Natchez Trace Parkway

U.S. Department of the Interior
National Park Service

Replacement of the John Coffee Memorial Bridge (Tennessee River Bridge)
Environmental Assessment

November 2024

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CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The National Park Service (NPS) is proposing to replace the John Coffee Memorial Bridge (Tennessee River Bridge or bridge) along the Natchez Trace Parkway (Parkway) to provide a safe and reliable crossing. The bridge spans the Tennessee River (river mile 410.7), approximately 6 miles north of Cherokee, Alabama. While the Tennessee Valley Authority (TVA) manages the river, the Parkway manages the Tennessee River Bridge and the land on both sides of the river. Detailed design and construction for the project would be conducted by the Federal Highway Administration Eastern Federal Lands Highway Division (FHWA), in consultation with the NPS. The US Coast Guard (USCG) oversees the use of this navigable waterway within the jurisdiction of the 8th District. The NPS is consulting with the USCG and US Army Corps of Engineers (USACE) and coordinating with both agencies for the permitting of the bridge, bridge design, and environmental analysis. FHWA, USCG, USACE, and TVA are cooperating agencies in the National Environmental Policy Act (NEPA) process.

This chapter describes the reasons the NPS is proposing to replace the Tennessee River Bridge and discusses the following topics: purpose of and need for action; project area and background; and issues and resource topics retained for detailed analysis.

The Council on Environmental Quality (CEQ) recently published the final version of Phase II of its NEPA rulemaking. This project started prior to the rollout of the Phase II rulemaking; therefore, it follows Phase I rulemaking (CEQ 2022).

PURPOSE AND NEED

The purpose of the project is to maintain a safe and reliable bridge crossing for users over the Tennessee River, while minimizing adverse effects on Parkway resources. The project is needed because this bridge, which opened in 1964, has exceeded its 50-year design life. The bridge has not undergone a major rehabilitation since 1964, but repairs have kept it operational and safe. FHWA regularly inspects the bridge in accordance with structural engineering guidelines and standards to confirm that it is safe for travel.

The bridge lacks redundancy[1] in its design, making it a Non-Redundant Steel Tension Member Bridge, formerly known as a fracture critical bridge.[2] Detailed structural inspections and studies note that the bridge exhibits widespread cracking in the bridge deck and notable deterioration of the bridge piers. In approximately 10 to 20 years, as the bridge deteriorates beyond the ability of routine maintenance and repairs to address structural issues and ultimately no longer meets bridge safety requirements, the NPS and FHWA would be required to close the bridge to vehicular traffic. To avoid the impacts of long-term or permanent bridge closure, the bridge needs to be replaced to provide a structurally sound vehicular bridge crossing the Tennessee River.

[1] Bridge redundancy is defined as the ability for a bridge structure to remain intact after one of the bridge members (components) fails. This means that the bridge structure has enough strength that the failure of one member will not cause a portion of or the entire bridge to collapse.

[2] Fracture critical bridge is defined as a member or component of a bridge in tension whose failure is expected to result in the collapse of the bridge or the inability of the bridge to perform its function.

PROJECT AREA

The project is located along the Parkway, spanning the Tennessee River, approximately 7 miles due north of the US 72 Highway (HWY) ramp intersecting the Parkway. As shown in Figure 1, the project area includes approximately 148 acres, bounded by the Tennessee River to the north and south. The NPS manages the bridge and land on both sides of the river, while TVA manages the river. The project area covers approximately 300 feet from either side of the existing Parkway centerline, from just west of the Colbert Ferry Boat Ramp Area entrance to just east of the ramps connecting the Parkway to Lauderdale County Road (CR) 2. The project area includes an agricultural lease, just southeast of the Tennessee River Bridge, which could serve as a construction staging area.

BACKGROUND

History of the Parkway

As one of the oldest transportation routes in North America, the Old Natchez Trace dates back approximately 10,000 years before present when it consisted of a network of trails. For centuries, Native Americans traveled and traded along this corridor, which crosses the homelands of Native American Tribes such as the Natchez, Chickasaw, and Choctaw. People from these Tribes and their ancestors created vibrant cultures that thrived for thousands of years along what is now the Parkway.

Native Americans were the first to establish the Natchez Trace, ushering in an era of trade and travel through this region for centuries. When the United States began to expand westward in the late 1700s and early 1800s, numerous travelers traversed the area, which became known as the Old Natchez Trace. In 1800, President John Adams designated the Old Natchez Trace as a national postal road for mail delivery between Nashville and Natchez. However, over time, new roads and population centers were developed, and steamships began to carry people and supplies upstream. While historical uses of the Old Natchez Trace declined, the route continues to be used in various forms to the present day. Segments of the Old Natchez Trace have been incorporated into the county road system in numerous locations.

The Parkway was established as a unit of the national park system by an act of Congress on May 18, 1938, to commemorate and preserve the Old Natchez Trace as an overland route connecting Nashville, Tennessee, and Natchez, Mississippi. Today, the Parkway is 444 miles long. The Parkway is eligible for listing in the National Register of Historic Places (NRHP) and has been designated an All-American Road (1996), which means it meets at least two of the six intrinsic qualities required for listing as a national scenic byway, with distinctive scenic, historic, natural, cultural, archeological, and/or recreational values. The Parkway, including both the roadway and its associated facilities, is a historic cultural landscape.

Bridge History and Current Conditions

The Tennessee River Bridge opened to traffic in 1964. Prior to the bridge opening, TVA issued a permit to the NPS, pursuant of Section 26a of the TVA Act, allowing the construction, maintenance, and operation of the bridge over the Tennessee River. The Tennessee River Bridge is approximately 4,955 feet long with a 35-foot-wide bridge deck and a posted speed limit of 50 miles per hour (mph) throughout the project area. The existing bridge is a 37-span structure composed of a 2-girder system that supports a cast-in-place deck centered over the navigable portion of the Tennessee River. The substructure consists of two reinforced concrete abutments founded on steel piles and reinforced concrete, and hammerhead piers founded on rock. The bridge includes a solar panel that provides power to navigational lighting at the widest span, but otherwise does not include utilities.

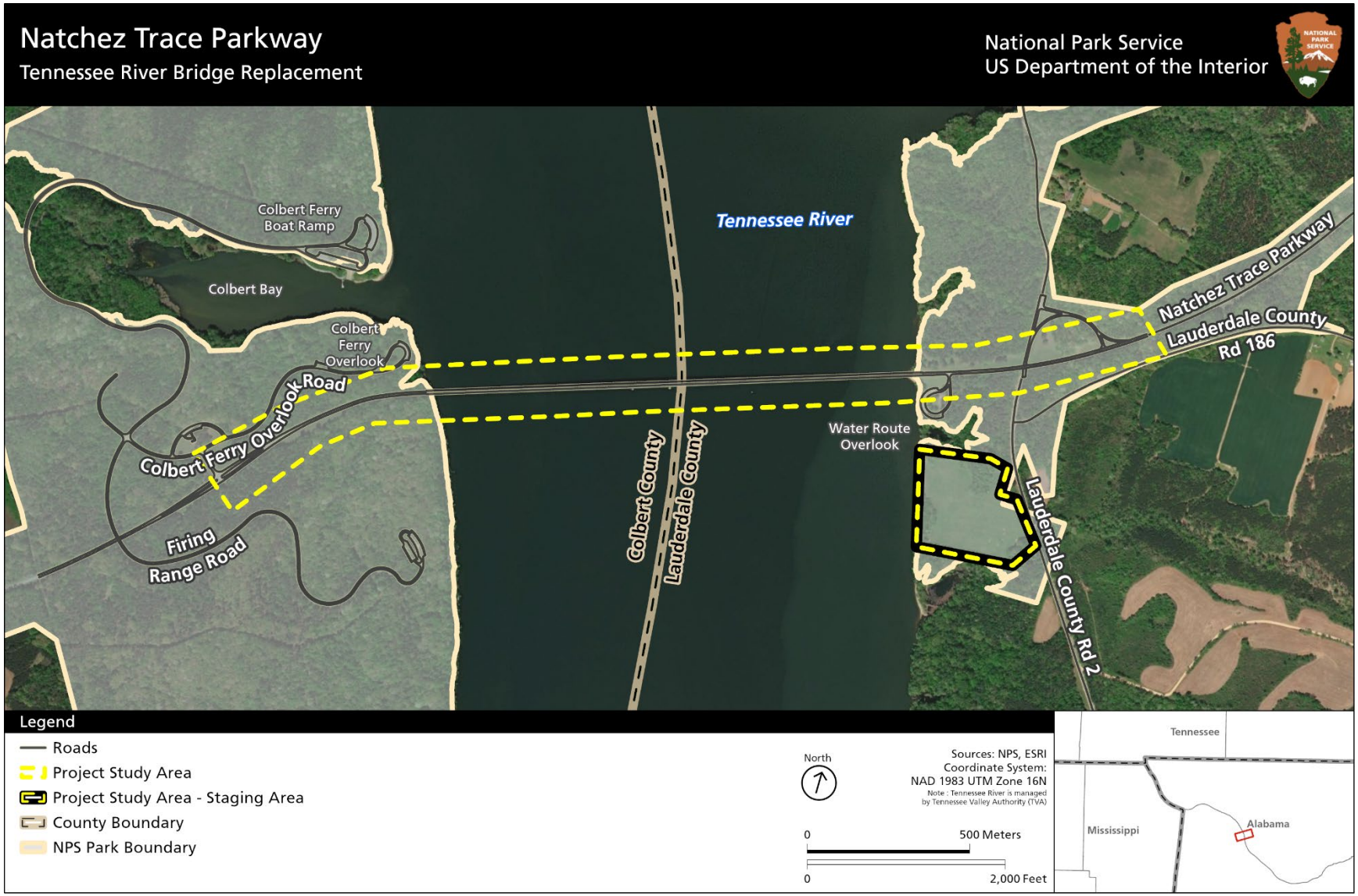


FIGURE 1. PROJECT AREA

The bridge provides access and connections for Parkway visitors and local communities across Alabama. It currently averages a traffic volume of about 1,400 vehicles per day. Although the Parkway prohibits non-permitted commercial traffic, these vehicles frequently use the Parkway and the bridge, which further contributes to the deterioration of the bridge's condition. Large recreational vehicles create similar issues for the bridge because of their size and weight; however, recreational vehicles are authorized to travel on the Parkway because the enabling legislation states the land was acquired in part for recreation.

The nearly 1-mile-long bridge passes over a navigable portion of the Tennessee River, allowing barge traffic underneath the bridge. To date, no collisions or other incidents with barge traffic have been recorded. TVA controls water levels on the Tennessee River within the project area through a series of dams. Historically, the Tennessee River routinely flooded, causing major issues for residents in the area. Since these flooding events, the Tennessee River has been dammed in multiple locations to combat flooding. The closest dams to the bridge are the Wilson Dam, located approximately 19 miles upstream from the bridge, and the Pickwick Landing Dam, located approximately 26.5 miles downstream from the bridge (USACE n.d.; TVA n.d.). TVA uses the dams and reservoirs to keep flooding under control by managing water levels throughout the year. The dams keep the water level of the river at the bridge fixed, in part, to retain it as a navigable waterway.

While the bridge is currently safe for the vehicle traffic it carries, as noted above, it has exceeded its design life and has been classified as a Non-Redundant Steel Tension Member structure, with widespread cracking in the bridge deck and notable deterioration of the bridge piers. If no action is taken to address the structural deficiencies on the bridge, FHWA has indicated that it will continue to deteriorate. In approximately 10 to 20 years, the substructure will experience accelerated deterioration and require extensive costly repairs and eventual closure. Therefore, routine maintenance and repairs can no longer address these structural issues.

ISSUES AND RESOURCE TOPICS

Resource topics considered in this document were identified through a series of internal meetings and site visits to the project area by an interdisciplinary team of Parkway and regional staff, natural and cultural resource experts, and engineers familiar with the project area, as well as through an analysis of site conditions, federal laws, regulations, executive orders (EOs), and NPS director's orders. The NPS identified a range of issues and impact topics to evaluate. Issues are problems that the current situation has caused or that will continue to occur if they are not addressed. Impact topics are resources or values to be analyzed as part of the proposed project.

The *2015 NPS NEPA Handbook* provides specific guidance for determining whether to retain issues for detailed analysis. Issues should be retained for consideration and discussed in detail if:

- the environmental impacts associated with the issue are central to the proposal or of critical importance,
- a detailed analysis of environmental impacts related to the issue is necessary to make a reasoned choice between alternatives,
- the environmental impacts associated with the issue are a big point of contention among the public or other agencies, or
- there are potentially significant impacts to resources associated with the issue (NPS 2015a).

If none of the considerations described above apply to an issue, it was dismissed from further consideration. Impact topics that were considered but ultimately dismissed from further analysis are summarized in Appendix A. Remaining issues and resource topics that this project could affect are Cultural Resources, Environmental Justice, Geological Resources, Natural Soundscapes, Wildlife, Including Threatened and Endangered Species, Visitor Use and Experience, and Water Resources and Water Quality.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

Chapter 2 describes the alternatives under consideration to maintain a safe and reliable bridge crossing for users over the Tennessee River on the Parkway. The proposed action to accomplish this is the demolition and reconstruction of the Tennessee River Bridge. NEPA requires that federal agencies explore a range of reasonable alternatives. CEQ regulations for implementing the NEPA process call for the alternatives considered in a document to include a no-action alternative. The description and evaluation of this alternative provide a baseline to which the action alternatives can be compared.

This chapter evaluates a no-action alternative and two action alternatives (Alternatives 1 and 2). The elements of these alternatives are described in the following sections. The action alternatives present a reasonable and feasible approach that meets the purpose of and need for action.

The environmental compliance process for new road and bridge construction is typically completed during or after the preliminary design phase to consider environmental effects before expending fiscal resources on subsequent design phases and to incorporate any resource protection measures into the project's overall design. This project is currently in the preliminary design phase, which includes acquiring existing topographic and other mapping data, developing preliminary horizontal and vertical alignments, developing preliminary cross sections, estimating cut-and-fill needs for construction, and completing various planning studies. The action alternatives are based on the best information available to date. Specific distances, areas, and layouts are based on estimates at the maximum limits of the expected impact for resources. If substantial changes are made to the project as a result of relevant information that arise during subsequent design phases, supplemental environmental compliance would be needed in accordance with NEPA and any other applicable laws prior to implementing the action.

NO-ACTION ALTERNATIVE

The No-Action Alternative describes the action of continuing present management operations and conditions. While the No-Action Alternative does not meet the purpose for and need of the project, it provides a basis for comparing the management direction and environmental consequences of the action alternatives. Under the No-Action Alternative, no major changes or structural improvements to the Tennessee River Bridge would occur. The current alignment would remain unchanged, and periodic maintenance and repairs to maintain the approach roadway would continue. The bridge would continue to consist of 37 spans with an overall length of 4,955 feet. No other lighting, except a solar-powered navigational light would be provided. The bridge deck would remain 35 feet wide, and the posted speed limit would remain at 50 mph throughout the project area. Current drainage structures would remain, including a 36-inch pipe near Mile Marker 328.

Issues related to the aging and eventual deterioration of the bridge would not be addressed. The NPS would continue to complete short-term and periodic repairs for the continued operation of the bridge. However, both the roadway and bridge would likely need more maintenance and repairs as the road surface condition declines and as bridge components continue to deteriorate and lose strength. These road maintenance projects would require traffic delays and closures to complete the work, as well as planned detour routes for visitors. Bridge maintenance repairs would include replacement of joints, concrete patching, repaving, pothole repairs, rail maintenance, road shoulder and ditch cleaning, and deck repair. Without replacement, the need for bridge maintenance and repairs would continue to increase to maintain the serviceable life of the existing bridge.

The Tennessee River Bridge is currently safe to drive on, and FHWA would continue to inspect the bridge in accordance with generally recognized structural engineering guidelines and standards to confirm that it is safe. However, without structural and design corrections, roadway bridge deterioration would

continue to escalate, and it is reasonable to assume that within 10 to 20 years, the bridge would reach a state where weight loads, including emergency response vehicles, would be restricted, and eventually the NPS and FHWA would close the bridge to vehicular traffic due to a failure to meet safety requirements.

Under the No-Action Alternative, once the bridge is closed, planning and updated studies would need to be conducted to develop plans for the eventual replacement of the bridge. The amount of time the bridge could be closed under this alternative is unknown and could be extensive as planning occurs and funding is secured. This alternative would include the eventual removal and replacement of the bridge, with actions likely similar to those discussed in Alternatives 1 and 2, described below.

PROJECT ELEMENTS COMMON TO BOTH ACTION ALTERNATIVES

Project Components

Under either action alternative, the bridge would be approximately 43 feet wide (compared to the existing 35 feet) with a typical cross section containing approximately one 11-foot travel lane in each direction and 6-foot-wide shoulders on each side. The addition of a 5-foot walkway is also currently proposed on the southern side with an appropriate guardrail. The railing would be steel and designed for visibility for drivers and pedestrians. While these exact specifications may vary based on the final design, the bridge would meet the current American Association of State Highway and Transportation Officials specifications regarding lane width, shoulder width, live load capacity, and railing system, and it would be designed for a 125-year service life.

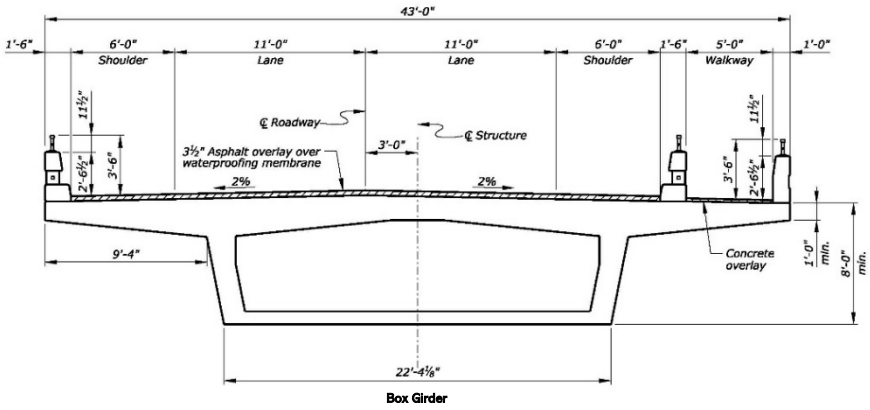
Consistent with Section 26a of the TVA Act, the NPS would seek permission from TVA to conduct activities related to bridge construction and demolition in portions of the project area. Section 26a requires that TVA approval be obtained prior to the construction, operation, or maintenance of a structure or activity affecting navigation, flood control, or public lands. This approval process ensures that the proposed activities do not interfere with TVA's management of the Tennessee River system.

