the dam.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. As a result, this alternative would not impact threatened or endangered animals.

3.5.2.2 Alternative E – Repair Scheme D

Federally listed mammals would not be directly impacted by Alternative E because work would be confined to the dam bridge, fly-over, and arches and existing fenced gravel-lined staging area. These areas have no bat use as confirmed by TVA biologists. No activities would be conducted in species habitat and, due to sufficient distance of the proposed actions from known caves, construction is not expected to impact listed bat species using nearby caves or forested areas. There would be no impact on the wood stork because this species has not been observed within the project area during nesting season or for nesting activity. Wood stork occurrence in the project area appears to be limited to migration and the scale and location of the proposed action is not expected to affect migration.

Federally listed fish and mollusks would not be directly impacted by Alternative E because work would be confined to the dam bridge, fly-over, and arches and gravel-lined staging area. No impacts to the watercourse are anticipated and implementation of BMPs would minimize indirect impacts from sediment mobilization and introduction of contact water into Wilson Reservoir and the Tennessee River.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the U.S. Fish and Wildlife Service on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) which was completed in April 2018. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified on pages 5 and 6 of the TVA Bat Strategy Project Screening Form (see Appendix F) and need to be reviewed/implemented as part of the proposed project.

Activities proposed under Alternative E would require use of an existing temporary equipment and supply staging area. No threatened and endangered species habitat occurs in the staging area. Therefore, Alternative E is not anticipated to have an impact on threatened and endangered species.

3.6 Solid and Hazardous Waste

3.6.1 Affected Environment

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated material, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances). Solid wastes are generally managed through recycling and local landfills.

Hazardous wastes consist of materials that may be harmful to human health or the environment due to their toxicity, reactivity, ignitability, or corrosivity. Hazardous materials and management of these materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration standards; Emergency Planning and Community Right to Know Act; RCRA; the Comprehensive Environmental Response, Compensation, and Liability Act; and the Toxic Substances Control Act. The federal laws regulating hazardous wastes are under RCRA and its implementing regulations codified in Title 40 CFR Parts 260-280. The regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for management and disposal of hazardous wastes.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Therefore, no hazardous or solid substances would be generated from construction or operation activities.

3.6.2.2 Alternative E – Repair Scheme D

Under Alternative E, demolition debris, such as concrete, would be generated during bridge deck and expansion joint removal. The concrete deck to be removed is approximately 3,600 tons (3,200’ x 20’ x 0.75’ x 150 per cubic foot (pcf)/2,000 tons/lb.) and the concrete debris generated during expansion joint removal would add several hundred more pounds. The refurbishment action includes a 10% increase in debris due to removal of materials from arches, sidewalks, and guardrail faces for an approximate total of 4,000 tons.

The six steel expansion joints weigh approximately 2,800 pounds in total and are expected to be recycled.

Various hazardous wastes, such as fuels, solvents, paints, adhesives, lead-based paint (LBP) and compressed gases could also be produced during construction. Oily wastes generated during servicing of heavy equipment would be managed by TVA approved off-site vendors who service on-site equipment using appropriate self-contained used oil reservoirs. Appropriate spill prevention, containment and disposal requirements for hazardous wastes would be implemented to protect construction and plant workers, the public, and the environment. A small amount of LBP debris may be generated during the preparation of the fly-over handrails. LBP would be captured as part of the closed abrasive pressure wash system. The amounts of LBP generated are anticipated to be small as most LBP on the handrails would have been removed during previous repainting efforts (repainting efforts have occurred post-1977 when the LBP ban went into effect).

TVA would manage all solid wastes generated from construction activities in accordance with established procedures. Solid wastes would be managed as required by applicable state regulations in conformity with TVA’s environmental procedures and BMPs. General municipal solid waste and scrap metal could be incorporated into TVA’s existing recycling program. Solid waste construction impacts are expected to be minor.

Nonhazardous waste generated from deck and expansion joint removal as well as preparing areas of sidewalk, guardrails, fly-over, and parts of arches would include concrete and a limited amount of other construction wastes, such as metal, paper, wood, plastic, and other debris. Appropriate disposal of non-recyclable materials generated by this action

would be disposed at the Republic Services' Morris Farm Sanitary Landfill located approximately 32 miles to the east in Hillsboro; the Shoals Solid Waste Authority Landfill located less than 10 miles to the south in Tuscumbia; or the Florence Municipal Solid Waste Landfill, a permitted construction and demolition debris management facility located approximately 10 miles northwest in Florence. Overall, sufficient landfill capacity is available to accommodate the additional solid waste generated as a result of the proposed construction activities. Generation of construction wastes would be short-term and temporary; therefore, with implementation of standard TVA procedures including recycling, direct or indirect effects associated with construction wastes would be minimal.

Hazardous materials used during refurbishment may include limited quantities of fuels, solvents, paints, and other hazardous materials. The deck, fly-over, expansion joint, and arch refurbishment would not require any solvents. Repaired handrails located along the bridge may be repainted to match existing handrails. The fly-over deck would be coated with two layers of epoxy. Appropriate spill prevention, containment, and disposal requirements for hazardous materials would be implemented to protect construction and plant workers, the public, and the environment. All wastes would be characterized for appropriate disposal and a TVA approved permitted third-party waste disposal facility would be used for ultimate disposal of the wastes. Therefore, no significant impacts associated with the use of fuels, oil, lubricants, and the limited quantities of other hazardous materials generated during construction would be expected.

Operation of the refurbished bridge deck and fly-over would be the same as described under Alternative A and no direct or indirect effects related to solid or hazardous wastes are anticipated from use of the refurbished bridge deck and fly-over.

3.7 Visual Resources

3.7.1 Affected Environment

This assessment provides a review of the visual attributes of existing scenery, along with the anticipated impacts resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA. The classification process is also based on the methodology and descriptions adapted from Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook Number 701 (U.S. Forest Service 1995).

Scenic resources within a landscape are evaluated based on several factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed. For this analysis, the affected environment is the dam, as well as the physical and natural features of the landscape around it.

The Wilson Dam is an National Historic Landmark (NHL) and is listed in the National Register of Historic Places (NRHP). It has been a visual presence in the area since the 1920s. No other historic resources are within direct line of sight to the Wilson Dam. The

nearest identified historic resource, the circa 1870 Norfolk Southern Railroad Bridge, is located approximately 2.69 miles west-southwest of the Wilson Dam. No NRHP-eligible resource associated with the TVA Muscle Shoals Reservation is within direct line of sight.

The downstream face of the Wilson Dam, where the concrete arches interface with the parapet have developed widespread spalls with efflorescence and visible water movement. In addition, the sidewalk, curb, parapet, and deck have developed widespread cracking. Sections of the bridge parapet show previous repairs that do not match the original bridge.

On the north shore of the dam is the Marriott Shoals Hotel and Spa constructed in 2005 and the 26-story Renaissance Tower built in 1991. On the south shore of the dam is the control building, a scenic overlook, and residential development. Upstream of the dam is Wilson Reservoir and downstream is the Tennessee River/ Pickwick Reservoir and the forested Jackson Island. Wilson Reservoir is visually dynamic depending on the time of year (e.g., lower pool levels may result in exposure of reservoir banks, bottoms, and flats). The combination of development and land use patterns along its shore contributes to the overall visual character of the area.

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

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. If the bridge is left unrepaired, deterioration of the deck, fly-over, expansion joints, keyways, and arches may progress over time, increasing the visible spalls and cracks and further degrading the scenic attractiveness of the dam, bridge, and fly-over. A minor visual impact would occur due to continued deterioration of the dam, bridge, an fly-over.

3.7.2.2 Alternative E – Repair Scheme D

Construction activities would temporarily affect the visual environment due to refurbishment activities. Hydrodemolition activities to remove the bridge deck concrete and the deteriorating concrete on the faces of the arches would be visible to visitors and residents viewing the Wilson Dam from the nearby shores. Cutting and chipping expansion joints as well as preparing the fly-over surface would also be visible. In addition, dump trucks removing debris or concrete mixer trucks would be visible entering and leaving the project area. Therefore, temporary, minor impacts to the visual environment are anticipated.

TVA intends to rehabilitate the bridge such that deteriorated features would be repaired to match the original features in design, color, texture, and other visual qualities. The textural finishes of any concrete or paint applied would be matched to the Wilson Dam's current appearance. Existing curbs, deck drain plates, and light fixtures set into the guard rails of

the bridge would be removed, retained, and reinstalled as a part of the project. Overall, the project would provide long-term visual benefits as it restores the scenic attractiveness of the dam, bridge, and fly-over by removing spall and the cracks in the roadway, sidewalks, and parapets.

3.8 Cultural and Historic Resources

3.8.1 Affected Environment

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, as well as locations of important historic events that lack material evidence of those events. Cultural resources that are listed, or considered eligible for listing, in the NRHP are called historic properties. To be considered a historic property, a cultural resource must possess both integrity and significance. A historic property's integrity is based on its location, design, setting, materials, workmanship, feeling, and association. The significance is established when historic properties meet at least one of the following criteria: (a) are associated with important historical events or are associated with the lives of significant historic persons; (b) embody distinctive characteristics of a type, period, or method of construction; (c) represent the work of a master, or have high artistic value; or (d) have yielded or may yield information important in history or prehistory (36 CFR Part 60.4).

Section 106 of the NHPA requires federal agencies to consider the effects of their proposed undertakings on historic properties and provide the Advisory Council on Historic Preservation an opportunity to comment on those effects. TVA determined that the Proposed Action (Alternative E) is an "undertaking" as defined by the regulations under NHPA. Once an action is determined to be an undertaking, the regulations require agencies to consider whether the proposed activity has the potential to impact historic properties. If the undertaking is such an activity, then the agency must follow the following steps: (1) involve the appropriate consulting parties; (2) define the area of potential effects (APE); (3) identify historic properties in the APE; (4) evaluate possible effects of the undertaking on historic properties in the APE; and (5) resolve adverse effects (36 CFR § 800.4 through 800.13.). An APE is defined as the "geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16.).

TVA defined the APE to be the following: the boundary of the Wilson Dam NHL (which includes the foundation lines of Wilson Dam, including the power house and the old and new locks); the planned staging area within the lock operation area on the north shore of the Tennessee River; and any historic properties within 0.5 miles and direct line of sight of Wilson Dam. Given the scale and scope of the project and limited view beyond the bridge itself, the APE accounts for both direct and indirect/visual effects.

The direct APE is limited to the concrete arches on the dam above the spring line, bridge deck, curbs, parapets, fly-over, and sidewalks between the control building at the south end and the fly-over's north end, as well as the existing 1.6-acre staging area located within the lock operations area. The surface of the staging area is covered in gravel and it is enclosed by a chain link fence.

Pietak (2002) investigated the APE as part of Tract I in a cultural resources survey of the Muscle Shoals Reservation. No archaeological sites were discovered and no additional work was recommended. None of the identified resources in the Alabama Register of Landmarks and Heritage web map have direct line of sight to Wilson Dam. The nearest

identified resource, the c. 1870 Norfolk-Southern Railroad Bridge, is located approximately 2.69 miles west-southwest of Wilson Dam and does not have a direct line of sight. NRHP data available through the National Park Service (NPS) indicates the only historic property within 1.25 miles of Wilson Dam is the Florence Wagon Works Site, listed in the NRHP by TVA in 1996. The site is not within direct line of sight. TVA records indicate additional NRHP-eligible resources associated with TVA's Muscle Shoals Reservation (including, but not limited to the Power Service Building and CCC Pavilion) are also not located within direct line of sight.