Under both action alternatives, the existing 37 piers are expected to remain in place in some manner. For example, they could be removed to the mud line, but remain in the ground, or they could be repurposed as dolphins (semi-submerged structures for pier protection) in the existing navigation channel. If repurposed, the piers would be cut to the appropriate height for a dolphin and reinforced. If left in place, coordination with USCG, USACE, and TVA would occur to ensure they do not create a hazardous condition for boat traffic. While it is possible that some of the piers may be removed, and the area where they were located remediated, the assumption that all piers would be left in place allows for the evaluation of the greatest potential disturbance in this environmental assessment (EA) because the river bottom would remain disturbed at the locations of the existing piers and would experience disturbance from the placement of new piers. No improvements to recreational river access are proposed under the action alternative.

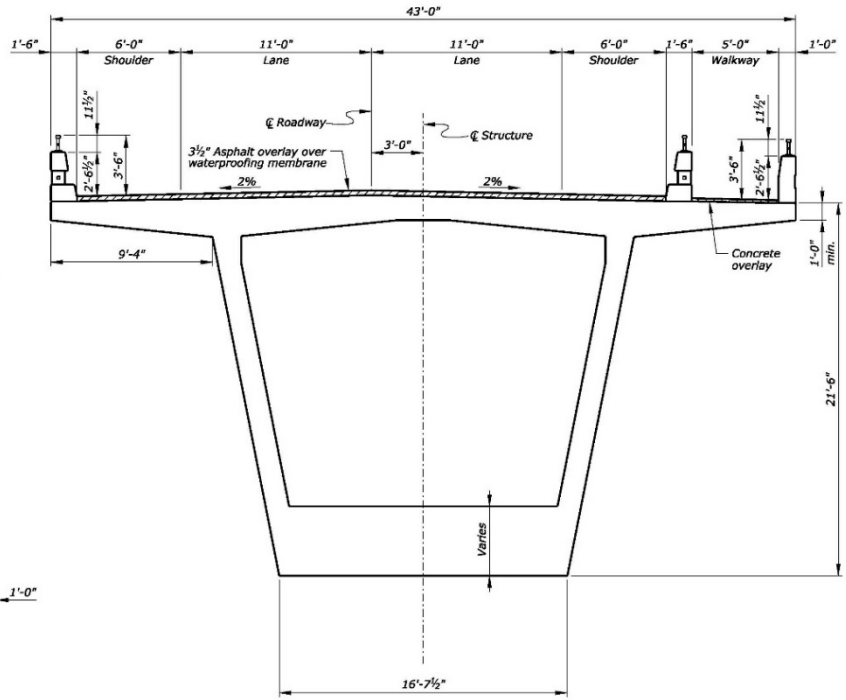
Under the action alternatives, the new bridge would include 27 new piers constructed in the river bottom; each pier would encompass an area of approximately 1,500–2,500 square feet. Different permanent deep foundations could be used in construction, depending on the bridge design; however, the NPS anticipates that temporary cofferdams would be required to construct concrete piers at some locations.

Both action alternatives evaluate a bridge design with pre-cast segmental concrete box and bulb tee girders with reinforced steel piers, which would account for the greatest potential disturbance. Girders and piers would be cast off-site and set in place with a crane positioned on a barge in the river. These design elements, as well as the exact construction means and methods, would be determined during the final design process. Figure 2 provides an example of a typical cross section of the proposed bridge design.

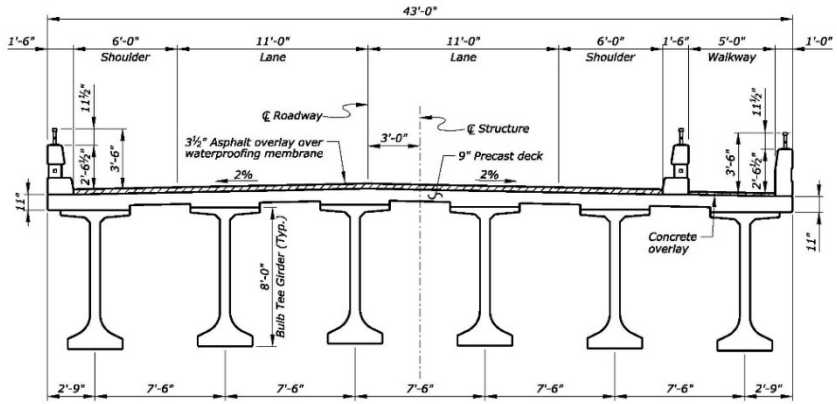
Under both action alternatives, approximately 10,000 to 15,000 cubic feet of riprap would be placed at each of the bridge abutments to protect the abutments from erosion. Navigational lighting (similar to the solar panel that currently exists) would continue to guide river traffic; however, no additional lights would be installed on the bridge.



TYPICAL SECTION
(Near midspan of span 13; Near pier 11 and 14)



TYPICAL SECTION
(Near pier 12 and 13)



TYPICAL SECTION
(Spans 1 - 11 and Spans 16 - 28)

FIGURE 2. TYPICAL CROSS SECTION FOR PRE-CAST SEGMENTAL CONCRETE BOX AND BULB TEE GIRDER BRIDGE

Construction/Staging Activities

Site Preparation and Staging Areas – Site preparation would include establishing staging areas, clearing, grading, building embankments for approaches to the new bridge, installing cofferdams, excavating, and placing fill material (as needed) to install temporary construction access(es). Permanent and temporary erosion and sediment control measures would be implemented during site preparation and throughout construction. The type of measures would depend on final bridge design and may include slope reinforcement, riprap for armoring, retaining walls, perimeter controls (such as silt fences), timber mats, slope stabilization (such as mulching and seeding), cofferdams, and turbidity curtains/controls.

One potential staging area has been identified on the agricultural lease immediately southeast of the bridge (see Figure 1). If used for staging, this site would be temporarily closed during construction for equipment and materials. During construction, the volume of construction vehicle traffic to, from, and through the project area and staging area would be higher due to the amount of subgrade needed, the removal of road and bridge material, and any trucking associated with transporting new materials for the project. After construction, the agricultural lease would not be renewed, and the staging area would be allowed to restore naturally. The area directly adjacent to the staging area would remain closed to vehicular and pedestrian traffic to make the road available for staging throughout the construction period (which varies by alternative), with minimal need for traffic management.

Additional staging areas, either terrestrial or in the water from barges, would be identified during the final design process. Staging areas would be located in the project area, where conditions are safe to host staging activities and where these activities would not affect natural resources, including wetlands, forested areas, or cultural resources, particularly archeological or potential Tribal resources. For terrestrial staging areas, the NPS would request the contractor select previously developed, paved, or disturbed areas to minimize additional disturbance. Similar to the identified staging area, staging areas identified during final design may require minimal traffic management to minimize disruption to local traffic patterns.

Due to the nature of bridge construction work, in-water staging areas would likely be required. Barges would be used for the construction of the new bridge in areas where the water depths are greater than 12 feet; barges would also be used to deliver construction equipment and materials/pre-cast elements. In areas where barges are used, no disturbance of the river bottom is expected.

In areas where the water depth is 12 feet or less, temporary platforms may be constructed for material and equipment staging. Work platforms would have piles to support loads from construction equipment and for the delivery of materials/pre-cast elements. Smaller platforms would be used to extend from the work platform to construct the piers. Disturbance west of the bridge from these temporary platforms would equal approximately 14,400 square feet, while platforms to the east of the bridge would disturb approximately 40,800 square feet.

This EA evaluates the use of the temporary in-water structures for material and construction staging within the project area, as shown in Figures 1 and 2. Activities outside the identified staging area would require further compliance and any necessary permitting by the contractor. Efforts would be made to minimize the interference to the navigation channel in the Tennessee River from the presence of temporary platforms and barges during bridge demolition and construction. Should temporary disruption to the navigation channel occur due to construction, the NPS would coordinate with USCG District 8 to issue a Local Notice to Mariners.[3] The Notice to Mariners provides timely marine safety information for the correction of all US Government navigation charts.

[3] Local Notice to Mariners is the primary means for disseminating information concerning aids to navigation, hazards to navigation, and other items of marine information of interest to mariners on the waters of the U.S., its territories, and possessions.

Construction and Demolition Equipment – Construction and demolition are expected to occur from both terrestrial and temporary in-water construction access platforms, including mobile scaffolding or platforms. Equipment used may include bulldozers, concrete trucks and pump trucks, water trucks, various paving equipment, striping equipment, dewatering equipment and pumps, jackhammers, concrete saws, grapples, hydraulic breakers, hydraulic shears, a concrete processor, and a concrete pulverizer.

Additionally, some work may be accomplished from vessels, including boats, tugboats, and small barges. Regardless of the construction methods selected, the use of vessels is anticipated to be minimal. Dredging is not anticipated to occur. Temporary lighting would be used to illuminate shadowed areas on the underside of the bridge(s) or if night work is needed. Night work would be minimized to the extent possible during construction to avoid the impacts of light and sound on nocturnal wildlife.

Materials Delivery and Disposal – To the extent possible, material delivery and disposal would occur either in the water via the Tennessee River or via main arterial roadways in the region to avoid local roads and minimize traffic interruptions. Construction materials would be stored in staging areas, as discussed above. Removal via water would rely on a crane and barge to haul material away. Explosives would not be used during demolition and material removal. During the contracting process, the NPS would coordinate with the construction contractor to establish parameters regarding how materials would be disposed. Additionally, if surface roads are used, the NPS would coordinate with the contractor to determine which structurally sound roadways and routes would be used to minimize impacts.

Prior to construction, the NPS would coordinate with the cooperating agencies to determine any necessary demolition methods. Under both action alternatives, demolition activities are anticipated to take approximately 200 days. Construction equipment that would be used in this process would include barges with cranes for beam and pier removal, towboats, jack hammers, concrete saws, and dump trucks or barges for disposal. Pier removal may also require the use of cofferdams and pile driving/drilling rigs. For the removal of the foundation, a ho-ram (similar to a jackhammer) may be used; however, the methodology to dispose of materials would be determined during final design.

Roadway Detours

During the construction activities under both action alternatives, detour routes would be established during times of bridge closure. The timeframe of bridge closure requiring a detour would vary under each alternative, as discussed below, but the detour route would be the same under both action alternatives (see Figure 3). This detour would be approximately 42 miles each way, or approximately 1 hour of additional driving travel time each way.

Resource Protection Measures

The NPS places strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. Resource protection measures are presented in Appendix B and discussed in Chapter 3. These protection measures are considered part of the proposed action and would be implemented to avoid, minimize, and/or reduce impacts on Parkway resources. The measures presented in Appendix B are subject to the final design and approval of plans by relevant agencies.

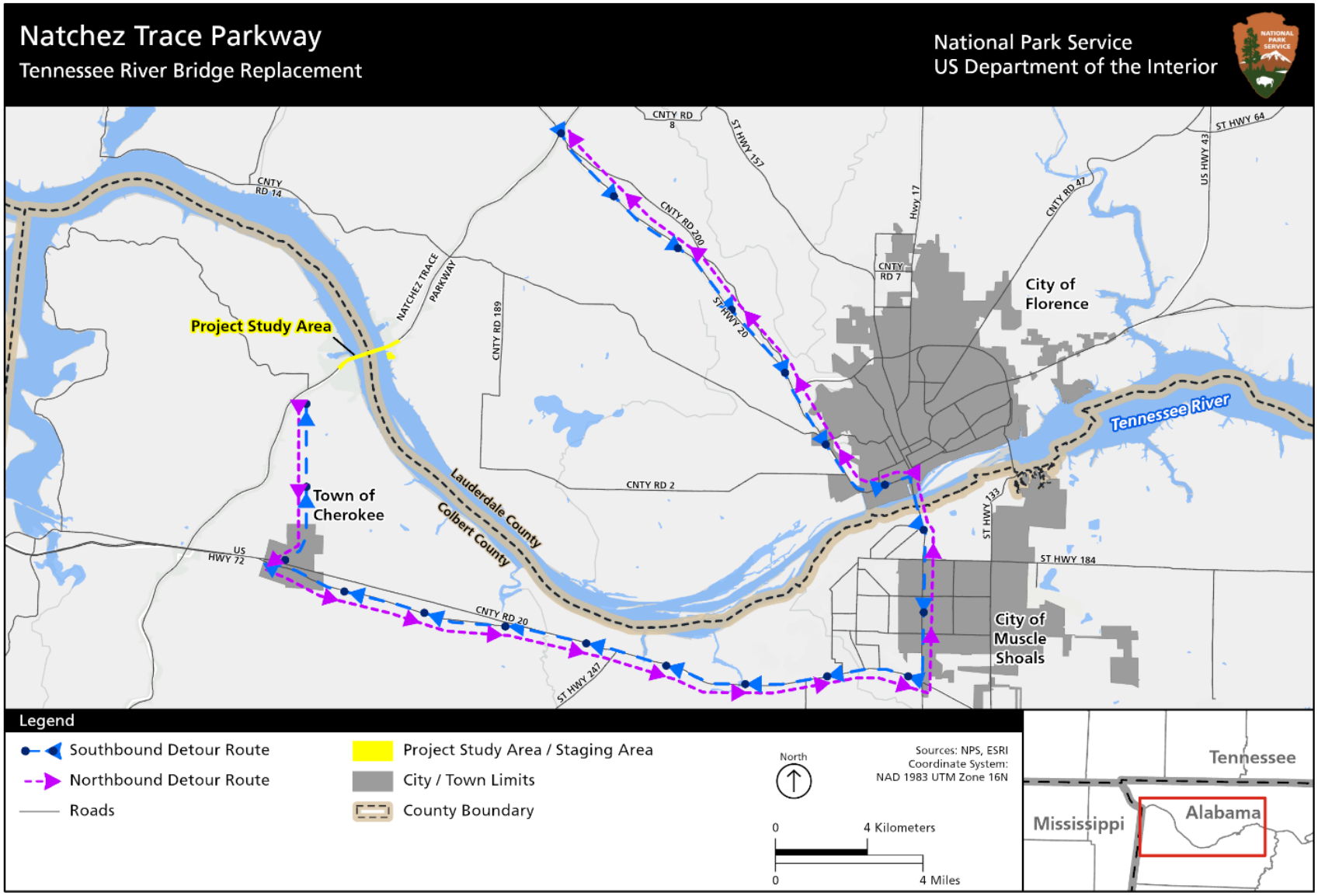


FIGURE 3. PROPOSED DETOUR ROUTE

ALTERNATIVE 1: REPLACE BRIDGE ON A SKEWED ALIGNMENT PARTIALLY SOUTH OF THE EXISTING BRIDGE (PREFERRED ALTERNATIVE)

During the preliminary planning process, multiple alignments were considered for the replacement of the Tennessee River Bridge (see Appendix C). The process considered factors such as safety, emergency access, bicycle and pedestrian access, resource protection, cultural resources, community access, resiliency, longevity, sustainably, maintainability, and impacts resulting from bridge closures.

Under Alternative 1, the NPS would replace the Tennessee River Bridge to improve the safety conditions for motorists, pedestrians, and cyclists in the project area. As shown in Figure 4, a new, longer bridge would be constructed on a skewed alignment, with the western end of the bridge remaining on the existing alignment and the eastern end of the bridge partially skewed to the south. The new bridge would be approximately 4,970 feet long and would shift the bridge centerline on the eastern end. Construction activities to access, excavate, install, and remove existing and new bridge components would encroach into the active waterway. The new bridge would have 27 spans and be constructed of pre-cast segmental concrete box and bulb tee girders with reinforced steel piers. Under Alternative 1, an approximately 30-foot-long extension to the existing drainage structure may be required in the drainage basin.

Construction activities for Alternative 1 are anticipated to occur over a period of approximately five years (or up to 1,360 working days) and would be completed in three phases—preconstruction (geotechnical investigations and tree clearing), construction (bridge construction, existing bridge removal, roadway construction), and post-construction (restoration and revegetation of the disturbed areas). This alternative would partially allow for the new bridge to be constructed and the current bridge to remain operational during bridge construction. However, in the areas where the new bridge would remain on the current alignment, the existing bridge would require a closure to tie the new bridge into the existing transportation network, resulting in a detour of approximately two years.

ALTERNATIVE 2: REPLACE BRIDGE ON NEW ALIGNMENT SOUTH OF THE EXISTING BRIDGE

Under Alternative 2, the NPS would replace the Tennessee River Bridge to improve the safety conditions for motorists, pedestrians, and cyclists in the project area. As shown in Figure 5, a new, shorter bridge would be constructed immediately south of and parallel to the existing bridge. The new bridge would be approximately 4,945 feet long and would shift the bridge approximately 50 feet south of the current alignment. Construction activities to access, excavate, and install and remove existing and new bridge components would encroach into the active waterway. The new bridge would have 27 spans and be constructed of pre-cast segmental concrete box and bulb tee girders with reinforced steel piers. Additionally, under Alternative 2, a new drainage structure, approximately 180 feet long, would be required in the drainage basin.

Construction activities for Alternative 2 are anticipated to occur over a period of approximately six years (or up to 1,600 working days) and would be completed in three phases—preconstruction (geotechnical investigations and tree clearing), construction (bridge construction, existing bridge removal, roadway construction), and post-construction (restoration and revegetation of disturbed areas). This alternative would allow the new bridge to be constructed and the current bridge to remain operational during most of the construction period. However, the bridge would be closed to tie the new bridge into the existing transportation network, resulting in a detour duration of approximately six months.

Table 1 compares the details of the action alternatives.