TVA considers effects to historic properties pursuant to Section 106 of the NHPA. The only historic property within the APE is the Wilson Dam NHL. In 1966, Wilson Dam was designated an NHL by the U. S. Department of the Interior and listed in the NRHP. The NHL was certified in 1977 (Rettig and Sheely 1976).

Section 106 of the NHPA requires federal agencies to consult with the respective State Historic Preservation Officer (SHPO) and Indian tribes when proposed federal actions could affect historic and cultural resources, including archaeological resources, which are also protected under the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act, in addition to the NHPA. Additionally, federal agencies must consult with the Secretary of the Interior for projects affecting NHLs.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or coat/paint the fly-over handrails. As a result, the dam,bridge, and flyover would continue to deteriorate. This alternative would have the potential to diminish the integrity of the NHL Wilson Dam and Bridge and could adversely affect this historic resource.

3.8.2.2 Alternative E – Repair Scheme D

Under Alternative E, there would be a direct and visual effect on the Wilson Bridge NHL from removing and replacing the existing bridge deck; patching deteriorated surfaces of arch face, rails, and sidewalks; resealing the fly-over epoxy overlay; replacing the fly-over expansion joints; and painting the fly-over handrails.

Specifically, existing curbs, deck drain plates, and light fixtures set into the guard rails of the bridge would be removed, retained, and reinstalled as a part of the project. The repair of any damaged lights is not a part of this project, however, the damaged lights or those that are missing globes would be reinstalled for potential future repair or restoration. In places where curbs are missing, in-kind replacements would be installed.

On the fly-over, the steel handrails would be prepared using an abrasive pressure wash to remove the existing coating/paint. This process has been used previously to remove paint on the handrails and has not caused harm to the handrails.

Any concrete or paint applied textural finishes would be matched to Wilson Dam's current appearance. Furthermore, as the plans specify, the contractor would take special care to protect any parts of the structure that are not to be removed specifically and the contractor is not allowed to use a hydraulic ram on a backhoe, mini excavator, or other equipment for concrete removal on portions of the structure to remain in service.

Given that the design of the bridge refurbishment is in keeping with the *Secretary of the Interior's Standards for Rehabilitation,* it is unlikely that the rehabilitation of the bridge, arches, and fly-over at the Wilson Dam would diminish the integrity of the NHL. Therefore, Alternative E would have no adverse effect to historic properties.

TVA completed consultation with the Alabama Historical Commission/SHPO, who provided concurrence on TVA's finding of no adverse effect to historic properties (see Appendix F). TVA consultated with the following federally-recognized tribes on the availability of the EA: Absentee Shawnee Tribe of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, Cherokee Nation, The Chickasaw Nation, Coushatta Tribe of Louisiana, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Jena Band of Choctaw Indians, Kialegee Tribal Town, The Muscogee (Creek) Nation, Poarch Band of Creek Indians, The Seminole Nation of Oklahoma, Shawnee Tribe, Thlopthlocco Tribal Town of Oklahoma, and the United Keetoowah Band of Cherokee Indians in Oklahoma.

TVA also notified the Secretary of the Interior, via the Southeast Regional Office of the NPS, regarding the SHPO's concurrence on the finding of no adverse effects, as required for projects affecting NHLs (see Appendix G).

3.9 Recreation

3.9.1 Affected Environment

Nearby recreation opportunities include boating and fishing on Wilson Reservoir. Common fish species include catfish, smallmouth bass, and largemouth bass. Fishing is also popular on the tail waters below the dam, both from the bank or by boat.

The closest boat access facilities are the TVA-owned public boat ramp and associated parking lot at the south end of the dam and the privately-operated Steenson Hollow Marina approximately 0.5 miles east of the dam.

The Wilson Dam Visitors Center is located on Reservation Road at the south end of the dam and includes display panels and interpretive materials. A visitor overlook and ADA-accessible fishing pier are located across the road to the east, while the 1-mile Energy Trail runs along the bluffs above the Tennessee River to the west.

The Muscle Shoals Waterfall Walk, 0.18 miles in length, is located along the southern shore below the dam. This paved trail provides views of Wilson Dam, limestone bluffs, and a waterfall. The trail is popular for bird watching, as many bird species congregate along the tail waters and at Jackson Island.

View of Muscle Shoals Waterfall Walk from Wilson Dam Bridge

The City of Florence operates two city parks on the north shore of the river and reservoir. Veteran's Memorial Park, located northeast of the dam, provides a variety of recreation amenities including baseball fields, tennis courts, a disc golf course, picnic areas, and a playground. River Heritage Park, northwest of the dam, features picnic shelters, a playground, and an interactive water fountain that is open seasonally. The park also has several river overlooks and is the starting point for the future River Walk Heritage Trail, a planned 2-mile walking path along the Tennessee River. Figure 3-1 provides an overview of local recreation areas and facilities.