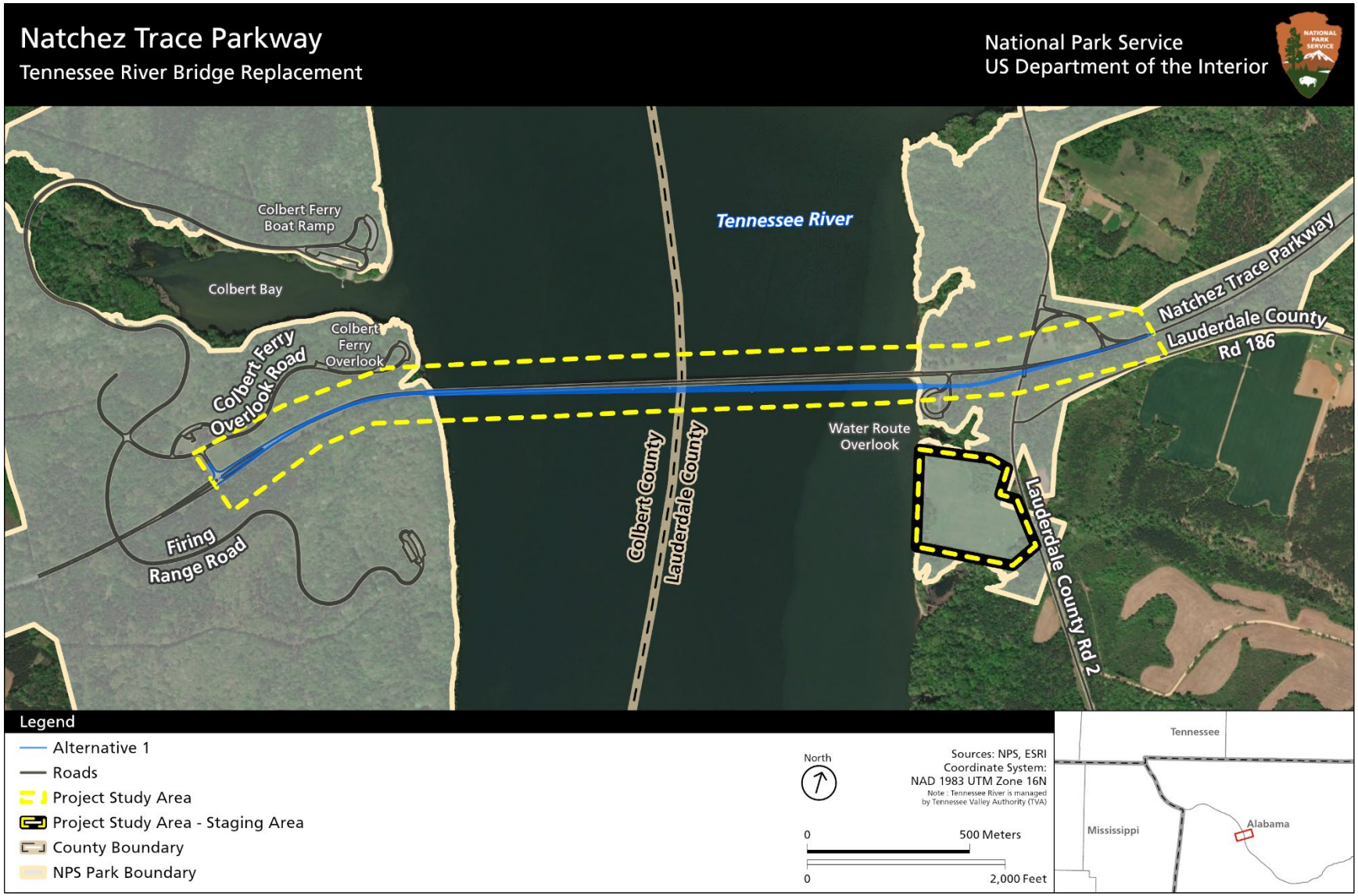


FIGURE 4. ALTERNATIVE 1 - REPLACE BRIDGE ON A SKEWED ALIGNMENT PARTIALLY SOUTH OF THE EXISTING BRIDGE

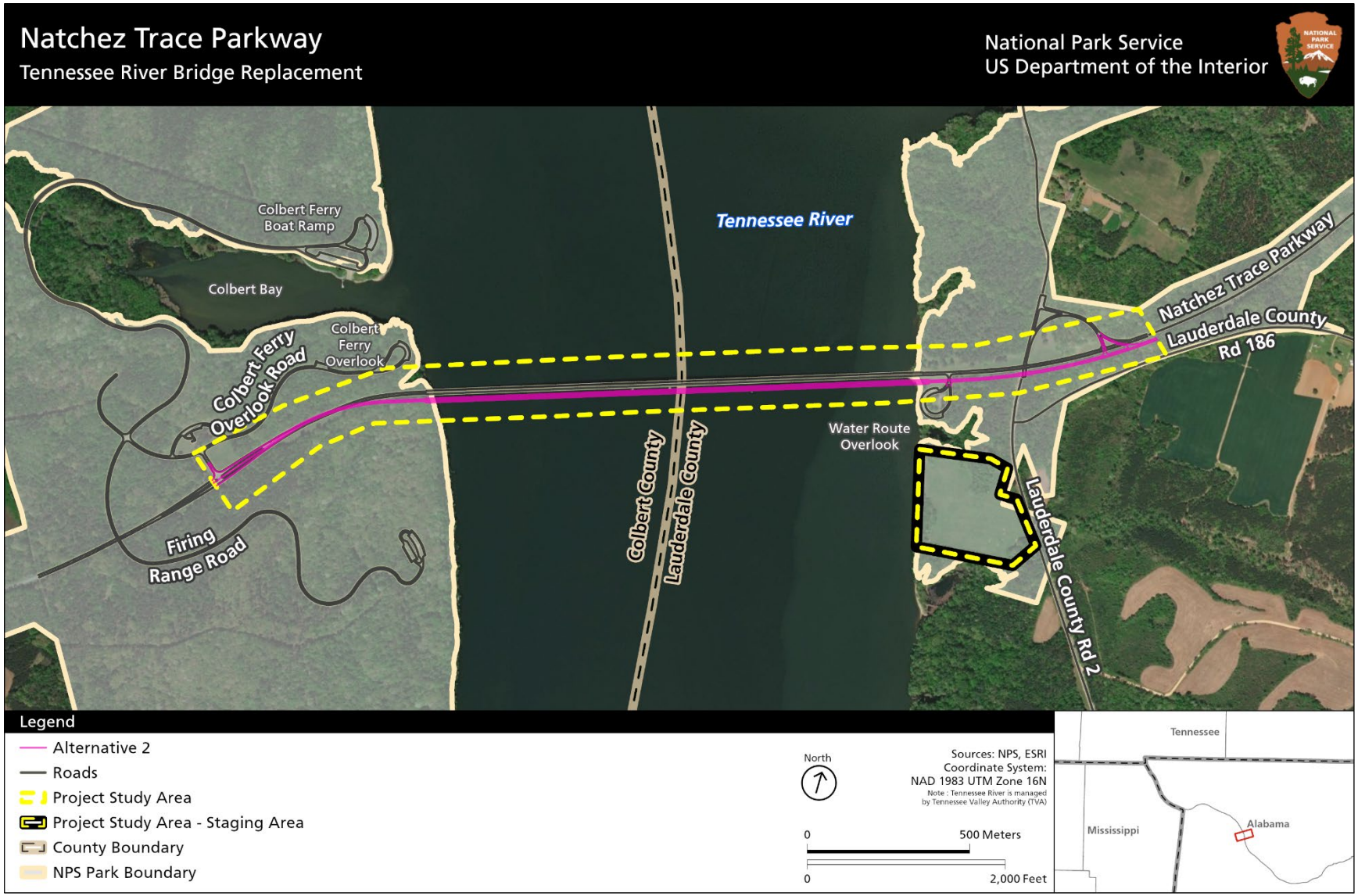


FIGURE 5. ALTERNATIVE 2 - REPLACE BRIDGE ON NEW ALIGNMENT SOUTH OF EXISTING BRIDGE

COMPARISON OF THE ACTION ALTERNATIVES

TABLE 1. COMPARISON OF THE ACTION ALTERNATIVES

Element	Alternative 1	Alternative 2
Number of Piers	27	27
Approximate Area of Work Platforms – East of the Bridge	1 acre	1 acre
Approximate Area of Work Platforms – West of the Bridge	<1 acre	<1 acre
Maximum Clearing and Excavation Limits on Land (Width)	101 feet	295 feet
Approximate Cut or Fill Required at Roadway	<1 foot of fill	16 feet of cut
Approximate Cut or Fill Required at Ditch (Along Each Side of the Roadway)	3 feet of cut	25 feet of cut
Drainage Box Extension or Construction Required	30 feet	180 feet
Approximate Duration of Construction	Five years	Six years
Approximate Duration of Bridge Closure	Two years	Six months

ALTERNATIVES CONSIDERED BUT DISMISSED

The NPS and FHWA developed several preliminary alternatives early in the planning process that were not carried forward for further analysis for the following reasons:

- Technical or economic infeasibility
- Inability to resolve the purpose and need for taking action
- Duplication with other, less environmentally harmful, or less expensive alternatives

Alternatives that were considered but dismissed are summarized in Appendix C.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 3 describes the existing condition of the resources retained for analysis and the potential impacts on these resources from implementing the alternatives. The descriptions of the resources provided in this chapter serve as an account of the baseline conditions within the project area. The impacts of all actions proposed under the No-Action Alternative and the proposed action alternatives were considered. Resource protection measures are part of the proposed action, as presented in Appendix B. Where appropriate, resource protection measures have been incorporated into the evaluation to prevent or lessen adverse impacts.

ANALYSIS METHODS FOR ESTABLISHING IMPACTS

The analysis of impacts follows the CEQ implementing regulations (40 Code of Federal Regulations [CFR] 1500–1508), Director's Order 12 procedures (NPS 2011), the NPS *NEPA Handbook* (NPS 2015a), and the NPS *NEPA Handbook Supplemental Guidance: Preparing Focused and Concise Environmental Assessments* (NPS 2015b). The intensity of impacts is assessed in the context of the Parkway's purpose and significance and any resource-specific context that may be applicable. The methods used to assess impacts vary depending on the resource being considered but generally are based on a review of pertinent literature and studies, information provided by on-site experts and other agencies, professional judgment, and Parkway staff knowledge and insight.

The environmental consequences for each resource were identified and characterized based on impact type (adverse or beneficial), area of analysis, intensity, and duration. In accordance with CEQ regulations finalized in 2022 (40 CFR 1508.1(g)), effects or impacts are defined as follows:

(1) Direct effects, which are caused by the action and occur at the same time and place.

(2) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

(3) Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

(4) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial.

Area of Analysis for Impacts

Area of analysis refers to the geographic setting within which an impact may occur, such as the affected area within the project area. For this analysis, an area of disturbance was developed for each alternative and represents the maximum potential limits of disturbance in the project area (Table 2). For the purposes of this EA, the area of disturbance includes a 75-foot buffered area on either side of the proposed bridge and roadway alignments for each action alternative (see Figures 6 and 7). The area of disturbance is based

on conceptual design information and reasonable assumptions. Therefore, the approximate disturbance calculations are subject to change during subsequent design phases. Changes that are not addressed by the range of impacts covered in this EA may require additional NEPA compliance.

TABLE 2. APPROXIMATE AREA OF DISTURBANCE FOR ACTION ALTERNATIVES

Area of Disturbance	Alternative 1	Alternative 2
Total Approximate Disturbance in Water (Buffered Area of Disturbance)	**17 acres (including 2 acres from piers)**	**17 acres (including 2 acres from piers)**
Total Approximate Disturbance on Land (Buffered Area of Disturbance)	**18 acres**	**19 acres**
- Forested Land	6 acres (including 1 acre of floodplains on land)	8 acres (including 2 acres of floodplains on land)
- Previously Disturbed Land (i.e., paved areas, grass shoulders)	11 acres	10 acres
- Open Pastureland	1 acre	1 acre
Total Approximate Disturbance in Proposed Staging Area	**24 acres**	**24 acres**
- Forested Land	4 acres	4 acres
- Previously Disturbed Land	<1 acre	<1 acre
- Open Pastureland	18 acres	18 acres
- Woody Wetlands*	1 acre	1 acre
Total Approximate Area of Disturbance	**59 acres**	**60 acres**
Approximate Disturbance Area (%)	50% of the project would be constructed on newly disturbed area, 50% on previously disturbed area	90% of the project would be constructed on newly disturbed area, 10% on previously disturbed area

Note: *The NPS would not allow staging to occur in this area.

Type of Impact

The potential impacts of the alternatives are described using the following terminology, unless otherwise noted:

- **Short term***:* Impacts that would occur as a result of the construction activities of the action alternatives. Depending on impact topic, impacts may be intermittent (days or weeks) or continuous during construction (years).
- **Long term**: Impacts that would continue to occur after construction is complete, including years or decades afterward.
- **Beneficial**: A favorable change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.
- **Adverse**: A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

Past, Ongoing, and Reasonably Foreseeable Actions

The past, ongoing, and reasonably foreseeable future actions or projects have that occurred or would occur within or near the project area are summarized in Appendix D.

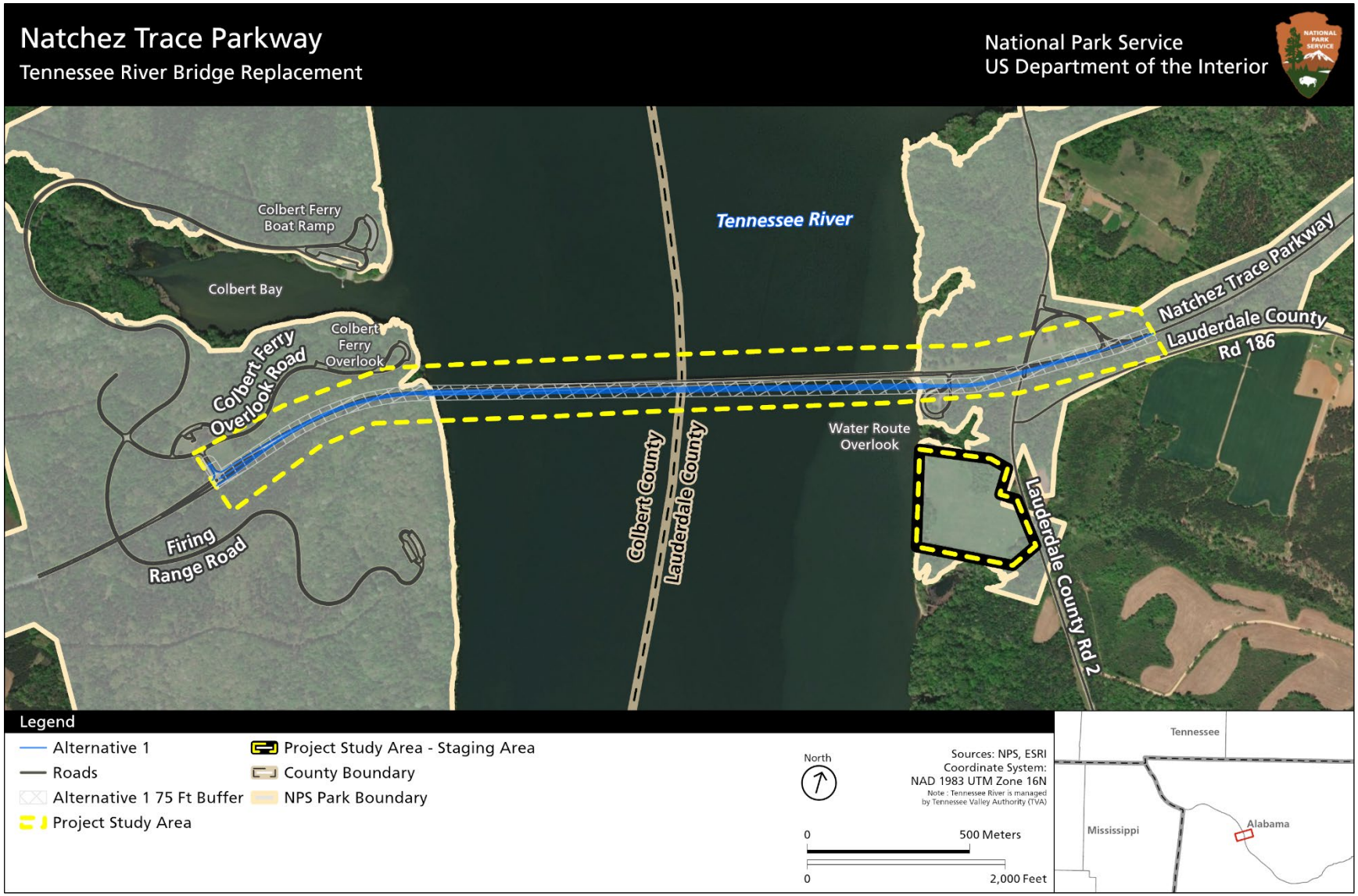


FIGURE 6. BUFFERED AREA OF DISTURBANCE (ALTERNATIVE 1)

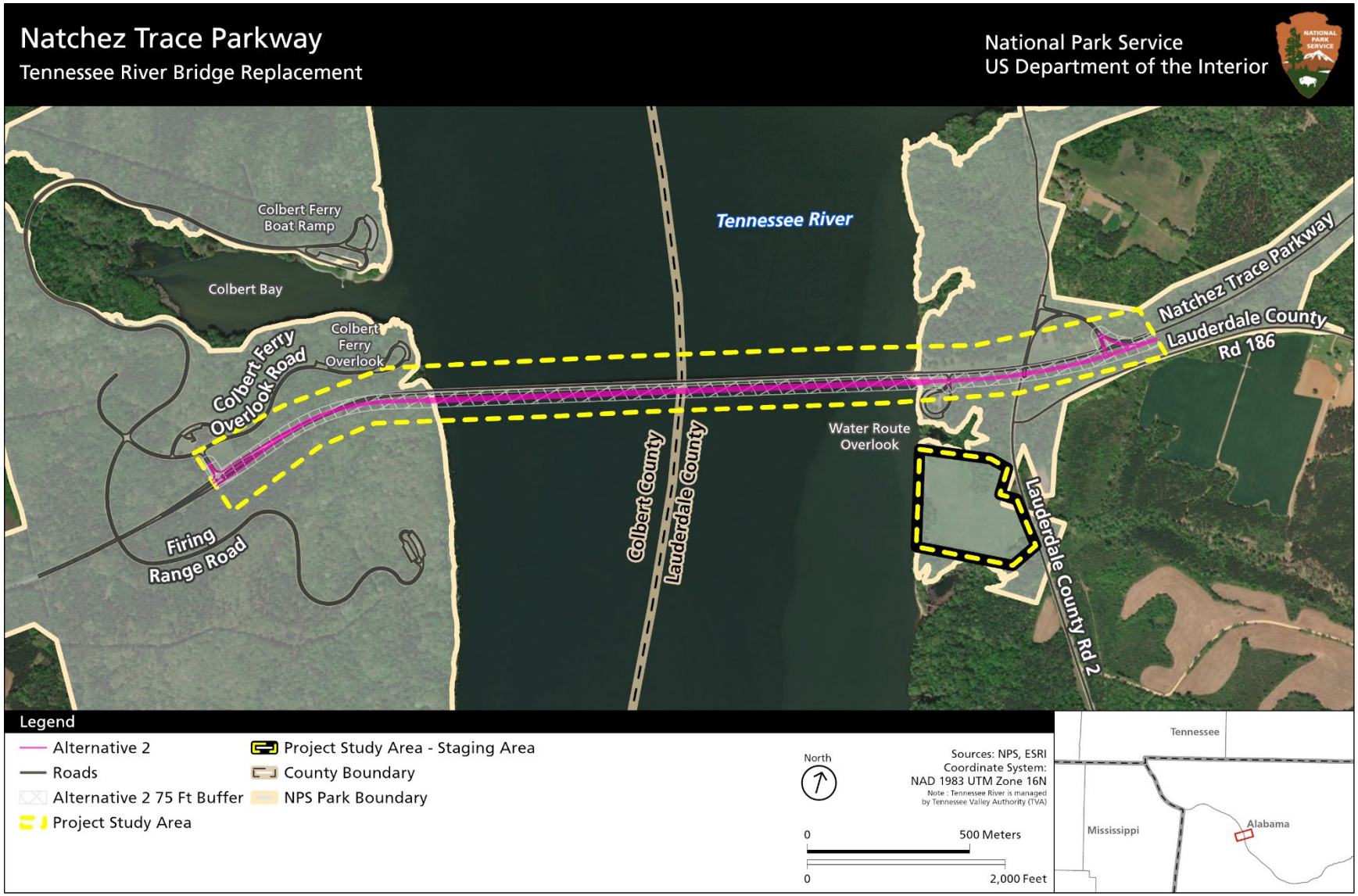


FIGURE 7. BUFFERED AREA OF DISTURBANCE (ALTERNATIVE 2)

CULTURAL RESOURCES

Affected Environment

The project area includes a 2-mile segment of the 444-mile Parkway, which was determined eligible for listing in the NRHP in 2004. The project area is within the John Coffee Memorial Bridge Cultural Landscape, which was determined eligible for listing in the NRHP in 2023 and is within the Chikasha Aiasha Traditional Cultural Landscape (TCL), also determined eligible for listing in the NRHP in 2023. The project area encompasses and is adjacent to several terrestrial and submerged archeological sites that have been proposed as the George Colbert Archeological District, eligible for designation in the NRHP under Criterion D in 2024. The Natchez Trace Parkway is also a national scenic byway and a cultural landscape.