Bird Watching from Muscle Shoals Waterfall Walk

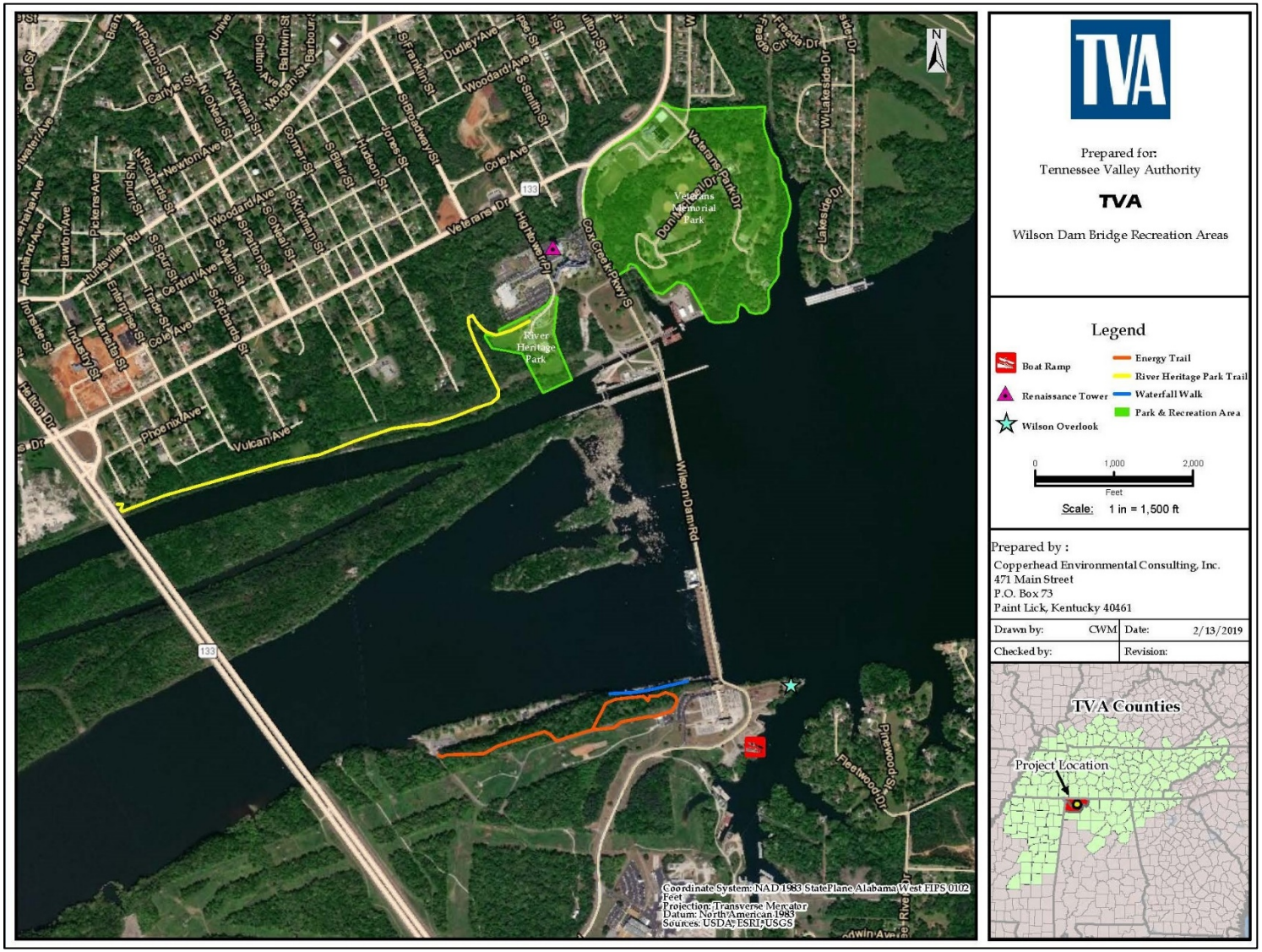

Figure 3-1. Recreation Areas

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no temporary closures or other adverse impacts on recreation over the short- or long-term.

3.9.2.2 Alternative E – Repair Scheme D

Implementation of the proposed action would result in minor, short-term, indirect impacts on recreation similar to those described for transportation below. There would be no direct impacts because all recreation facilities would remain open during refurbishment and no recreation activities would be unavailable.

The closure of Reservation Road would require users to use Singing River Bridge on State Highway 133/157 as an alternate route when accessing recreation facilities and activities on the opposite side of the dam. For example, access to the visitors' center from the north end of the dam would require a 5-minute detour on the Singing River Bridge. These impacts would only occur while Reservation Road is closed.

Activities such as fishing, boating, hiking, and bird watching would be unaffected.

3.10 Transportation

3.10.1 Affected Environment

The Muscle Shoals Reservation is served by highway and railway modes of transportation. The transportation network surrounding the Reservation contains roads, bridges, rail lines, and navigable waterways. Reservation Road crosses the Wilson Dam. Based on a 2017 traffic study, approximately 3,500 vehicles per day travel across the Wilson Dam (Volkert 2017). Wilson Dam Traffic Data is provided in Appendix E.

To the west of the dam is Alabama State Highway 133 (AL 133) or Wilson Dam Road, a multi-lane divided highway, which runs north-south between Muscle Shoals and Florence and carries traffic over the Tennessee River (see Figure 3-2). AL 133 crosses the Tennessee River via the Singing River Bridge (formerly known as the Patton Island Bridge) and carries over 34,710 vehicles per day (ALDOT 2017). On the south side of the Wilson Dam, Reservation Road, a minor arterial, continues until it intersects with AL 133/Wilson Dam Road. On the north side of the Wilson Dam, Reservation Road becomes South Cox Creek Parkway and intersects with Veterans Drive, which are both principal arterials.

The Alabama Department of Transportation (ALDOT) is finishing up work on a section of AL 133 south of the Singing River Bridge in 2019. Additional roadway projects are planned in Florence over the next few years.

A pedestrian sidewalk is on the west side of the bridge crossing the dam. No dedicated bicycle facilities are in the project area. Trail systems are near the project area on both sides of the dam/ bridge but are not within the project area.

There is an extensive intermodal system in the Muscle Shoals area. Included in this system are two railways, Norfolk-Southern Railroad and the Tennessee Southern Rail Company. Norfolk-Southern serves Colbert County with connections to markets to the east, west and south of the Shoals Area. The Tennessee Southern Rail Company is a short line railroad

that serves Lauderdale County with connections into middle Tennessee. The rail service in the Muscle Shoals area is freight based with no passenger rail service.

AL 133 and Singing River Bridge

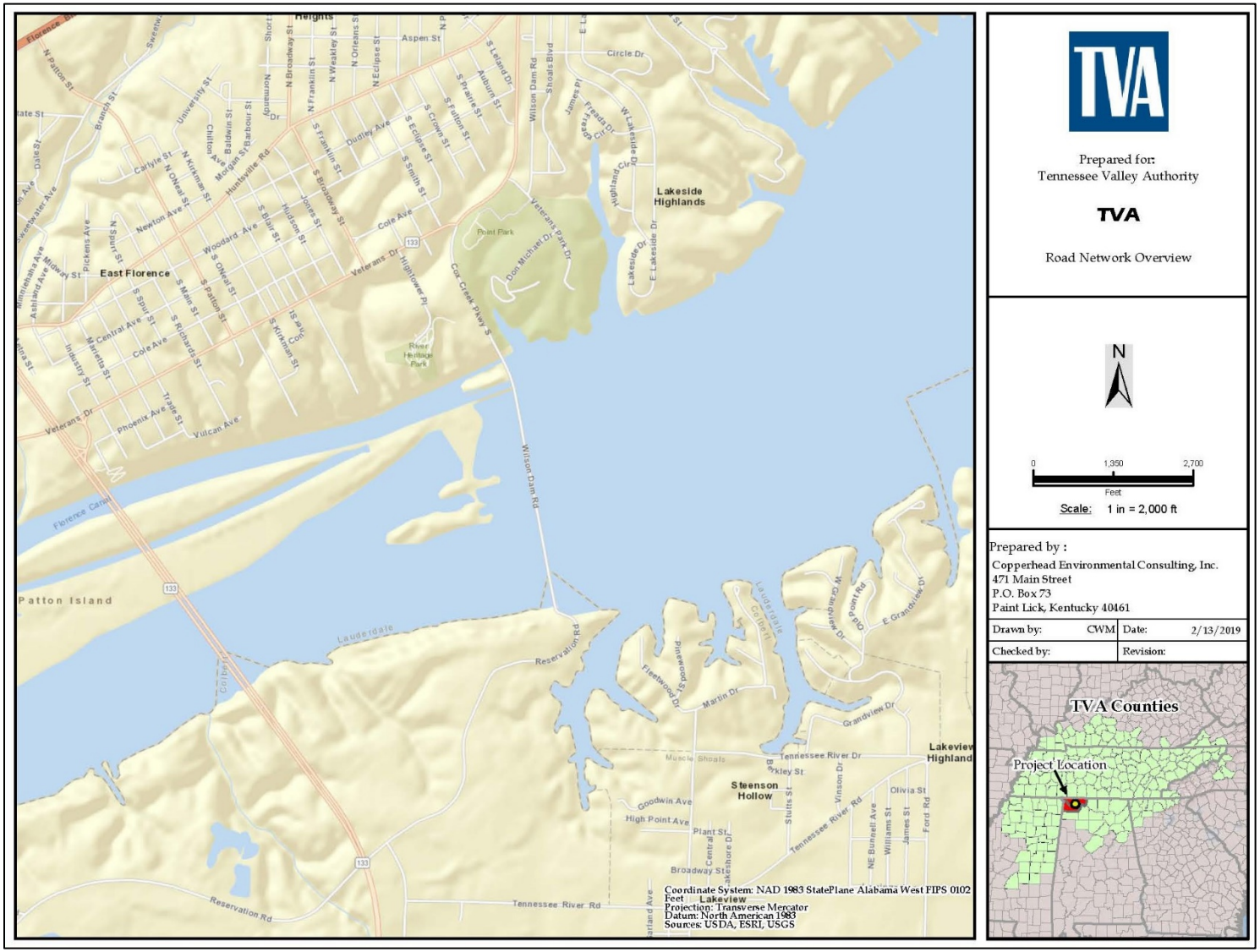

Figure 3-2. Road Network Overview

The Tennessee River provides opportunities for commercial and industrial transportation in the Muscle Shoals Area. The navigable waterway has created the opportunity for thousands of industrial and service jobs at businesses and industries that utilize the river for transportation. The Wilson Dam has a navigation lock, which is operated by the USACE. Port facilities are available on both sides of the waterway for use by commercial and industrial interests. Public and private docks are located along the Tennessee River providing an intermodal transportation connection. The Florence – Lauderdale County Port Authority is a public, not-for-profit organization chartered by the Lauderdale County Commission and the City of Florence. The Authority owns the Port of Florence. The Port Authority leases land and equipment to private operators and manages the public dock.

The Port of Florence is a multi-modal port located at mile 256 on the Tennessee River. Tennessee Southern Railroad provides rail access to the port and operator services at the public dock. The railway connects to CSX north of Columbia, Tennessee. The Tennessee Southern Railroad also operates the Port Authority's 40-ton overhead bridge crane. Fleeting is provided by Muscle Shoals Marine Service.