Archeological Resources

Several surveys were conducted in the project area throughout the 20th century. These surveys identified five terrestrial archeological sites and five submerged archeological sites in the project area (Table 3). In addition, several other known archeological sites, both submerged and terrestrial, lie in the vicinity of the Tennessee River Bridge.

TABLE 3. PREVIOUSLY KNOWN TERRESTRIAL AND SUBMERGED ARCHEOLOGICAL SITES IN THE PROJECT AREA

Natchez Trace Parkway (NATR) Number/State Site Number	Terrestrial/ Submerged	Description
NATR00031/1LU48	Terrestrial	Possible lithic workshop or village; Potsherds collected. Damaged by Parkway construction.
NATR00034/1CT38	Submerged	Lithic workshop. Researchers did not recommend further investigation.
NATR00035/1CT39	Submerged	Small dwelling, burial of adult skeleton with half of a bowl and a double-looped vessel.
NATR00036/1CT40	Submerged	Prehistoric horseshoe-shaped site. Classified as a village although only lithics collected.
NATR00164/1LU49	Submerged	Linear shell mound/midden. Lithics collected and recorded.
NATR00178/1CT141	Submerged	Light shell scatter. Some flint and potsherds collected.
NATR00331	Terrestrial	Segments of Old Trace between Natchez and Nashville; historic resource.
NATR00406/CP-24	Terrestrial	Isolated Find. Fire-cracked rock and core collected.
NATR00420/1LU312	Terrestrial	Light lithic scatter.
NATR00421/1LU313	Terrestrial	Light lithic scatter and historic refuse.

Additional terrestrial archeological investigations were carried out in November 2022 and January 2023. Terrestrial surveys included close-interval shovel testing of the project area; intensive shovel testing of three sites (NATR00031/1LU48, 1CT693, and 1CT694); test unit excavation at two sites (1CT693 and 1CT694); and metal detection at select sites and areas that had potential to contain historic remains. Phase I testing investigated four known sites (NATR00331, NATR00031/1LU48, NATR00420/1LU312, and NATR00421/1LU313) and identified four new archeological sites (1LU802, 1LU803, 1CT693, and 1CT694).

Underwater archeological investigations analyzed data from high-resolution geophysical survey techniques conducted in October and November 2022, including slide-scan sonar, multibeam echosounder, and parametric sub-bottom profiler high-resolution geophysical data sets. Review of all high-resolution geophysical data sets for the eight known submerged archeological sites, including the five submerged sites (i.e., 1CT38, 1CT39, 1CT40, 1LU49, and 1CT141) and three adjacent, previously recorded sites (i.e., 1CT31, 1CT37, 1LU45), indicated that anomalies were present for all but one site (NATR00034). In other words, known sites correlated to anomalous areas within the riverbed horizon, suggesting that these seven archeological sites still retain surface expression at the riverbed surface (Table 3) (Burns 2022).

Cultural Landscapes and Historic Structures

In March 2004, the Tennessee Department of Transportation completed an assessment (independent of this proposed bridge replacement project) that evaluated the Parkway's eligibility for listing in the NRHP. The significance statement concludes that the Parkway is significant under Criteria A and C for its association with the planning and development of the national parkway system during the New Deal era and is an example of naturalistic parkway design. In a June 2004 review of this separate NRHP evaluation, the Tennessee State Historic Preservation Officer (SHPO) responded that the entire length of the Parkway is eligible for listing. The Tennessee River Bridge (i.e., the John Coffee Memorial Bridge) and Sections 2A and 2C of the Parkway have also been determined eligible for listing for their association with NPS's Mission 66. This resource has not been listed in the NRHP to date (Coco et al. 2023; De Vries, O'Donnell, and Bruce 2023; Heritage Landscapes 2022, 2023).

In September 2022, field investigations were conducted, and a Cultural Landscapes Inventory (CLI) was produced in March 2023. The CLI identified the John Coffee Memorial Bridge Cultural Landscape as a 590.74-acre area spanning the bridge in Colbert and Lauderdale Counties and containing a 2-mile segment (Mile Markers 327–329) of the Parkway (including the 0.93-mile-long bridge), portions of the Old Natchez Trace, Colbert Ferry Park, and several significant archeological sites (Heritage Landscapes 2023). This CLI informed the Historic American Engineering Record (HAER) documentation of the John Coffee Memorial Bridge Cultural Landscape for compliance with Section 106 of the National Historic Preservation Act (NHPA). The Historic American Landscape Survey (HALS) documentation states that the John Coffee Memorial Bridge Cultural Landscape is significant under Criteria A, B, C, and D, with a period of significance spanning from 1801 to 1968.

According to both the CLI and the HALS documentation, the John Coffee Memorial Bridge Cultural Landscape is significant under Criterion A for its association with the Old Natchez Trace, one of North America's earliest modern transportation routes that originally served Indigenous peoples and was adapted in 1801 as a postal route to connect European American settlements; for its association with the George Colbert Ferry and Stand, which crossed the Tennessee River and connected to the Old Natchez Trace; and for its national significance as a New Deal-era and Mission 66 infrastructure project related to the planning and development of the national parkway system. It is locally significant under Criterion B for its association with George Colbert, a Chickasaw leader also known as Tootemastubbe and a veteran of the War of 1812 and the Creek War (1813–1814). The bridge is eligible under Criterion C as embodying distinctive characteristics of parkway construction in the 20th century and as an example of the Mission 66 Modernist style that revealed function through clarity of form, simplified lines, and lack of ornamentation. The report also notes that the cultural landscape is significant under Criterion D for its potential to yield additional archeological information on precontact settlements along the river as well as from the historic period of significance (De Vries, O'Donnell, and Bruce 2023; Heritage Landscapes 2022, 2023).

A draft Determination of Eligibility was submitted to the Alabama SHPO proposing the listing of the John Coffee Memorial Bridge Cultural Landscape in the NRHP (NPS 2024a). On the form, the areas of significance listed above were provided, but the period of significance was refined to 1800–1973. The

NPS stated the cultural landscape's significance under all four criteria and provided a list of character-defining features and their contributing status; this list is included as Table 4. Features within the project area include the road prism of the Parkway, vegetative plantings close to the bridge, the designed topography, views and vistas, and portions of the Colbert Ferry Trail.

TABLE 4. LIST OF CULTURAL LANDSCAPE CHARACTER-DEFINING FEATURES AND CONTRIBUTING STATUS

Feature Name	Feature Contribution
Natural Systems and Features	
Tennessee River	Contributing
Native Hardwood Forest	Contributing
Colbert Bay	Contributing
Colbert Creek	Contributing
Rock Bluffs	Contributing
Spatial Organization	
Curving roadway with pull-outs for overlooks and recreation areas	Contributing
Distributed recreational area (picnic, boat launch, campground) and historic spaces	Contributing
Land Use	
Recreation	Contributing
Transportation	Contributing
Interpretation	Contributing
Topography	
Designed topography of raised roadbed and drainage system/manipulated topography to move drainage away from roads	Contributing
Grade change at bridge abutments that allow the Parkway to "float" above the adjacent terrain	Contributing
Vegetation	
Designed pattern of lawn and forested edge along roadway	Contributing
Freestanding planted vegetation along the roadway	Contributing
Pine trees along the edges of the Parkway in Lauderdale County (east)	Contributing
Privet shrub edge along the Parkway (east)	Unconfirmed
Elm at Colbert's Stand	Contributing
Planted trees at Visitor Contact Station (red pine, juniper, hackberry, dogwood, cherry)	Contributing
Planted trees along the internal roadways within Colbert Ferry Park (dogwoods, redbuds, cherry)	Contributing
Circulation	
Natchez Trace Parkway Motor Road	Contributing

Feature Name	Feature Contribution
Old Natchez Trace	Contributing
Water Route Overlook Parking Area	Contributing
Informal paths at Water Route Overlook Parking Area	Non-contributing
Parking area at Visitor Contact Station and sidewalk	Contributing
Colbert Spur Road (Colbert Ferry Overlook Road)	Contributing
Pull-out at Colbert's Stand and sidewalk	Contributing
Colbert's Stand Trail	Non-contributing
Colbert Ferry Overlook parking area and sidewalks	Contributing
Colbert Ferry Trail from Colbert Ferry Overlook to an Undisclosed Cave along River Bluff	Contributing
Stone steps, Colbert Ferry Trail, three flights	Contributing
North Park Road	Contributing
Parking area at picnic/swimming beach and sidewalk	Contributing
Picnic area with Americans with Disabilities Act-compliant access to accessible picnic spot	Non-contributing
Parking area at Boat Launch	Contributing
Sidewalk and boardwalk to Colbert Ferry Dock	Non-contributing
Concrete steps at Boat Launch	Contributing
South Park Road/Firing Range Road	Contributing
Parking area at South Park Road and sidewalk	Contributing
Campground Road	Contributing
Buildings and Structures	
Tennessee River Bridge	Contributing
Lauderdale County Road 2 Bridge	Contributing
Abandoned County Road 2 Bridge (outside the CLI project area)	Non-contributing
South Park Road/Firing Range Road Bridge	Contributing
Culverts and headwalls	Contributing
Drainage system of concrete swales and box culvert west side of Tennessee River Bridge	Contributing
Colbert Creek Bridge	Contributing
Visitor Contact Station/Restroom	Non-contributing
Pump House/Colbert Ferry utility building	Contributing
Pump House/North Park Road utility building	Contributing
Colbert Ferry Boat Launch Comfort Station	Non-contributing
Colbert Ferry Boat Launch	Contributing

Feature Name	Feature Contribution
Colbert Ferry Dock	Non-contributing
NPS Natchez Trace Parkway Cherokee Alabama Gun Range	Non-contributing
Views and Vistas	
View to Tennessee River Bridge and Tennessee River from Parkway (both directions)	Contributing
View, 360 degrees from Tennessee River Bridge	Contributing
View to Tennessee River Bridge from Water Route Overlook parking area	Contributing
View to the Tennessee River from Water Route Overlook parking area	Contributing
View to Tennessee River Bridge and Tennessee River from Colbert Ferry Overlook	Contributing
View to Tennessee River Bridge and Tennessee River from Boat Launch and Swimming Beach	Contributing
Views to the Old Natchez Trace	Contributing
Small-Scale Features	
Signs, Parkway wayfinding, wood	Contributing
Sign to Colbert Ferry, wood	Contributing
Signs, modern wayfinding	Non-contributing
Signs, modern educational and interpretive	Non-contributing
Signs, regulatory at Boat Launch	Non-contributing
Wayside exhibit at Water Route Overlook parking area	Non-contributing
Sign at Colbert's Stand, wood	Contributing
TVA markers, concrete/brass	Contributing
Daughters of the American Revolution monument at Colbert's Stand parking area	Non-contributing
Oval Marker at Old Natchez Trace and Colbert's Stand	Contributing
Picnic tables (Visitor Contact Station; Colbert Ferry Overlook; picnic/swimming beach; Walk-in Campground; Water Route Overlook parking area)	Non-contributing
Picnic table concrete piers	Contributing
Picnic grills	Non-contributing
Trash receptacles (Visitor Contact Station; Colbert Ferry Overlook; Boat Launch; Water Route Overlook parking area)	Non-contributing
Fire pits (picnic area; campground)	Unconfirmed
Site lighting (visitor contact station; boat launch)	Non-contributing
Drinking fountains (visitor contact station; boat launch)	Non-contributing
Split-rail fence at Water Route Overlook parking area	Non-contributing
Large boulder at Campground Road	Unconfirmed

Ethnographic Resources

A 2023 study outlines the research methodology, findings, and recommendations for assessing the ethnographic elements within the area of potential effects (APE) for the potential undertaking, including adjacent areas. The study's main objective was to identify ethnographic resources and places of traditional religious and cultural significance within the APE that are eligible for listing in the NRHP, including evaluating any traditional cultural properties that were identified in the study according to NRHP standards and criteria. The APE has a rich history with connections to several federally recognized Tribes, including the Absentee-Shawnee Tribe of Indians of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Shawnee Tribe, Alabama-Coushatta Tribe Texas, Alabama-Quassarte Tribal Town, Coushatta Tribe of Louisiana, Cherokee Nation, Eastern Band of Cherokee Indians, United Keetoowah Band of Cherokee Indians in Oklahoma, Chickasaw Nation, Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Kialegee Tribal Town, Muscogee (Creek) Nation, Poarch Band of Creek Indians, Thlopthlocco Tribal Town, and Seminole Nation of Oklahoma. Stakeholders also include the Nahce, which is not a federally recognized Tribe. Resources identified in the study were listed on the NPS online Cultural Resources Inventory System (CRIS). The work was undertaken in compliance with Section 106 of the NHPA (Coco et al. 2023).

The ethnographic study area was developed in a two-stage study that considered the bridge's viewshed as well as known ethnographic and other cultural resources. The study included coordination with Tribal partners and local community members and identified additional ethnographic resources through interviews. Background research and fieldwork were conducted, including collecting oral histories through interviews, attending a planning workshop in August 2022, and conducting field research in Oklahoma in November 2022 and in Alabama in January 2023. From this research, the study defined the Chikasha Aiasha TCL and evaluated it as a site that spans both sides of the Tennessee River in the APE and incorporates portions of George Colbert's landholdings and ferry landing, the precontact Natchez Trace and the historic Natchez Trace, two caves, the Tennessee River, Colbert's house site, and multiple archeological sites and other features (Coco et al. 2023).

As a result of the ethnographic study, the study recommended the Chikasha Aiasha TCL as eligible for listing in the NRHP as a traditional cultural property to the Chickasaw Nation under Criterion A for Ethnic Heritage – Native American as well as for Transportation, Exploration/Settlement, Commerce, and Agriculture. Additionally, the TCL is recommended eligible under Criterion B for its association with George Colbert (also known as Tootemastubbe), an important late 18th- and early 19th-century Chickasaw leader. Finally, the Chikasha Aiasha TCL is recommended eligible under Criterion D for its important information potential as represented in an array of archeological sites. In addition to this TCL, the study also recommended the Tennessee River, an Undisclosed Cave, George Colbert's Home and Ferry Site, and the Old Natchez Trace as significant ethnographic resources for inclusion in CRIS (Coco et al. 2023). In April 2023, the Alabama SHPO agreed with the determination that the Chikasha Aiasha TCL was eligible for listing in the NRHP under Criteria A, B, C, and possibly D.

Trends and Planned Actions

Detailed structural inspections and studies note that the bridge exhibits widespread cracking in the deck and notable deterioration of its piers. As the bridge deteriorates beyond the ability of routine maintenance and repairs to address structural issues and ultimately no longer meets bridge safety requirements, the NPS and FHWA would be required to close the bridge to vehicular traffic.

The NPS's Cultural Resources Climate Change Strategy establishes goals to preserve and maintain cultural resources as the climate continues to warm. Rising global temperatures can expedite crystallization of efflorescent salts from increased evaporation rates, which can lead to higher rates of structural cracking and the deterioration of the existing bridge's concrete, along with damage to other historic structures in the NRHP-eligible cultural landscape (NPS 2016). Moisture absorption in brick and porous stone structures from the potential increase of intense rainfall events may lead to frost damage,

mold growth, and stress from the salt crystallization (NPS 2016). Surface cracking, flaking, and sugaring (i.e., surface disintegration) of these structures and spalling (i.e., peeling away) of stone could also occur as a result of worsening freeze/thaw cycles. Increased flooding and other catastrophic weather events related to climate change have the potential to further degrade cultural resources in the project area. NPS actions that occur in the project area include routine maintenance and repairs of the infrastructure. While the NPS regularly maintains the Tennessee River Bridge, the structure is expected to continue to deteriorate without improvements, and over time, contributing features would be adversely impacted.

Environmental Consequences

This section analyzes the potential adverse impacts of the no-action and action alternatives on the following historic properties:

- The George Colbert Archeological District that was determined eligible for listing in the NRHP in 2023. Eight terrestrial and three submerged archeological sites that contribute to the significance of the district are in the project area.
- The Natchez Trace Parkway, a cultural landscape that was determined eligible for listing in the NRHP in 2004. The John Coffee Memorial Bridge (Tennessee River Bridge) is a contributing feature to the cultural landscape.
- The John Coffee Memorial Bridge Cultural Landscape that was determined eligible for listing in the NRHP in 2023; components of this cultural landscape in the project area include the Parkway's road prism, vegetative plantings close to the bridge, the designed topography, views and vistas, and portions of the Colbert Ferry Trail.
- The Chikasha Aiasha TCL was determined eligible for listing in the NRHP in 2023 and includes the determination as a significant ethnographic resource.

This section also analyzes the potential impacts to ethnographic resources from the action alternatives. The Chikasha Aiasha TCL includes four significant ethnographic resources that contribute to the TCL, including the Tennessee River Viewshed, the Undisclosed Cave (1CT42), George Colbert's Home and Ferry Sites, and the Old Natchez Trace (NATR00331).