The Northwest Alabama Regional Airport is located north of U.S. Highway 72 Alternate approximately 3 miles south of the Wilson Dam. The airport has 14 "T" hangers, 12 aerial ports and tie-downs for over 75 general aviation aircraft. The airport hosts approximately three passenger flights per day and 15 freight/mail flights per day (Northwest Alabama Regional Airport 2019). Commercial passenger air service is provided by Mesaba Airlines operating as a Delta Connection with daily connections to Atlanta, Georgia.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Reservation Road would remain open and traffic would continue to use Wilson Dam Bridge. A potential minor impact to transportation would occur if deterioration of the bridge and fly-over continues to the point where it can no longer accommodate current or forecasted traffic volumes.

3.10.2.2 Alternative E – Repair Scheme D

As discussed in the Purpose and Need section, the concrete bridge deck and sidewalks have deficiencies in the form of cracks and evidence of previous repairs. The overlay and expansion joints on the fly-over are showing signs of wear and tear. To repair the bridge deck, fly-over, and sidewalks, Reservation Road over the Wilson Dam Bridge would be closed for approximately 8 months. Detoured traffic would use existing arterial roads and cross the Tennessee River using the nearby Singing River Bridge on AL 133. The detour would add approximately 5 minutes to an average crossing. The small volume of traffic, approximately 3,500 vehicles per day, is not anticipated to negatively affect existing traffic on nearby roads or the Singing River Bridge, where traffic volumes would temporarily increase by approximately 10 percent during repairs. Currently, during bad weather, such as when water freezes on the dam, the bridge is closed and traffic is detoured. Similarly, during dam safety maintenance or inspections, the bridge is closed. Bridge closures occur on a semi-regular basis and travelers using the Wilson Dam Bridge have become accustomed to these closures.

The daily workforce during construction/renovation is expected to be approximately 35 workers. Construction traffic is expected to predominantly consist of a mix of passenger

cars and pickup trucks, along with less frequent large delivery or construction trucks including dump trucks and concrete mixer trucks. For this analysis, the bounding value of the construction workforce (35 workers) is used to assess potential effects on traffic operations. Traffic is assumed to be distributed during a peak morning period (to the site) and during a peak evening period (away from the site). Therefore, a daily traffic volume of 35 vehicles per day (worker vehicles, material delivery trucks, and construction trucks (dump and cement) is assumed to be generated by Alternative E. It is assumed that construction-related traffic would utilize interstate highways or major arterial roadways as much as possible and therefore would only generate a minor increase in traffic on local roads.

Pedestrians using the bridge and fly-over, primarily guests of the Muscle Shoals Hotel and Spa or visitors, would not be able to cross the bridge during repairs but other pedestrian facilities (trails) located on both sides of the Tennessee River near the Wilson Dam would continue to provide for pedestrian access.

Temporary bridge closure would have no impact on boat or barge traffic as the Wilson Dam locks would not be affected by the bridge closure. Passenger and freight air and freight travel would not be affected by the temporary bridge closure.

The temporary bridge closure is not expected to affect local emergency, fire, and law enforcement agencies and would not jeopardize their capacity to respond to other emergencies. These services occur on both sides of the Tennessee River and in case of a large emergency, access would continue through use of the Singing River Bridge.

After repair work is completed, no change in vehicle traffic volume is anticipated and traffic patterns should return to current levels. Therefore, the Project is expected to have a temporary, minor adverse impact on transportation during repairs and have a long-term transportation benefit as the bridge and fly-over would be able to continue to accommodate current or forecasted traffic volumes.

3.11 Noise

3.11.1 Affected Environment

Noise is defined as unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses and the time of day the noise occurs (i.e., higher sensitivities would be expected during the quieter overnight periods).

Sound is measured in units of decibels (dB) on a logarithmic scale. Therefore, increasing the noise level by 5 dB results in a noise level perceived by the human ear to be twice as loud as the original source. Given that the human ear cannot perceive all pitches or frequencies in the sound range, sound level measurements are typically weighted to correspond to the limits of human hearing, as measured in dBA. A noise change of 3 dBA or less are not normally detectable by the average human ear. An increase of 5 dBA is generally not readily noticeable and a 10-dBA increase is usually felt to be "twice as loud" as before.

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978, USC 42 4901-4918), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although there are no federal, state, or local regulations for community noise in Colbert or Lauderdale counties, USEPA guidelines (1974) recommend that Ldn (day-night average sound level) not exceed 55 dBA for outdoor residential areas. The USEPA noise guideline recommends an Ldn of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety" (USEPA 1974). 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).

Sound from a source spreads out as it travels from the source and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy. Atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over distance from the source. An individual's sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval.

Community noise refers to outdoor noise near a community. A continuous source of noise is rare for long periods and is typically not a characteristic of community noise. Typical background day/night noise levels for rural areas range between 35 and 50 dB whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (USEPA 1974). Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio and sleeping.

At the Wilson Dam, ambient noise sources include regular operations at the dam (water releases from the reservoir), lock (opening and closing lock), barges, and daily vehicle traffic crossing the bridge. Noise levels increase when cranes and machinery are used during lock outages. Birds also frequent the areas below the dam and generate noise from their calls and activity and have a roost on Jackson Island.

The Northwest Alabama Regional Airport at Muscle Shoals is 3 miles south of the Wilson Dam. The airport can accommodate small to medium size airplanes. The airport hosts approximately three passenger flights per day and 15 freight/mail flights per day (Northwest Alabama Regional Airport 2019). Approaching and departing planes regularly pass over the nearby Muscles Shoals Reservation and are an external source of noise.

Sensitive noise receptors (residences, hotels, parks, etc.) are located near the proposed project. On the north side, the Muscle Shoals Hotel and Spa is 0.36 miles; and Veterans Park is 0.2 mi away from the project area. The nearest residence is located approximately 0.36 miles to the southeast of the dam. A parking lot and overlook of the dam is approximately 0.1 miles from the dam.

Construction noise associated with the proposed action would include the use of vehicles such as dump trucks, delivery trucks, concrete mixers, pavers, pickup trucks, and skid steer loaders, and generators and hand-held pneumatic tools. These types of equipment emit 55 to 85 dBA at a distance of 50 feet (FHWA 2017).

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Therefore, there would be no changes to the existing noise environment and no new impacts on sensitive receptors.

3.11.2.2 Alternative E – Repair Scheme D

Repairs at the Wilson Dam are anticipated to take up to 8 months. During this time, vehicle traffic would detour to the Singing River Bridge and traffic noise would decrease. At the same time, worker personnel vehicles (approximately 35) would park at the staging area. Equipment expected to be used to rehabilitate the dam and bridge include 1-2 truck-mounted cranes, 2 skid steer loaders, 2-4 dump trucks, concrete trucks and pump trucks during deck pours, hand tools, generators, compressors and other miscellaneous equipment. Construction activities would primarily occur during the day on weekdays; however, construction activities could occur at night or on weekends, if necessary. Typical noise levels from construction equipment are expected to be 85 dBA or less at 50 feet.

Based on a simplified analysis of straight-line noise attenuation from the project boundary, it is estimated that construction phase noise levels would attenuate to below the USEPA guidelines. For example, the sound level of construction tools and equipment emitting 55 to 85 dBA at 50 feet would be approximately 28.5 to 58.5 dBA at Veteran's Park (0.2 miles away) and approximately 27.3 to 57.3 dBA at the Muscle Shoals Hotel and Spa and at the nearest residence (approximately 0.23 miles away). These construction noise impacts would be partially offset by the absence of noise from the 3,500 vehicles which normally travel over the bridge.

Given the temporary and intermittent nature of construction noise, the impact of noise generated from construction activities is expected to be minor. There may be minor indirect noise impacts from the detour of traffic (approximately 3,500 vehicles per day) onto the nearby Singing River Bridge. This would temporarily increase the vehicle noise on the detour routes used. The detour traffic noise would only occur during the 8-month construction period.

3.12 Socioeconomics and Environmental Justice

3.12.1 Affected Environment

The northern shore of Wilson Reservoir is the boundary between Lauderdale County (to the north) and Colbert County (to the south). The largest population center near the project is the City of Florence, which is in Lauderdale County directly north of the dam. The City of Muscle Shoals, in Colbert County, is approximately two miles southwest of the dam.

Population and income estimates were derived from the most recent US Census data and are provided in Table 3-2 below. This includes information on low-income and minority populations. EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) mandates federal agencies to consider potentially disproportionate health or environmental impacts that their activities may have on minority or low-income populations. Although TVA is not subject to this EO, it routinely evaluates the impacts of its actions on low-income and minority populations.

Table 3-2. Population and Income

Metric	State of Alabama	Colbert County	Lauderdale County	City of Florence	City of Muscle Shoals
Population	4,874,747	54,500	92,538	39,852	14,022
Per Capita Income	$25,746	$23,675	$25,803	$23,311	$26,227
Median Household Income	$46,472	$45,477	$44,888	$37,843	$52,201
Persons in Poverty (Percent)	16.9	15.4	13.7	22.2	10.2
Minority Population (Percent)	34.4	21.5	15.4	24.7	17.3

Source: US Census 2019

During refurbishment, a temporary workforce of approximately 35 workers would utilize services and likely commute from their homes in Colbert and Lauderdale counties.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no temporary workforce needed to conduct refurbishment and therefore no impacts on socioeconomics or environmental justice.

3.12.2.2 Alternative E – Repair Scheme D

Implementation of the proposed action would result in minor, short-term beneficial impacts on socioeconomics, primarily through the temporary use of 35 workers to conduct refurbishment activities. Because workers would likely be local to Colbert and Lauderdale counties, there would be no anticipated increase in sales or lodging taxes. However, the proposed action would provide employment for these workers for the duration of refurbishment activities. Beneficial impacts would extend to environmental justice if workers are hired from minority or low-income populations. Indirect effects would be minor and include spending by workers in the local economy.

3.13 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by the CEQ and the courts. Impacts associated with refurbishment and repair of the Wilson Dam Bridge deck, fly-over, and other concrete surfaces have the potential to cause unavoidable adverse effects to several environmental resources.

Impacts associated with construction have the potential to cause unavoidable adverse effects to existing open water habitats. Use of high-pressure water and aggregate to remove deteriorated and sound concrete and old paint could cause temporary impacts to water quality in receiving water bodies from runoff/drainage. BMPs to filter and minimize runoff would be implemented, and water released by construction activities would meet established ADEM permit limits.

Other impacts associated with Alternative E would primarily be related to activities associated with the use of construction equipment. Equipment use may result in varying amounts of air emissions, noise and vibration that may potentially impact onsite workers. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the site. Emissions from construction activities and equipment are minimized through implementation of BMPs, including proper maintenance of construction equipment and vehicles.

3.14 Relationship of Short-Term Uses to Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This EA focuses on the analyses of environmental impacts associated with the refurbishment or repair of the Wilson Dam Bridge deck, fly-over, and concrete surfaces. These refurbishment activities are considered short-term uses of the environment as they would occur during the 8 months of construction and the long-term use is considered to be initiated upon the completion of the refurbishment and reopening of the bridge to traffic. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of either the bridge or dam.

Construction activities would have a negative effect on a limited amount of short-term uses of the environment such as air, noise and transportation resources as described above. Most environmental impacts during construction activities would be relatively short term and would be addressed by BMPs and mitigation measures. Construction activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction and support jobs and revenue.

Use of an existing solid waste landfill would have a minor impact on capacity and, therefore, have an impact on the users of the landfill. This project is not anticipated to have any significant impact on solid waste management capacities due to the small volume of waste to be managed.