For the purposes of the NEPA analysis, an adverse effect on a cultural resource occurs when the characteristics of a historic property that qualify it for inclusion in or eligibility for the NRHP are altered in a manner that diminishes the resource's integrity (36 CFR Part 800.16(i)). For those properties that could be affected, the criteria of adverse effect (i.e., impact) from Section 106 of the NHPA were applied (36 CFR Part 800.5). An adverse effect on a historic property is determined when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Adverse effects on historic properties are being analyzed under Section 106 of the NHPA. The NPS developed a draft Programmatic Agreement with the Alabama SHPO and other consulting parties to guide avoidance and minimization of impacts to cultural resources within the project area. Proposed resource protection measures to resolve the adverse impacts to historic properties are listed in the draft Programmatic Agreement in Appendix E with additional minimization measures in Appendix B. These potential protection measures, which would be presented as stipulations in an agreement document, would depend on whether the bridge design avoids archeological sites. The protection measures include documentation of historic properties and preparation of an NRHP nomination for the Chikasha Aiasha TCL, avoidance of archeological sites, construction monitoring, and compliance with Section 106 of the NHPA and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.

No-Action Alternative

Under the No-Action Alternative, the current alignment would remain unchanged, and historic properties would remain unaltered. Parkway and FHWA staff would perform periodic maintenance and repairs to maintain the approach roadway, and the NPS would follow NPS *Management Policies 2006* and *Cultural Resource Management Guidelines* (NPS 2006, 1998), as well as requirements of the NHPA, for continued treatment of historic properties in the area. The existing road and bridge would likely need more maintenance and repairs over time as road surface conditions decline and bridge components continue to deteriorate and lose strength. Maintenance repairs would include repaving, pothole repairs, and road shoulder and ditch cleaning. There would be no impact to the George Colbert Archeological District, the Natchez Trace Parkway, the John Coffee Memorial Bridge Cultural Landscape, or the Chikasha Aiasha TCL that would diminish their integrity.

The eventual removal and replacement of the bridge in approximately 10 to 20 years would result in long-term, adverse impacts on historic properties, which would be addressed later in time when removal is proposed. Removal of the bridge and replacement with a new bridge would result in actions and impacts on cultural resources likely similar to those expected under the active alternatives. Additionally, the delay in replacing the bridge under the No-Action Alternative may require new surveys and inventories for historic properties, which could identify additional properties based on the passage of time in which some sites, structures, and districts may have become at least 50 years old. However, since the anticipated closure duration to reconstruct a new bridge is unknown at this time, the adverse impacts would be long term compared to the two action alternatives.

Impacts Common to Both Action Alternatives

Both Alternatives 1 and 2 would result in a long-term, adverse impact to the Natchez Trace Parkway Historic District and the John Coffee Memorial Bridge Cultural Landscape. The project design for Alternatives 1 and 2 would need to avoid physical impacts to contributing sites and elements within the district to minimize these impacts. Avoidance of physical impacts to the contributing sites and elements would also serve to minimize impacts to the Chikasha Aiasha TCL because those sites are contributing features of the cultural landscape. The NPS is working with FHWA to develop design alternatives that would avoid or minimize impacts to the known cultural resources in the project area, and the NPS is continuing to consult with the Alabama SHPO and other consulting parties through the NHPA Section 106 process. Unavoidable impacts to cultural resources would be addressed through stipulations in a Programmatic Agreement (see the draft in Appendix E).

Alternative 1

Alternative 1 would remove the existing bridge components and construct new bridge components within the riverbed, construct new bridge abutments on either side of the river, and realign the road prism on the eastern side of the river. The implementation of Alternative 1 would constitute an adverse impact that would diminish the integrity of the Parkway and the John Coffee Memorial Bridge Cultural Landscape, as described below. Alternative 1 could result in a long-term, adverse impact on the George Colbert Archeological District, the Chikasha Aiasha TCL, and the related ethnographic resources; however, the NPS and FHWA are working on developing design options that avoid impacts to these resources, and unavoidable impacts to cultural resources would be addressed through stipulation in a Programmatic Agreement.

Archeological Resources

The proposed alignment for Alternative 1 seeks to avoid all terrestrial and submerged sites to avoid impacts on contributing resources associated with the George Colbert Archeological District. If the alignment were altered during the final design phase and the plans directly affect the contributing resources of the district, the removal of the Tennessee River Bridge and replacement with a new bridge may constitute an adverse effect to the George Colbert Archeological District. The bridge extends through

the boundaries of the archeological district. Two terrestrial archeological sites (NATR00031/1LU48 and NATR00654/1LU803) and one submerged archeological site (NATR00164/1LU49) are located within the alignment proposed as part of Alternative 1. Two additional terrestrial archeological sites (NATR00420/1LU312 and NATR00421/1LU313) are also located within the proposed staging area located on the east side of the Tennessee River. None of the five sites are individually eligible for listing in the NRHP; however, four sites (NATR00031/1LU48, NATR00164/1LU49, NATR00420/1LU312 and NATR00421/1LU313) are contributing resources to the George Colbert Archeological District (Meyers et al. 2024). While situated within the boundaries of the archeological district, NATR00654/1LU803 is a bridge constructed during the historic period and determined to be a non-contributing resource to the district.

Depending on the final design, ground disturbance associated with the construction of a new bridge parallel to and south of the existing bridge under Alternative 1 could affect site NATR00164/1LU49, and the construction of the new approach on the east side of the river could affect site NATR00031/1LU48. In addition, compaction and ground disturbance associated with the storage of construction materials and equipment within the proposed staging area could result in additional impacts to the George Colbert Archeological District because sites NATR00420/1LU312 and NATR00421/1LU313 may also be affected. However, current designs avoid direct impacts to the archaeological district, and the Section 106 Assessment of Effects recommends a finding of no adverse effect to the archeological district.

Historic Structures and Cultural Landscapes

As a contributing feature of the Natchez Trace Parkway Cultural Landscape, the removal and replacement of the Tennessee River Bridge under Alternative 1 would constitute an adverse impact to this cultural landscape. The removal of the bridge fabric and adjacent road prisms would diminish the cultural landscape's integrity of design, materials, and workmanship, resulting in long-term, adverse impacts.

Under Alternative 1, the removal of the bridge and realignment of the east side of the Parkway would constitute an adverse impact to the John Coffee Memorial Bridge Cultural Landscape. As a notable character-defining feature of this cultural landscape, the destruction of the bridge would diminish the integrity of design, setting, materials, workmanship, feeling, and association of the historic, designed cultural landscape. Furthermore, other character-defining features, including portions of the adjacent road prism on the east side of the Parkway, the Water Route Overlook and Parking Area, vegetative plantings on either side of the bridge, the designed topography, views and vistas, and portions of the Colbert Ferry Trail, would be affected, further diminishing the integrity of the cultural landscape. The proposed realignment under Alternative 1 would adversely impact the Water Overlook and Parking Area. These impacts from Alternative 1 would also result in additional long-term, adverse impacts to the John Coffee Memorial Bridge Cultural Landscape. A context-sensitive design of the new bridge, its approaches, and new vegetation would minimize visual impacts to this cultural landscape.

The Tennessee River Bridge is considered a non-contributing resource to the Chikasha Aiasha TCL, and its removal would not constitute an adverse impact to the TCL. However, depending on the final project design, the removal and replacement of a new bridge could affect archeological sites that contribute to the George Colbert Archeological District. The archeological district is considered a contributing resource to the Chikasha Aiasha TCL, and potential impacts to the sites within the archeological district would constitute a long-term, adverse impact to the NRHP-eligible property. However, as noted above, current designs avoid direct impacts to the archeological district, and the Section 106 Assessment of Effects recommends a finding of no adverse effect to the archeological district.

Ethnographic Resources

The Undisclosed Cave (1CT42), George Colbert's Home and Ferry Sites, and the Old Natchez Trace (NATR00331) ethnographic resources are located outside the alignment currently proposed under Alternative 1, and the removal of the bridge would not affect these ethnographic resources. While the

Tennessee River Bridge does not contribute to the significance of the Tennessee River as an ethnographic resource, the construction of a new bridge could affect the existing viewshed by permanently altering portions of the landscape. Impacts would be minimized if the new bridge were designed to maintain the existing viewshed and surrounding landscape.

In addition, the archeological sites that make up the George Colbert Archeological District are also a meaningful part of the Tennessee River ethnographic resource. As currently planned, Alternative 1 seeks to avoid impacts to all contributing resources associated with the George Colbert Archeological District. However, if the final design of Alternative 1 results in impacts to archeological resources, the Tennessee River Viewshed ethnographic resource would also experience long-term, adverse impacts.

Alternative 2

Alternative 2 would remove existing bridge components and construct new bridge components within the riverbed, construct new bridge abutments on either side of the river, and slightly realign the road prism on both sides of the river. The implementation of Alternative 2 would constitute an adverse effect that diminishes the integrity of the Natchez Trace Parkway and the John Coffee Memorial Bridge Cultural Landscapes. Depending on proposed final design, Alternative 2 could result in a permanent, adverse impact on the George Colbert Archeological District, the Chikasha Aiasha TCL, and related ethnographic resources. These potential impacts are described below; however, the NPS and FHWA are working on developing design options that avoid impacts to these resources.

Archeological Resources

The proposed alignment for Alternative 2 seeks to avoid all terrestrial and submerged sites to avoid impacts on contributing resources associated with the George Colbert Archeological District. If the alignment were altered during the final design phase and the plans directly affect the contributing resources of the district, the removal of the Tennessee River Bridge and replacement with a new bridge may constitute an adverse effect to the George Colbert Archeological District. The bridge extends through the boundaries of the archeological district. Two terrestrial archeological sites (NATR00031/1LU48 and NATR00654/1LU803) and one submerged archeological site (NATR00164/1LU49) are located within the alignment proposed as part of Alternative 2. Two additional terrestrial archeological sites (NATR00420/1LU312 and NATR00421/1LU313) are also located within the proposed staging area located on the east side of the Tennessee River. None of the five sites are individually eligible for listing in the NRHP; however, four sites (NATR00031/1LU48, NATR00164/1LU49, NATR00420/1LU312 and NATR00421/1LU313) are contributing resources to the George Colbert Archeological District (Meyers et al. 2024). While situated within the boundaries of the archeological district, NATR00654/1LU803 is a bridge constructed during the historic period and determined to be a non-contributing resource to the district.

Depending on the final design, ground disturbance associated with the construction of a new bridge under Alternative 2 could affect site NATR00164/1LU49, and the construction of the new approach on the east side of the river could affect site NATR00031/1LU48. In addition, compaction and ground disturbance associated with the storage of construction materials and equipment within the proposed staging area could result in additional impacts to the George Colbert Archeological District because sites NATR00420/1LU312 and NATR00421/1LU313 may also be affected. However, current designs avoid direct impacts to the archeological district, and the Section 106 Assessment of Effects recommends a finding of no adverse effect to the archeological district.

Historic Structures and Cultural Landscapes

Removal and replacement of the Tennessee River Bridge under Alternative 2 would constitute an adverse impact to the Natchez Trace Parkway Cultural Landscape because it is a contributing feature of the cultural landscape. Removal of the bridge fabric and adjacent road prisms would diminish the integrity of the cultural landscape's design, materials, and workmanship, resulting in long-term, adverse impacts.

Under Alternative 2, the removal of the bridge and proposed realignment on the west and east sides of the Parkway would constitute an adverse impact to the John Coffee Memorial Bridge Cultural Landscape. As a notable character-defining feature of the cultural landscape, the physical destruction of the Tennessee River Bridge would diminish the integrity of design, setting, materials, workmanship, feeling, and association of the historic, designed cultural landscape. Furthermore, other character-defining features, including portions of the adjacent road prism of the Natchez Trace Parkway; the Water Route Overlook and Parking Area; vegetative plantings on either side of the bridge; the designed topography, views, and vistas; and portions of the Colbert Ferry Trail, would be impacted, further diminishing the integrity of the historic, designed cultural landscape. A context-sensitive design of the new bridge, its approaches, and new vegetation would minimize visual impacts to the John Coffee Memorial Bridge Cultural Landscape. In addition, impacts to archeological sites caused by the removal of the existing bridge and replacement with a new bridge would result in additional adverse impacts to the John Coffee Memorial Bridge Cultural Landscape.

Similar to Alternative 1, the removal of the Tennessee River Bridge would not constitute an adverse impact to the Chikasha Aiasha TCL because it is considered non-contributing. However, depending on the final project design of Alternative 2, the removal and replacement of a new bridge could affect archeological sites that contribute to the George Colbert Archeological District. As noted above, current designs avoid impacts to the archeological sites, resulting in no adverse impacts to the TCL.

Ethnographic Resources

Under Alternative 2, George Colbert's Home and Ferry Sites and the Old Natchez Trace (NATR00331) ethnographic resources are located outside the alignment currently proposed, and the removal and replacement of a new bridge south of the current alignment would not impact these ethnographic resources. The Undisclosed Cave (1CT42) is located south of the west abutment of the Tennessee River Bridge. Under Alternative 2, the new bridge would be constructed south of the current alignment, but the new bridge alignment would not affect the viewshed from the Undisclosed Cave. As a result, Alternative 2 would not impact this ethnographic resource.

Similar to Alternative 1, the construction of a new bridge could affect the existing viewshed; however, impacts could be minimized if the new bridge were designed in a way that maintains the existing viewshed and surrounding landscape. In addition, the archeological sites that make up the George Colbert Archeological District are a meaningful part of the Tennessee River ethnographic resource. As currently planned, Alternative 2 seeks to avoid impacts to all contributing resources associated with the George Colbert Archeological District. However, if the final design of Alternative 2 results in impacts to archeological resources, the Tennessee River Viewshed ethnographic resource would also be affected.

Cumulative Impacts

Past, ongoing, and reasonably foreseeable planned actions are described above in the "Trends and Planned Actions" section and in Appendix D. Ongoing and reasonably foreseeable actions include repairs and replacements to Parkway roads and bridges; ongoing maintenance, repairs, and upkeep of recreation areas and facilities; and impacts to building materials and cultural resources from climate change. Under the No-Action Alternative, the existing bridge would be maintained in place, and impacts would be limited to the normal deterioration of the bridge and impacts to Parkway building materials from climate change. Under the No-Action Alternative, the bridge is expected to eventually need to be removed or replaced as part of a future project, resulting in potentially adverse impacts to historic, archeological, and ethnographic resource that would require analysis at the time of any future project.

Under the No-Action Alternative, impacts, including those from past, ongoing, and reasonably foreseeable future actions would result in long-term, adverse impacts to cultural resources from the future removal and/or replacement of the existing bridge. There would be no other new impacts beyond those described in the "Environmental Consequences" section.

Under Alternative 1, the existing bridge would be replaced, and the roadway approaches to the bridge would be reconstructed, resulting in adverse impacts to historic, archeological, and ethnographic resources, as discussed above. No other new direct or indirect impacts beyond those described in the "Environmental Consequences" section would occur. Under Alternative 1, impacts, including those from past, ongoing, and reasonably foreseeable future actions would result in long-term, adverse impacts to cultural resources.

Under Alternative 2, the existing bridge would be replaced, and the roadway approach to the bridge would be reconstructed, resulting in adverse impacts to historic, archeological, and ethnographic resources, as discussed above. No other new impacts beyond those described in the "Affected Environment" section would occur. Under Alternative 2, impacts, including those from past, ongoing, and reasonably foreseeable future actions would result in long-term, adverse impacts to cultural resources.

Conclusion

As discussed above, implementation of either action alternative could have long-term, adverse impacts to historic, archeological, and ethnographic resources, and both action alternatives would contribute long-term, adverse impacts to the overall adverse cumulative impact. However, Alternative 2 would realign the east and west sides of the Parkway, thus creating more of an adverse impact than Alternative 1 because of the amount of new disturbance. The NPS is currently working with FHWA to develop design alternatives that would avoid or minimize impacts to the known cultural resources in the project area. In addition, the NPS is continuing to consult with the Alabama SHPO and other consulting parties through the NHPA Section 106 process. During consultation efforts, the Alabama SHPO stated that removal of the bridge would result in an adverse effect to the bridge and that any new alignment may have an adverse effect on the cultural landscape (Alabama Historical Commission 2023). Unavoidable impacts to cultural resources would be addressed through stipulations in a Programmatic Agreement (see Appendix E).

The 2024 Assessment of Effect report summarizes its effects recommendations as, "…implementation of the proposed project would result in a finding of Adverse Effect to the John Coffee Memorial Bridge/Colbert Ferry Park/Water Route Overlook Cultural Landscape and the Natchez Trace Parkway historic district as the John Coffee Memorial Bridge is being removed and replaced. Furthermore, the replacement of the bridge produces effects to contributing features of the cultural landscape. A finding of no adverse effect is anticipated for the Chikasha Aiasha TCL if the George Colbert Archeological District or any other contributing element is not directly physically affected. A finding of no adverse effect is anticipated for the George Colbert Archeological District, contingent upon there being no physical effects to contributing resources of the district" (Coco 2024).

As part of NHPA Section 106 consultation for the proposed project, the NPS has developed a draft Programmatic Agreement (Appendix E) with the Alabama SHPO to formalize minimization or avoidance of adverse impacts to cultural resources in the project area, which will result in no long-term impacts to the John Coffee Memorial Bridge/Colbert Ferry Park/Water Route Overlook Cultural Landscape, the Natchez Trace Parkway Historic District, the Chikasha Aiasha TCL, and the George Colbert Archeological District. Appendix E includes the Programmatic Agreement and its stipulations.

ENVIRONMENTAL JUSTICE

Affected Environment

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority or low-income populations. More recently, EO 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, builds on EO 12898 to complement and deepen ongoing environmental justice work within the federal government.

Environmental justice is a term used to describe the fair and equitable treatment of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other federal activities that affect human health and the environment—collectively referred to as communities with environmental justice concerns. Communities with environmental justice concerns experience disproportionate and adverse human health or environmental burdens, which can arise from a number of causes, particularly as a result of federal activities. Consistent with CEQ and US Environmental Protection Agency guidance, NPS staff considers: (1) whether communities with environmental justice concerns (e.g., minority or low-income populations) exist in the project area; (2) whether impacts on communities with environmental justice concerns are disproportionately high and adverse; and, if so, (3) what mitigation measures might be needed (CEQ 1997; USEPA 2016a).