In the long-term, refurbishing or repair of the bridge deck, fly-over, and other concrete surfaces is not expected to alter long-term uses of the bridge or dam.

3.15 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used in the refurbishment of the Wilson Dam bridge deck, fly-over epoxy overlay, expansion joints, and handrails. The term irreversible commitments of resources describe environmental resources that are potentially changed by construction or operation and that could not be restored at some later time to the resource’s state prior to construction or operation. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road right of way if the road remains. Irretrievable commitments of resources are generally materials that are used for the refurbished bridge in such a way that they could not, by practical means, be recycled or restored for other uses. For example, mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored. Under Alternative A, no irreversible or irretrievable commitments would occur as the existing bridge would remain unchanged. Under Alternative E, the bridge refurbishment would involve irreversible commitment of fuel, energy, and concrete, overlay, and painting material resources.

3.16 Cumulative Effects

CEQ regulations for implementing the procedural provisions of the NEPA of 1969, as amended (42 USC § 321 et seq.) define cumulative impact as: "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR § 1508.7).

The proposed action identified under Alternative E would occur on land that was previously disturbed and is used for transportation, water storage, and energy generating purposes. Consequently, the potential for direct and indirect effects from project activities is generally low. For resources where no direct or indirect effects were identified, there would be no cumulative effects.

Unless otherwise stated, the geographic scope of analysis is assumed to include a 5-mile radius around the Wilson Dam. This is the area in which indirect and cumulative effects are expected to occur. This area is largely defined by urban and suburban land use, water features including Wilson Reservoir, and agricultural and forested lands in unincorporated areas.

Past, present and reasonably foreseeable future actions were identified within the 5-mile radius and include the following:

- Commercial, and industrial development in Florence (e.g., Underwood Baptist Church student building, Florence; University of North Alabama renovations to historic Strickland Building).
- American Paper & Twine started construction in 2019 of a 30,000 square foot facility in Shoals Research Airpark in Muscle Shoals.
- The Alabama Department of Transportation (ALDOT) is finishing up work on a section of AL 133 south of the Singing River Bridge in 2019.
- In 2019, ALDOT will widen a section of U.S. 43 to four lanes and add a turning lane. The work is from AL 64 north to the Tennessee state line (Lauderdale County).
- In 2019, ALDOT will replace two bridges at the Ash Boulevard overpass on Hatch Boulevard in Sheffield.
- In 2020, ALDOT will replace the overpass on Mitchell Boulevard at Coffee Road in Florence.

As shown in Table 3-3, the cumulative impacts associated with the proposed action in combination with the above identified actions would be insignificant.

Table 3-3. Cumulative Impacts

Resource Area	Alternative E – Repair Scheme D
Air Quality	Minor, short-term cumulative impacts. The temporary construction-related air emissions are not expected to result in any changes to NAAQS attainment.
Climate	Minor, short-term cumulative impacts.
Surface Water	Minor, short-term cumulative impacts due to the confined scale of the construction activities and the BMP minimization measures that would be implemented to minimize impacts to water quality. No long-term water quality or ecological health impacts are anticipated.
Wildlife	No cumulative impacts.
Threatened and Endangered Species	No cumulative impacts.
Solid and Hazardous Waste	Minor short- and long-term cumulative impacts due to the small waste volumes generated and the regional solid waste management capacity. The capability of regional waste management facilities to continue accepting waste would not be compromised.
Visual	Short- and long-term beneficial cumulative impacts on the visual landscape as it restores the visual qualities of the current Wilson Dam and bridge. This would result in long-term cumulative effects if other nearby restoration or preservation actions are undertaken.
Cultural and Historic Resources	No cumulative impacts.
Recreation	Minor, short-term cumulative impacts on recreation due to temporary construction detour. No long-term cumulative impacts to nearby recreation facilities are anticipated.
Transportation	Minor, short-term cumulative impacts to vehicle traffic due to temporary construction detour that would occur simultaneously with other transportation improvement and development projects and their traffic impacts. No cumulative impacts anticipated on air, railroad, or barge transportation.
Noise	Minor, short-term cumulative noise impacts.
Socioeconomic and Environmental Justice	Minor, short-term, beneficial cumulative impacts from the temporary employment of a construction workforce. The proposed action is not expected to contribute to cumulative impacts on environmental justice.

CHAPTER 4 – LIST OF PREPARERS

4.1 NEPA Project Management

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Project Role:	Socioeconomics and Environmental Justice, Recreation, Surface Water, QA/QC

Experience:	12 years of experience with environmental policy including NEPA document preparation.

CHAPTER 5 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

5.1 Federal Agencies

National Park Service, Secretary of the Interior

5.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma

Alabama-Coushatta Tribe of Texas

Alabama-Quassarte Tribal Town

Cherokee Nation

The Chickasaw Nation

Coushatta Tribe of Louisiana

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Jena Band of Choctaw Indians

Kialegee Tribal Town

The Muscogee (Creek) Nation

Poarch Band of Creek Indians

The Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town of Oklahoma

United Keetoowah Band of Cherokee Indians in Oklahoma

5.3 State Agencies

Alabama Historical Commission, State Historic Preservation Officer

Alabama Department of Environmental Management

Alabama Department of Transportation

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CHAPTER 6 – LITERATURE CITED

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Appendix A – Wilson Dam Bridge Deck Refurbishment Design

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Appendix B – Expansion Joint Installation Details

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Appendix C – Wilson Dam Bridge Deck Refurbishment Study

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Appendix D – Scoping Study Alternatives Scoring

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Appendix E – Wilson Dam Traffic Volume Data

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Appendix F – TVA Bat Strategy Project Screening Form

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Appendix G – Consultation Correspondence

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