Following the recommendations set forth in *Promising Practices*, the NPS uses 50% and the meaningfully greater analysis methods to identify minority populations (USEPA 2016a). Using this methodology, minority populations have been defined within the area of study where: (1) the aggregate minority population of the block group in the affected area exceeds 50%; or (2) the aggregate minority population in the block group affected is 10% higher than the aggregate minority population percentage in the county. CEQ's *Environmental Justice Guidance* also directs low-income populations to be identified based on the annual statistical poverty thresholds from the US Census Bureau (CEQ 1997). Using *Promising Practices'* low-income threshold criteria method, low-income populations are identified as block groups where the percentage of low-income population in the identified block group is equal to or greater than that of the county (USEPA 2016a).

For the purposes of analyzing demographic data, communities with environmental justice concerns were identified through the review of US Census Data, including the census tracts and block groups within and adjacent to the project area.[4] Data were obtained from the 2018–2022 American Community Service Five-Year Estimates at the census tract and block group levels. As shown in Figure 8, the project area is located within and/or adjacent to the following census tracks/block groups: Census Tract 021000, Block Group 1 and Block Group 2; Census Tract 011300, Block Group 1 and Block Group 2; and Census Tract 011200, Block Group 2 and Block Group 3.

Five of eight block groups within a 3-mile radius of the project area exceed minority or low-income thresholds and are therefore classified as communities with environmental justice concerns (WSP 2023a). According to the US Census Bureau, 20.3% of Colbert County and 13.8% of Lauderdale County are composed of minority populations, and 15.5% of Colbert County and 13.0% of Lauderdale County are composed of low-income populations. The westernmost portion of Lauderdale County and all portions of Colbert County within a 3-mile radius of the project area, including the town of Cherokee (33.9%), exceed low-income environmental justice thresholds. Only one block group, located about 10 miles northwest of the bridge, exceeds minority environmental justice thresholds, with 67% of the block group composed of minority populations (US Census Bureau 2022a).

[4] Census tracts are small, relatively permanent statistical subdivisions of a county or statistically equivalent entity (generally between 1,200 and 8,000 people). Block groups are statistical divisions of census tracts (generally between 600 and 3,000 people), and are used to present data and control block numbering.

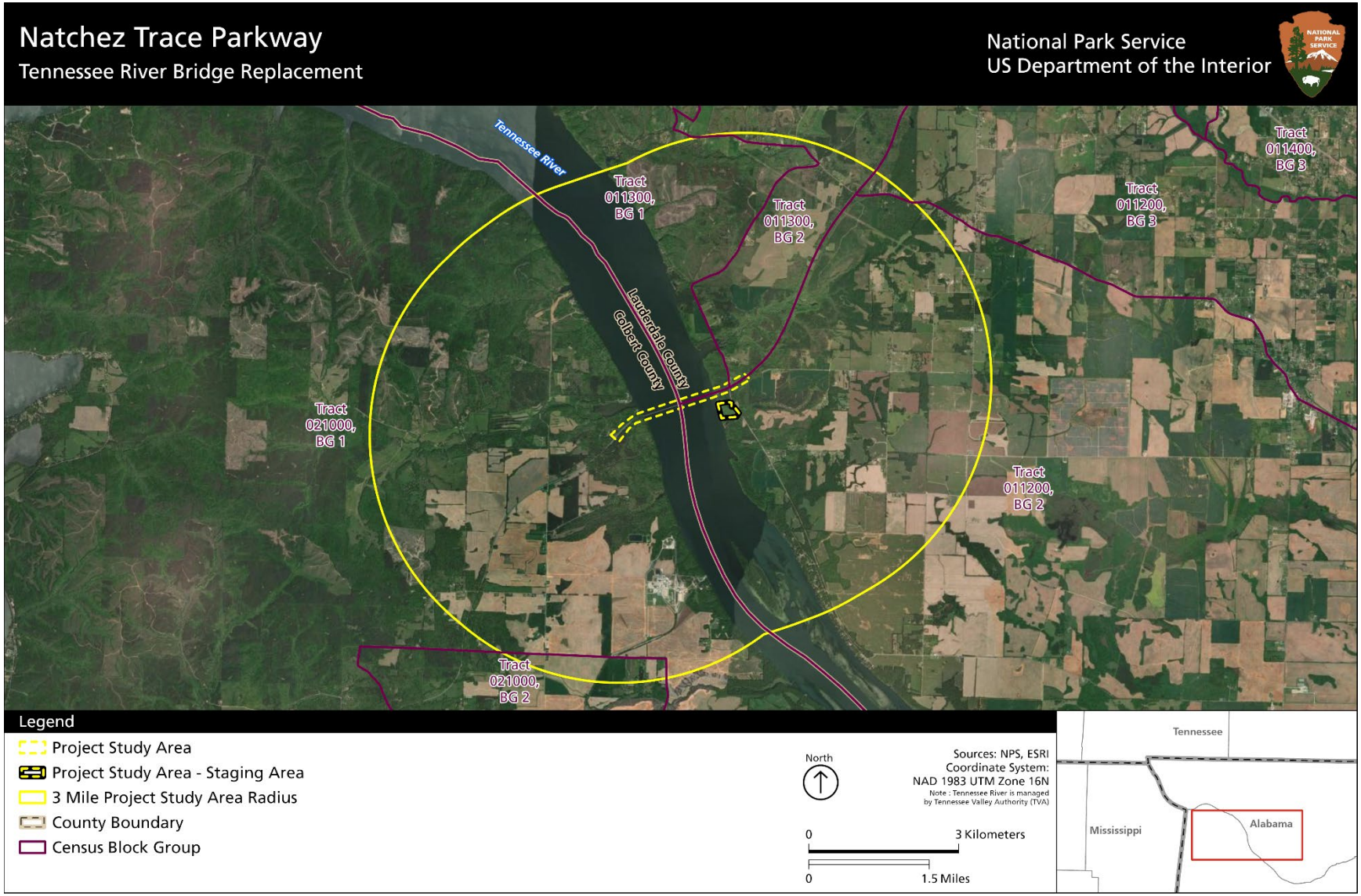


FIGURE 8. COMMUNITIES WITH ENVIRONMENTAL JUSTICE CONCERNS NEAR THE PROJECT AREA

The largest employment sectors in Colbert County, by number of employees in 2020, were retail trade (6,049), manufacturing (5,668), state and local (4,119), and accommodation and food service (4,013). The largest employment sectors in Lauderdale County in 2020 were finance and insurance (6,976), retail trade (6,049), manufacturing (5,668), and state and local (4,750) (NACOLG 2020). Of the employed residents of Colbert County between 2002 and 2019, 46.5% worked in Colbert County and 19.3% worked in Lauderdale County. Of the employed residents of Lauderdale County between 2002 and 2019, 47.4% worked in Lauderdale County and 18.5% worked in Colbert County (US Census Bureau 2020). In 2021, travel-related employment accounted for 1,443 jobs in Colbert County and 3,368 jobs in Lauderdale County, and travel-related earnings totaled $35.6 million in Colbert County and $82.2 million in Lauderdale County (Alabama Tourism Department 2022).

In the 2020 US Census, Colbert County had a population of 57,227, of whom 16,275 (28.4%) lived in Muscle Shoals and 178 (0.3%) lived in Waterloo. Lauderdale County had a population of 93,564, of whom 40,184 (42.9%) lived in Florence and 970 (1.0%) lived in Cherokee (US Census Bureau 2022a). According to the American Community Survey Five-Year Estimates from 2016 through 2020, the median household income in Colbert County was $47,962, compared with $35,875 in Cherokee, and the median household income in Lauderdale County was $48,428, compared with $39,735 in Florence and $37,813 in Waterloo (US Census Bureau 2022b). The median home value during the third quarter of 2022 was $154,370 in Colbert County and $208,640 in Lauderdale County (National Association of Realtors 2023).

The Parkway, HWY 20, and HWY 72 are the main travel corridors near the 3-mile radius of the project area that provide access to the town of Cherokee and connections to the city of Florence, thus serving as critical roadways for economic and recreational activities. Many unincorporated local communities in the project area rely on the highways for local travel and connections to other communities, providing critical contributions to the economies of Colbert and Lauderdale Counties. CR 14 provides access to the town of Waterloo, connecting residents to the Parkway and the city of Florence. The lack of alternate routes to the Parkway hampers emergency response, especially during peak travel periods where congested conditions make it difficult to reach emergencies. Within the 3-mile radius of the project area, the Cherokee Family Clinic serves as the only medical clinic, and emergency responders must travel more than 23 miles to the Hellen Keller Hospital in Sheffield for any incidents requiring hospital services.

Trends and Planned Actions

Colbert County experienced a population increase of 5.1% between the 2010 US Census and the 2020 US Census and is projected to experience population growth of approximately 9% between 2020 and 2040 (WSP 2023a). The towns of Cherokee and Waterloo both experienced substantial population declines between the 2010 and 2020 Census, and population projections expect this trend to continue. Given the population trends of the area, the greatest travel impacts on communities with environmental justice concerns are expected on HWY 20 and HWY 72, particularly near the greater Florence area.

The most severe harms from climate change fall disproportionately on underserved communities who are least able to prepare for, and recover from, heat waves, poor air quality, loss of labor hours due to extreme temperature, flooding, and other impacts (USEPA 2021). Over time, the adverse impacts that climate change has on communities with environmental justice concerns are expected to increase (USEPA 2021). With this, the dependence on the Tennessee River Bridge will also likely increase because the bridge provides community members with a route to broader employment opportunities in the region. The bridge also provides a reliable route for emergency response vehicles and community members during extreme weather events in the region.

Environmental Consequences

Potential impacts to adjacent communities with environmental justice concerns are assessed based on changes to the way these populations experience their surrounding environment and how the alternatives would alter their experiences within the project area. Impacts are focused on the geographic area and

populations most likely to be affected by the alternatives, which typically include populations within and adjacent to the project area. Generally, impacts were assessed for communities with environmental justice concerns in the area immediately surrounding the project, within approximately a 3-mile radius of the bridge (WSP 2023a). The town of Cherokee was also included based on the presence of communities with environmental justice concerns.

Under both action alternatives, the existing bridge would be closed while the bridge is removed and replaced. During the closure, communities with environmental justice concerns would need to use an approximately 42-mile detour route (approximately 1 hour drive) to reach community resources, businesses, employment destinations, emergency services, or other services in adjacent communities on either side of the Tennessee River (see Figure 3). These assumptions include a single trip along the detour route once per day for a five-day week.

No-Action Alternative

Under the No-Action Alternative, during periodic bridge closures for maintenance and repair activities, communities with environmental justice concerns would experience short-term, adverse impacts from changes in traffic patterns from bridge closure as well as impacts on access to community resources, regional businesses, employment destinations, and goods and services in adjacent communities, and reduced access to emergency services.

Eventual removal of the bridge in 10 to 20 years would result in impacts likely similar to those expected under the action alternatives. However, because the anticipated closure duration to reconstruct a new bridge is unknown at this time, the adverse impacts would be long term compared to the two action alternatives because planning and updated studies would need to be conducted to develop plans for the eventual replacement of the bridge. The amount of time the bridge could be closed under this alternative could be extensive as planning occurs and funding is secured. Therefore, implementation of the No-Action Alternative would result in overall long-term, adverse impacts associated with the eventual removal of the bridge and subsequent travel delays from the detour route, including changes in traffic patterns from bridge closure as well as impacts on access to community resources, regional businesses, employment destinations, and goods and services in adjacent communities, and reduced access to emergency services. Therefore, under the No-Action Alternative, impacts associated with the unknown duration of the eventual bridge closure and subsequent financial burdens from the detour route would have a disproportionate and adverse impact on communities with environmental justice concerns compared to the general public.

Alternative 1

Under Alternative 1, the existing bridge would be closed to the public for approximately two years while the bridge is removed and replaced. An estimated 21,840 miles of additional driving (annually, per vehicle), or approximately 520 hours of additional travel, would be required of communities with environmental justice concerns to reach the abovementioned resources in adjacent communities on either side of the Tennessee River. As a result, both adverse and beneficial impacts under Alternative 1 are anticipated as described below.

Travel Operations

During the approximate two-year bridge closure during construction, communities with environmental justice concerns would experience short-term, adverse impacts from altered traffic operations and increased travel times to reach nearby destinations. In addition, they would experience increased congestion on local roadways along the detour route. Communities with environmental justice concerns would need to travel the detour route for approximately an additional hour each way to continue accessing nearby community resources, businesses, employment destinations, emergency services, or other services in adjacent communities, particularly in the town of Cherokee.

During the public engagement process, several residents expressed concern about the increased time associated with traveling the detour route. If communities with environmental justice concerns are not able or willing to continue frequenting these resources during construction because of the increased travel duration, the abovementioned resources, businesses, and services in the area may also experience decreased economic development and vitality. Travel operation impacts associated with the additional time needed to access these resources, businesses, and services would be fairly distributed across the public and would not be predominately borne by communities with environmental justice concerns; therefore, the additional time required to travel the construction detour would not cause a disproportionate and adverse impact on communities with environmental justice concerns compared to the general public.

Community Resources

During the approximate two-year closure, communities with environmental justice concerns would experience short-term, adverse impacts on their ability to access community resources on either side of the Tennessee River. The detour route may add up to 1 hour of travel time during peak travel periods for communities with environmental justice concerns, including during times while accessing community resources across the Tennessee River, particularly the nine cemeteries, seven religious institutions, and four recreation facilities near the project area.

Similarly, eight public schools surround the project area, and the closest hospitals are located in Florence on the north side of the Tennessee River, which is approximately 20 miles away, and Sheffield on the south side of the Tennessee River, which is approximately 23 miles away from the project area. Because the project area is bisected by Colbert and Lauderdale Counties, public school-related transportation services and public emergency services for each designated county are not anticipated to cross the bridge during construction. Therefore, impacts associated with accessing these community resources would be fairly distributed across the public and would not be predominately borne by communities with environmental justice concerns, and these communities would not experience a disproportionate adverse impact compared to the general public.

However, during the bridge closure, there would be short-term, adverse impacts on the ability of communities with environmental justice concerns to reach private emergency facilities, particularly the Cherokee Family Clinic, and private schools not serviced by county-wide school transportation services. Similarly, communities with environmental justice concerns would incur an increased financial burden associated with traveling the detour route to reach private emergency facilities or schools on either side of the Tennessee River. As a result, these populations would have to allocate a greater portion of their income to pay for additional fuel or vehicle maintenance costs associated with the increased mileage to access these resources. Therefore, implementation of Alternative 1 would result in short-term, adverse impacts associated with the detour route and would have a disproportionate adverse impact on communities with environmental justice concerns compared to the general public. These impacts would be resolved after the approximate two-year bridge closure when the bridge is reopened to visitors, and the proposed detour route is no longer necessary.

Upon completion of the proposed bridge and potential pedestrian walkway on the bridge, communities with environmental justice concerns would experience long-term, beneficial impacts related to access to community recreation resources. Communities with environmental justice concerns visiting the recreation resources near the project area accessing the area as a pedestrian would have a safer travel space to cross the Tennessee River, avoid vehicular collisions, and experience improved access to community recreation resources, particularly Colbert Ferry Park, the Natchez Trace Parkway, the Trail of Tears Water Route Overlook, and several nearby nature trails.

Economic Resources

During the approximate two-year bridge closure, communities with environmental justice concerns would experience short-term, adverse economic impacts that would affect their ability to access employment

destinations and goods and services on either side of the Tennessee River. The Tennessee River Bridge is an important river crossing for the region—the next closest bridge is approximately 20 miles away in Florence on the north side of the Tennessee River and approximately 25 miles away in Sheffield on the south side of the Tennessee River.

The bridge closure would eliminate easy access to employment destinations and businesses in the project area, particularly in the town of Cherokee. Potential customers and employees would experience an increased financial burden associated with traveling the detour route to reach destinations on either side of the Tennessee River. As a result of the detour, communities with environmental justice concerns would have to allocate a greater portion of their income to pay for additional fuel or vehicle maintenance costs associated with the increased mileage from the detour.

During the public engagement process, several residents expressed concern about the associated costs of traveling the detour route, and residents indicated that a long bridge closure may require them to seek other employment opportunities. Similarly, if communities with environmental justice concerns, including customers and employees, are not able or willing to continue frequenting these resources during construction due to the increased financial burden, businesses also may experience decreased economic development and vitality. Therefore, implementation of Alternative 1 would result in short-term, adverse impacts associated with financial burdens from the detour route and would cause a disproportionate and adverse impact on communities with environmental justice concerns compared to the general public. However, short-term, beneficial economic impacts are anticipated during construction and would include the employment of approximately 50 to 75 workers that may include workers from environmental justice communities. Short-term project-related construction jobs are not anticipated to affect income levels in the long term; however, temporary construction jobs may provide a short-term benefit to income levels if local and regional workers are hired for the project.

Under Alternative 1, construction (including wages and materials but excluding preliminary engineering, construction engineering, or NEPA analysis), is expected to cost approximately $250 million. If local workers were hired and materials were obtained locally, project construction would have a short-term, beneficial impact on local businesses, including businesses in environmental justice communities and businesses that employ members of communities with environmental justice concerns. In addition, the use of a detour route during bridge construction may increase visitation and spending in nearby towns and recreation areas along the proposed detour route. Detours may encourage visitors to cross routes previously and otherwise unexplored, further contributing short-term, beneficial impacts to communities with environmental justice concerns, particularly business owners, from increased spending along the detour route.

Alternative 2

Under Alternative 2, the existing bridge would be closed to the public for approximately six months. Based on preliminary calculations, an additional 10,920 miles of additional driving (annually, per vehicle), or approximately 260 hours of additional travel, would be required of communities with environmental justice concerns to reach the abovementioned resources in adjacent communities on either side of the Tennessee River. As a result, certain adverse and beneficial impacts are anticipated under Alternative 2 as described below.

Travel Operations

Under Alternative 2, the adverse impacts on communities with environmental justice concerns related to travel operations would be similar to the impacts described for Alternative 1. These short-term, adverse impacts would include disruptions to traffic operations and increased travel times to reach nearby destinations. However, Alternative 2 would require a shorter bridge closure duration; therefore, communities with environmental justice concerns would experience adverse impacts for a shorter period as a result of the approximate six-month detour under Alternative 2.

Community Resources

Under Alternative 2, adverse impacts on communities with environmental justice concerns related to accessing community resources would be similar to the impacts described above for Alternative 1. These short-term, adverse impacts would include access to nearby cemeteries, religious institutions, recreation facilities, private schools, emergency facilities, and other resources adjacent to the project area on either side of the Tennessee River. Correspondingly, the beneficial access impacts to community resources for communities with environmental justice concerns described under Alternative 1 would be similar under Alternative 2.

However, Alternative 2 would require a shorter bridge closure duration; therefore, communities with environmental justice concerns would experience adverse impacts for a shorter period as a result of the approximate six-month detour under Alternative 2.

Economic Resources

Under Alternative 2, the adverse impacts on economic resources for environmental justice would be the same as those described for Alternative 1. These short-term, adverse impacts would include the ability to access employment destinations and goods and services on either side of the Tennessee River, as well as decreased economic development and vitality in the region. In addition, the beneficial economic impacts during construction, including the short-term employment of workers, described under Alternative 1, would be the same under Alternative 2.

However, Alternative 2 would require a shorter bridge closure duration, resulting in marginal short-term, adverse impacts to economic development and vitality, as well as marginal impacts on travel times to reach nearby destinations. The bridge closure under Alternative 2 would be approximately six months, and preliminary calculations indicate communities with environmental justice concerns would need to travel an additional 10,942 miles to reach nearby businesses, employment destinations, or services in adjacent communities. However, Alternative 2 would require a shorter bridge closure duration; therefore, communities with environmental justice concerns would experience adverse economic impacts for a shorter period as a result of the approximate six-month detour under Alternative 2.

Under Alternative 2, construction (including wages and materials, but excluding preliminary engineering, construction engineering, or NEPA analysis) is expected to cost approximately $255 million. Therefore, Alternative 2 would result in long-term, beneficial economic impacts for communities with environmental justice concerns.

Cumulative Impacts

Past, ongoing, and reasonably foreseeable actions that could affect communities with environmental justice concerns in the project area are described above in “Trends and Planned Actions” sections and in Appendix D. Ongoing and reasonably foreseeable actions that could impact communities with environmental justice concerns include routine maintenance, repairs, and safety improvements on the Parkway and the HWY 72 road construction projects. Routine maintenance, repairs, and safety improvements on the Parkway could close the bridge and Parkway and could result in short- or long-term travel delays and detours until access is restored. These actions would have adverse impacts on communities with environmental justice concerns from the loss of access to community resources, regional businesses, employment destinations, and goods and services in adjacent communities. The potential accessibility impacts, and travel delays could place an increased financial burden on communities with environmental justice concerns compared to the general public. Similarly, the HWY 72 road construction projects could close nearby bridges that cross the Tennessee River and/or roads in the cities of Sheffield and Florence. If these actions occurred simultaneously with this project, additional adverse impacts are anticipated for communities with environmental justice concerns due to increased delays, loss of access to resources, and an increased financial burden. However, the projects are not

anticipated to occur at the same time based on the current project planning processes. Should schedules change, the NPS would coordinate to avoid replacing the bridge while these projects are occurring.

Under the No-Action Alternative, the abovementioned actions would result in long-term, adverse impacts to communities with environmental justice concerns due to the eventual removal and replacement of the bridge in approximately 10 to 15 years. Because the amount of time needed to replace the bridge is unknown and could be extensive as planning occurs and funding is secured, communities with environmental justice concerns would be required to use a permanent detour route. Therefore, communities with environmental justice concerns would be required to change travel plans and routes to access resources until a new bridge was constructed. When combined with the effects of past, ongoing, and reasonably foreseeable actions, the No-Action Alternative could contribute to disproportionate, adverse impacts on communities with environmental justice concerns and to the overall cumulative impacts on these populations in the surrounding project area.

Under Alternative 1, the abovementioned actions would result in short-term, adverse impacts to communities with environmental justice concerns because these impacts are anticipated to occur for approximately two years for the duration of the bridge closure. Impacts on communities with environmental justice concerns under Alternative 2 would be similar to those described under Alternative 1, except that the duration of impacts associated with construction-related activities would occur for approximately six months. When combined with the effects of past, ongoing, and reasonably foreseeable actions, Alternatives 1 and 2 could contribute to short-term, disproportionate adverse impacts on communities with environmental justice concerns and contribute to the overall cumulative impacts on these populations in the surrounding project area. However, because these impacts are anticipated to occur only during the closure of the bridge during construction, long-term, adverse impacts are not anticipated; therefore, Alternatives 1 and 2 would not disproportionately affect communities with environmental justice concerns after project completion.

Conclusion

As discussed above, under the "No-Action Alternative" section, during periodic bridge closures for maintenance and repairs activities, and the eventual bridge closure and removal, communities with environmental justice concerns would experience short- and long-term, adverse impacts from travel operations, as well as impacts on access to community resources, regional businesses, employment destinations, goods and services in adjacent communities, and emergency services. Communities with environmental justice concerns would also incur an increased financial burden associated with traveling the detour route to reach these resources on either side of the Tennessee River. The anticipated closure duration to reconstruct a new bridge is unknown at this time, but would be longer compared to the two action alternatives. Therefore, implementation of the No-Action Alternative would result in overall long-term, adverse impacts associated from eventual removal of the bridge and subsequent detour route and would have a disproportionate and adverse impact on communities with environmental justice concerns due to increased financial burden compared to the general public.

Under both action alternatives, the existing bridge would be closed while bridge construction occurs. Under Alternative 1, the bridge would be closed to the public for approximately two years while it is removed and replaced. Under Alternative 2, the existing bridge would be closed to the public for approximately six months. During the closure, communities with environmental justice concerns would need to use an approximately 42-mile detour route to reach community resources, businesses, employment destinations, emergency services, or other services in adjacent communities on either side of the Tennessee River. During bridge construction under both action alternatives, the employment of local workers and use of local materials would have a short-term, beneficial effect on the local economy.

However, Alternative 2 would require a shorter bridge closure duration; therefore, communities with environmental justice concerns would experience adverse impacts for a shorter period as a result. The magnitude and duration of adverse impacts related to travel operations, access to community resources,

and access to economic resources would be reduced for communities with environmental justice concerns under Alternative 2 compared to Alternative 1.

No long-term, adverse cumulative impacts are expected under either action alternative.

GEOLOGICAL RESOURCES

Affected Environment

Soils and Bedrock

Soils in the project area consist predominantly of silt loam with steep slopes and large soil particle sizes (Table 5). Soil characteristics differ on opposite sides of the Tennessee River, with soils on the Colbert County side consisting of the Decatur and Fullerton series, and soils on the Lauderdale County side consisting of the Dickson, Bodine, Dewey, and Etowah series (USDA-NRCS 2024). These soils are described briefly below and are shown on Figure 9.

TABLE 5. SUMMARY OF SOIL TYPES OCCURRING IN THE PROJECT AREA

Soil Type	Acres in Project Area	Percent of Project Area
Study Area		
BoE - Bodine Gravelly Silt Loam (12% to 30% slopes)	6	4
DaB - Decatur Silt Loam (2% to 6% slopes)	18	12
DeB - Dewey Silt Loam (2% to 6% slopes)	1	0
DoA - Dickson Silt Loam (0% to 2% slopes)	15	10
DoC - Dickson Silt Loam (6% to 10 % slopes)	4	2
FaC - Fullerton Gravelly Silt Loam (6% to 15% slopes)	4	3
FaD - Fullerton Gravelly Silt Loam (6% to 15% slopes)	5	3
FbF - Fullerton-Bodine Complex (15% to 45% slopes)	8	6
W - Water	64	43
Staging Area		
DoA - Dickson Silt Loam (0% to 2% slopes)	13	9
EtB - Etowah Silt Loam (2% to 8% slopes)	7	5
FaC - Fullerton Gravelly Silt Loam (6% to 15% slopes)	3	2
W - Water	1	0

- The Decatur series consists of very deep, well-drained, moderately permeable soils that formed in residuum derived from limestone. These soils are on level to strongly sloping uplands in valleys with mean annual temperatures around 62 degrees Fahrenheit, and mean annual precipitation of more than 49 inches. Slopes range from 2% to 6% (USDA-NRCS 2024).
- The Fullerton series consists of very deep, well-drained, moderately permeable soils that are strongly acidic. Gravel and chert cobbles range from 10% to 45% of soil content, and soil aggregates are highly friable. These soils are found throughout river valleys in southern Appalachian ridges. Slope values range from 6% to 15% (USDA-NRCS 2024).
- The Dickson series consists of very deep, moderately well-drained soils that have a slowly permeable fragipan in the subsoil. These soils formed in a silty mantle 2- to 4-feet thick, and the underlying residuum is limestone. They are on nearly level to sloping uplands. Slopes range from 0% to 12% (USDA-NRCS 2013).

- The Bodine series consists of very deep, somewhat excessively drained soils with a moderately rapid permeability. Gravel, cobbles, and chert cobbles average 35% to 80% of soil content. These soils are strongly acidic and formed in colluvium or residuum weathered from cherty limestone. Bodine series soils are extensive and found in the Highland Rim and Southern Appalachian ridges and valleys in Tennessee, Alabama, Georgia, southern Kentucky, and Oklahoma. Slope values range from 12% to 30% (USDA-NRCS 2024).
- The Dewey series consists of very deep, well-drained, moderately permeable soils that are strongly acid. These soils formed in a residuum of limestone or in 1 to 3 feet of old alluvium and the underlying residuum from limestone. Gravel size chert ranges from 0% to 15% of soil content. Dewey series soils are found on gently sloping to steep uplands with slope ranges of 2% to 40%, and some areas are pitted with sinks and depressions.
- The Etowah series consists of very deep, well-drained moderately permeable soils that are strongly acidic. Coarse fragments are commonly less than 5% of soil content but range from 0% to 20% for individual horizons. Etowah series soils formed in alluvium or colluvium underlain by limestone residuum over 40 inches below the ground surface and are founds on high stream terraces, alluvial fans, and foot slopes. Slopes range from 0% to 35%.

Soils near the project area, including soils above the Undisclosed Cave, have low susceptibility to landslides (GEOServices 2023).

As shown in Figure 10, bedrock geology on the Colbert County side of the project area consists of Tuscumbia Limestone, a partly-oolitic, white-gray limestone that often contains fine to very coarse-grained bioclastic crinoidal limestone. Chert nodules and concretions are scattered throughout and are abundant locally. Bedrock on the Lauderdale County side is formed from Fort Payne Chert, a bioclastic (abundant pelmatozoans) limestone containing abundant nodules, lenses, and beds of light to dark-gray chert with a broad range of grain and bed sizes. The upper part of the bedrock layer consists of laminated siltstone that contains small- to medium-sized cavities, lined or filled with quartz, with shale, shaly limestone, and siltstone scattered throughout. Claystone and shale belonging to the Maury Formation occur at greater depths (Szabo et al. 1998). A summary of the bedrock types occurring in the project area is included in Table 6.

TABLE 6. SUMMARY OF BEDROCK TYPES OCCURRING IN THE PROJECT AREA

Bedrock Type	Acres in Project Area	Percent of Project Area
Study Area		
Mfp - Fort Payne Chert	31	21
Mt - Tuscumbia Limestone	30	20
W - Water	64	43
Staging Area		
Mfp - Fort Payne Chert	23	15
W - Water	1	1

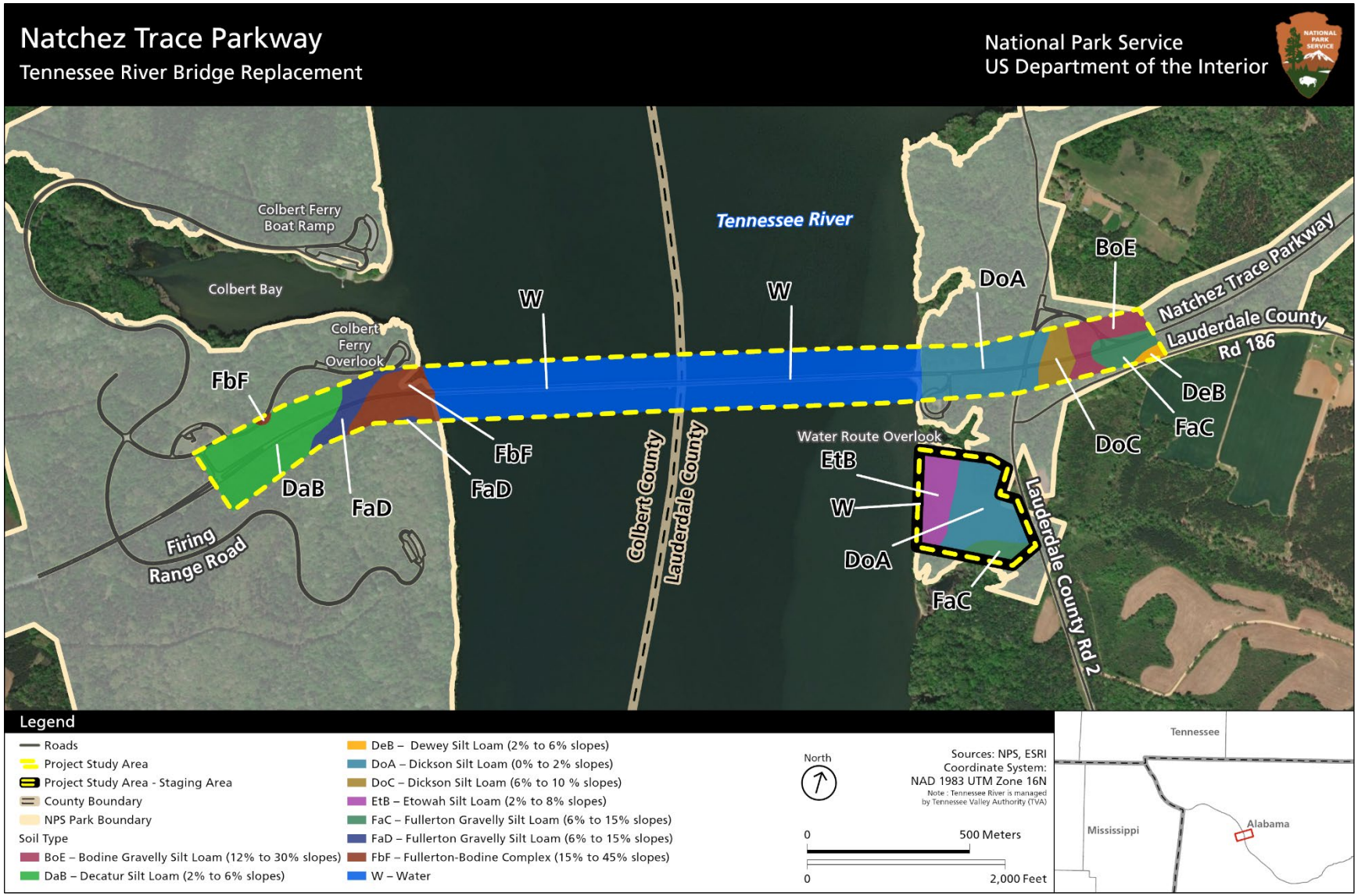


FIGURE 9. SOIL TYPES IN THE PROJECT AREA

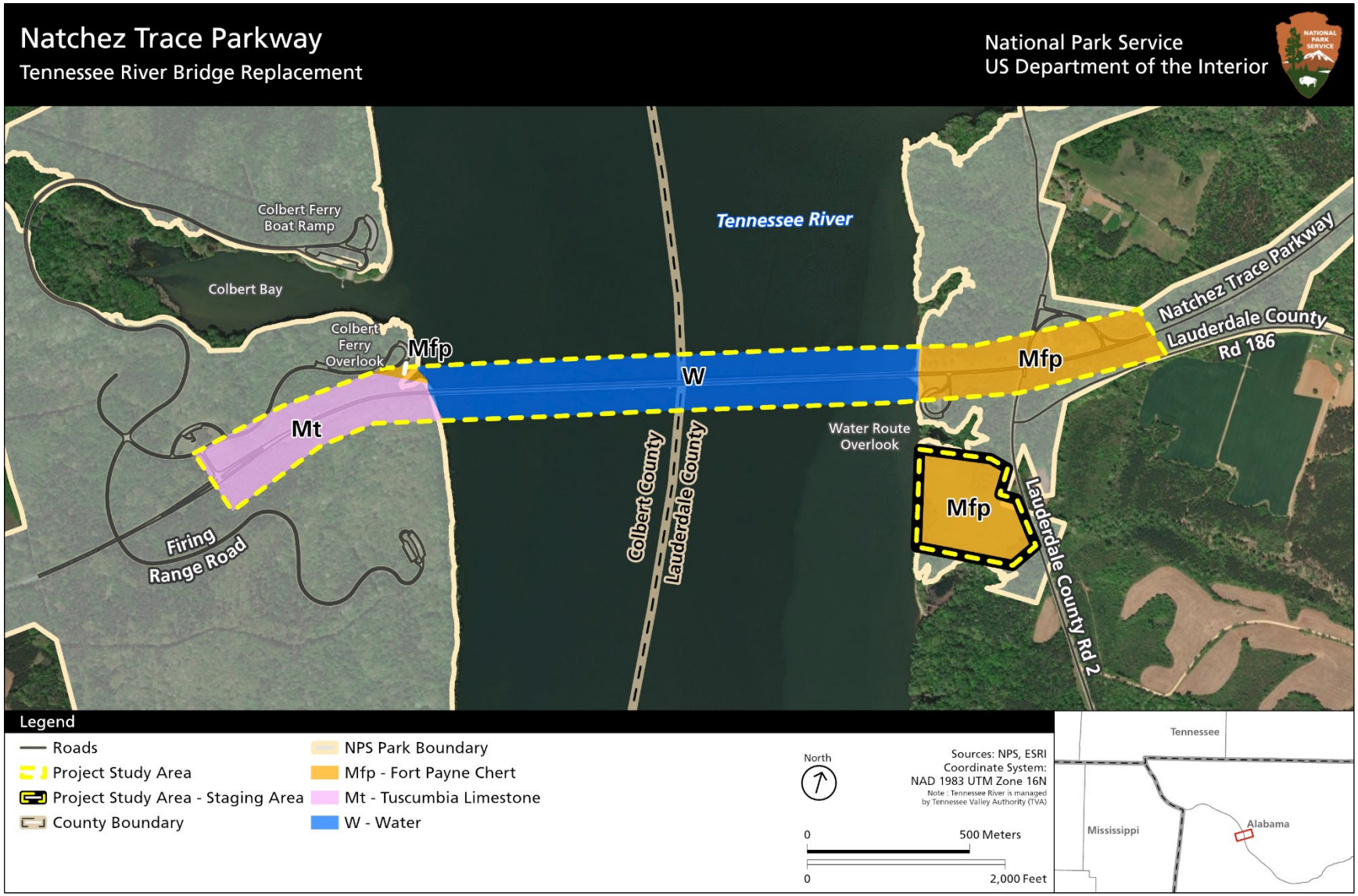


FIGURE 10. BEDROCK GEOLOGY IN THE PROJECT AREA

Hydrology and Karst Features

Surface drainage in the project area flows into the Tennessee River via Colbert Creek; several ephemeral tributaries of the Tennessee River; and some culverts, wells, and springs. Most freshwater in Colbert and Lauderdale Counties is drawn from the Tuscumbia Limestone aquifer. Tuscumbia Spring, located about 5 miles south of the Tennessee River and roughly 20 miles downstream from the project area, is connected to the Tuscumbia Limestone aquifer and discharges between 6 million to 70 million gallons of water per day.

The project area lies within the Highland Rim and Central Basin physiographic provinces, which are characterized by subsurface drainage through karst and/or karst-like features. These features are defined as points where surface water may enter the subsurface and could affect groundwater. Dye trace studies conducted approximately 10 miles west of the project area indicated that the hydrogeology of the dye trace study area is interconnected with the underlying Tuscumbia Limestone aquifer. This dye trace study was not directly correlated with the project area; however, because the project area is also underlain by Tuscumbia Limestone, the results, suggest that future construction within the project area could affect the underlying karst systems and groundwater (GEOServices 2023).

The geomorphology associated with the Tennessee River and the gently rolling hills would likely mantle or fill in historical karst features, particularly near the existing river line. The Undisclosed Cave, a known karst feature located near the project area boundary on the east side of the Tennessee River, is a protected resource under the Federal Cave Resource Protection Act of 1988. Gated and closed to public use, the cave entrance is along an exposed limestone bluff line south of the existing bridge.

The Karst Investigation Report (GEOServices 2023) identified 17 potential karst or karst-like features. Of these 17 features, only 1—the Undisclosed Cave—appeared to be directly connected to the overall karst system and is expressed on the surface. Only visual confirmation of the cave was made during the field program because it is located outside the project area; no formal geophysical survey was conducted at that time. The field investigation visually confirmed that the remaining 16 features did not have obvious karst characteristics and should not be considered karst features (GEOServices 2023).

The Karst Investigation Report (GEOServices 2023) recommended that an Electrical Resistivity Imaging geophysical survey be conducted at the proposed eastern bridge abutment along the proposed southern roadway alignment to investigate potential subsurface karst. This survey was expanded to include determination of the cave's extent after a "lead" feature was observed along the river bluff near the cave during a survey conducted by the Cave Mapping Project. GEOServices investigated the "lead" feature, a circular opening in the face of the rock bluff in the vicinity of the trail leading to the cave entrance, after the cave survey was complete. "Lead" and other similar features have the potential to be connected to the Undisclosed Cave and could be impacted by construction along the proposed southern alignment (GEOServices 2024).

The Electrical Resistivity Imaging survey was performed in late 2023 and included two areas: one above the Undisclosed Cave, and one along the southern alignment. Survey results from above the Undisclosed Cave are consistent with the location of the cave as interpreted from the Global Positioning System coordinates provided in the Karst Investigation Report and indicate that the Undisclosed Cave is outside the project area (GEOServices 2023). The results also indicate that the "lead" feature observed during the Cave Mapping Project survey does not appear to be connected to the Undisclosed Cave (GEOServices 2024).

Survey results from along the southern alignment detected a known subsurface concrete box culvert and concrete ditch that cross under the existing Parkway. However, the data also indicate that subsurface open-air features are not present (GEOServices 2024). Detailed summaries of the investigation and findings of the Electric Resistivity Imaging survey are presented in the Geophysical Investigation Report (GEOServices 2024).

To date, no evidence of other karst features, mantled or otherwise, connected to hydrogeology in the project area have been found.

Three closed contour depressions were observed outside the project area: one to the north on the eastern side, one to the south on the western side, and one adjacent to the Parkway on the east bank of the Tennessee River. These depressions are described in more detail in the Geophysical Investigation Report; none are karst features (GEOServices 2024). The geophysical investigation also noted an area to the northwest of the project area that was experiencing extensive erosion. This is also not a karst feature, but it does create a slightly elevated risk of landslides north of the project area. Regardless, the landslide risk remains low (GEOServices 2024).

Trends and Planned Actions

Geological resources generally remain unchanged unless acted upon by an internal force like fault action or an external force like rainfall or surface runoff. Climate change is expected to increase precipitation intensity and variability, and increases in these factors are expected to lead to more severe floods that could increase the amount of soil washed away when the Tennessee River and/or its tributaries overtop their banks. Higher intensity and more frequent rainfall may lead to more soil erosion via surface runoff, which could expose the limestone bedrock to dissolution and form sinkholes, particularly in areas already characterized by closed depressions (USEPA 2016b; GEOServices 2023).

A previous action that impacted surface soils is the construction of the River Heritage Trail, a bicycle and pedestrian trail from River Heritage Park to the Patton Island Overlook. This trail is approximately 22 miles northwest of the project are and includes several overlook points on the Tennessee River. Creation of the trail and overlooks disturbed surface soil, temporarily increasing erosion and runoff in the project area. These impacts ended once the trail and any restoration activities were completed.

One planned action at the Parkway that could protect karst resources is the Colbert Ferry Gully Erosion Project. While funding for this project is unavailable at this time, if implemented, the action would improve conditions at two gully erosion sites at Colbert Ferry, preventing the formation of new sinkhole conduits into karstic bedrock.

Ongoing and future actions at the Parkway include bridge and roadway maintenance and repairs, corridor maintenance and repairs, hazard tree removal, forest management, and construction projects. Bridge and roadway maintenance and repair activities are conducted on an as-needed basis and include patching, repaving, and restriping roadway surfaces. The Parkway corridor is maintained with regular mowing during the growing season, and trimmers are used to keep vegetation low around signposts. In addition, hazard trees that are blown into the road by a storm are removed from the road and sometimes hauled away. These actions do not directly impact surface soils, but they use gas-powered equipment and/or equipment aided by hydraulic systems containing fluids that could indirectly impact surface soils via contamination related to spills. However, impacts from potential spills are expected to be minimal; the use of lawn mowers and leaf blowers is geographically dispersed, and the amount of gas and other fluids that this equipment uses is small.

Future construction projects in the immediate vicinity of Florence and Muscle Shoals include replacing a bridge over Ashe Boulevard in Sheffield, replacing a bridge over Highway 20 in Florence, and widening a road east of Florence (ALDOT 2023). Disturbances to surface soil and bedrock similar to those anticipated for Alternatives 1 and 2 could occur during these future bridge replacement activities, but at a magnitude corresponding to the size of the bridge being replaced at the time. The road widening work could include excavating and removing surface soils, placing road base materials, and completing the driving surface. The project could result in increased surface runoff into the surrounding areas and the introduction of road pollution to those areas. In addition, construction projects are subject to the same potential impacts from equipment spills.

As part of ongoing forest management efforts, the Parkway conducts prescribed burning in the forests on the south side of the Tennessee River Bridge. These controlled burns can benefit the soil, generally increasing the nutrient content to the benefit of the ecosystem (Francos and Úbeda 2021).

Environmental Consequences

This section analyzes the potential effects of the alternatives on geological resources. Geological resources analyzed include soils, bedrock, and the underlying karst system. Potential impacts on soil are analyzed quantitatively by calculating the acreage that each alternative would affect. Potential impacts on bedrock and the underlying karst system are qualitatively analyzed by assessing the extent, impact mechanism, and impact characteristics.

As described above in "Affected Environment," karst and karst-like features are defined as points where surface water may transition to and could potentially impact groundwater (GEOServices 2023). Locating and assessing these zones is critical because active domestic water wells draw water from the Tuscumbia Limestone aquifer. Furthermore, one of the largest springs in Alabama, nearby Tuscumbia Springs, discharges from the same aquifer that underlies this area of interest (GSA 2018).

As described above in "Affected Environment," the area of interest is characterized by subsurface drainage through karst systems. Dye trace studies conducted approximately 10 miles west of the project area indicate that the hydrogeology of the dye trace study area is interconnected with the underlying Tuscumbia Limestone aquifer. This dye trace study was not directly correlated with the project area, but because the project area is also underlain by Tuscumbia Limestone, the results suggest that future construction within the project area could affect the underlying karst systems and groundwater (GEOServices 2023).

Impacts on a karst system can be defined as:

- Direct disturbance to karst-like features and subsurface features associated with mantled karst.
- Increases in the rate and volume of stormwater runoff, which could increase the potential for sinkhole formation.
- Introduction of contaminants in polluted runoff from impervious surfaces (roads, parking, and bridges), soil erosion, and spills, which could pass rapidly from the surface into groundwater in karst terrain with little or no filtration or modification.

No-Action Alternative

Under the No-Action Alternative, no changes or improvements to the Tennessee River Bridge would occur. Therefore, there would be no impacts on geological resources associated with construction and demolition activities. Ongoing impacts to soils from erosion due to normal runoff and flooding events and weathering impacts to bedrock and karst features (including the Undisclosed Cave) would continue at current rates. Ongoing impacts associated with operation, maintenance, and repair of the existing bridge and roadway (e.g., potential accidental spills from construction vehicles or human error) would remain the same as under existing conditions. However, the frequency of emergency maintenance could increase over time as the bridge continues to deteriorate, resulting in an increased potential for the accidental contamination of surface soils. These impacts would be short term because immediate containment and cleanup of any spills would be conducted.

The bridge would eventually reach a state where it no longer meets safety requirements, and the NPS and FHWA would be required to close the bridge to vehicular traffic. Therefore, in approximately 10 to 20 years, this alternative would include the eventual removal and replacement of the existing bridge. Eventual removal of the bridge and replacement with a new bridge would result in actions and impacts to geological resources likely similar to those expected under the action alternatives.

Impacts Common to Both Action Alternatives

Soil

Construction activities could result in short-term, adverse impacts to soils. Clearing land for construction and preparing the staging area could disturb soils and may increase the quantity of runoff, enlarge existing drainage paths, and create new ones. The new and expanded paths could increase the rate of soil erosion, which could expose new bedrock surfaces to weathering. Excavation of soil could also create new paths for runoff and expose new bedrock surfaces to weathering. Erosion rates would remain elevated or continue to increase during construction due to soil disturbance from construction vehicles. Post-construction, erosion would decrease as disturbed areas are restored to their preconstruction state, eliminating the adverse impacts from construction.

Overall, impacts to soils under both action alternatives would be short term and adverse from increased runoff and soil erosion. These impacts would be mitigated by adhering to the resource protection measures listed in Appendix B, including minimizing soil disturbance; implementing erosion control measures; siting of staging and storage areas for construction vehicles, equipment, materials, and soils in previously disturbed or paved areas; and maintaining the existing cover.

Bedrock and Karst Systems

Construction activities could also result in permanent, adverse impacts to bedrock. Specific construction methods, such as pier installation and demolition or abandonment in place, or abutment construction, have not yet been identified. However, the construction/demolition equipment for these activities is limited to drilling equipment, jackhammers, hydraulic breakers and shears, saws, and bulldozers. These types of equipment would not generate vibration or percussive waves strong enough to impact rock outside the use area, so permanent, adverse impacts would be limited to rock removed as part of construction activities. Bedrock left in place would not be affected.

An increase in runoff across the surface could increase the rate of weathering in exposed bedrock that could expand the existing connections between the surface and subsurface and change the volume of water entering the karst system. The increased volume could result in permanent, adverse impacts to exposed bedrock from more frequent ponding and drainage, which could form a sinkhole through the repeated dissolution and removal of the dissolved rock. The increased volume could also result in permanent, adverse impacts the subsurface hydrology by wearing away bedrock and enlarging existing flow paths. If the open space in the subsurface grows too large and there is not enough support for the land surface, sudden collapse into a new open sinkhole could occur. A decrease in the volume could also result in permanent, adverse impacts by reducing the amount of water available to downgradient domestic wells that obtain drinking water from the Tuscumbia Limestone aquifer.

Impacts to bedrock and karst systems under both action alternatives could be short term and adverse or permanent and adverse. These impacts would be mitigated by adhering to the resource protection measures listed in Appendix B, including using construction techniques that minimize changes to natural karst processes; maintaining the predevelopment hydrology of the property to the maximum extent technically feasible; and developing a karst management plan specifying methods for protecting karst features from removal, replacement, and construction staging activities.

Alternative 1

Soil

Impacts to soils under Alternative 1 would be short term and adverse and would be similar to those described under “Impacts Common to Both Action Alternatives.” As indicated in Table 2, the total approximate area of disturbance is up to approximately 59 acres under Alternative 1. However, because the new bridge would be built partially on the existing alignment before skewing to a new alignment, less undisturbed land would be required for the construction. As stated in Table 1, the amount of land needed

to support the new roadway and ditch would vary between action alternatives based on the required amount of clearing, as well as the amount of excavation ("cut") or the addition of material ("fill"). Under Alternative 1, approximately 101 feet of land would need to be cleared and excavated; approximately one foot of cut-and-fill would be required at the roadway; and approximately three feet of excavation would be required for construction of the roadway ditch.

While the acreages of specific land types within the disturbance area under Alternative 1 (shown in Table 2) would be similar, the amount of construction required on these land types would vary. Under Alternative 1, approximately 50% of the project, or up to approximately 30 acres, would be constructed on newly disturbed area, and approximately 50%, or up to approximately 30 acres, would be constructed on previously disturbed area. Short-term, adverse impacts on soils from ground disturbance would also occur from construction of the drainage system extension, which would extend an additional 30 feet long.

As noted above, construction activities under Alternative 1 would occur for approximately five years, thus affecting the duration of soil impacts associated with project construction.

Bedrock and Karst Systems

Impacts to bedrock and the karst system under Alternative 1 could be permanent and adverse and would be similar to those described under "Impacts Common to Both Action Alternatives." As noted above, the methods for pier installation and demolition or abandonment in place have not yet been identified. However, construction/demolition equipment would be limited to tools that do not generate sufficient vibration or percussive waves to damage bedrock outside their area of use.

Construction of the new bridge abutment may require the removal of rock as part of cut-and-fill activities. The actual location and quantity of rock removal would be determined during the design phase. However, because the new bridge abutment and tie-ins would be constructed on newly disturbed land and the other abutment would be constructed on already disturbed land (where the current abutment exists), less than 1 foot of cut-and-fill would be required at the roadway, and an additional 3 feet would be required at the ditch locations.

The construction/demolition equipment used to remove rock would be the same as that used for pier removal. As discussed above, this equipment does not generate sufficient vibration or percussive waves to damage bedrock outside the area of use. Therefore, permanent, adverse impacts would be limited to rock removed as part of construction activities. Bedrock left in place would not be affected.

However, the increased weathering of exposed bedrock could result in permanent, adverse impacts to karst features. While no areas of exposed bedrock were observed during the geophysical investigations conducted at the site, 39 acres of Tuscumbia Limestone and 62 acres of Fort Payne Chert underlie the soil in the project area under Alternative 1 and could be impacted by runoff dissolution if the surface soil erodes.

These impacts would be mitigated by adhering to the resource protection measures listed in Appendix B, including using construction techniques that minimize changes to natural karst processes; maintaining the predevelopment hydrology of the property to the maximum extent technically feasible; and developing a karst management plan specifying methods for protecting karst features from removal, replacement, and construction staging activities.

Alternative 2

Soil

Impacts to soils under Alternative 2 would be short term and adverse and would be similar to those described under "Impacts Common to Both Action Alternatives." As indicated in Table 2, the total amount of disturbed area is up to approximately 60 acres under Alternative 2. However, because the new bridge would be constructed on a new alignment south of the existing bridge, two new tie-ins would be

constructed on previously undisturbed land. As stated in Table 1, the amount of land needed to support the new roadway and ditch would vary between action alternatives based on the required amount of clearing. as well as the amount of excavation ("cut") or the addition of material ("fill"). Under Alternative 2, approximately 295 feet of land (width) would need to be cleared and excavated; approximately 16 feet of cut-and-fill would be required at the roadway; and approximately 25 feet of excavation would be required for construction of the roadway ditch.

While the acreages of specific land types within the disturbance area under Alternative 2 (shown in Table 2) would be similar, the amount of construction required on these land types would vary. Under Alternative 2, approximately 90%, or up to approximately 54 acres, would be constructed on previously undisturbed area, and approximately 10%, or up to approximately 6 acres, would be constructed on previously disturbed area. Short-term, adverse impacts on soils from ground disturbance would also occur from construction of the drainage system extension, which would extend an additional 180 feet long.

Construction activities under Alternative 2 would also occur for approximately six years, thus affecting the duration of soil impacts associated with project construction.

Bedrock and Karst Systems

Impacts to bedrock and the karst system under Alternative 2 are expected to be similar to those described for Alternative 1. However, under Alternative 2, both bridge abutments and tie-ins would be constructed on undisturbed land. These impacts would be mitigated by adhering to the resource protection measures listed in Appendix B and described above.

Cumulative Impacts

Past, ongoing, and reasonably foreseeable actions are described above in the "Trends and Planned Actions" section and in Appendix D. The described actions would have no direct impacts on geological resources. Under the No-Action Alternative, short-term, adverse impacts to soils would occur from the normal rates of runoff and erosion.

Under Alternative 1, short-term, adverse impacts to soils would occur from runoff and erosion during construction. Permanent, adverse impacts to bedrock and karst systems due to weathering are possible but would be prevented to the maximum extent technically feasible. Under Alternative 2, short-term, adverse impacts to soils would occur from runoff and erosion during construction. Permanent, adverse impacts to bedrock due to percussive hammers and/or pile driving equipment and other high-impact techniques are possible but would be prevented to the maximum extent technically feasible. Similar to the No-Action Alternative and Alternative 1, permanent, adverse impacts to bedrock and karst systems due to weathering are possible but would be prevented to the maximum extent technically feasible. A measurable difference in the contribution of Alternative 2 to the overall cumulative impact compared to Alternative 1 is possible based on the larger area of disturbance and longer construction duration under Alternative 2.

Conclusion

Under both action alternatives, bridge demolition and construction would have short- and long-term, adverse impacts on soil and bedrock. The potential impact to surface soil would be increased erosion produced by elevated quantities of surface runoff and disturbance from more frequent vehicle traffic. However, these impacts would be mitigated to avoid increasing erosion beyond current levels.

No impacts to bedrock would occur from the construction/demolition of bridge support piers because the construction equipment would be limited to tools that do not produce percussive or vibratory waves of sufficient strength to damage the rock matrix. However, impacts on bedrock removed during cut-and-fill activities required for abutment and tie-in construction would be long term and adverse because they would be permanent, while bedrock left in place would not be affected because the construction equipment would be limited to tools that do not produce percussive or vibratory waves of sufficient strength to damage the rock matrix.

Finally, potential permanent, adverse impacts to karst features could be the creation of new surface to subsurface connections driven by the exposure of bedrock surfaces through soil erosion and the dissolution of the exposed rock by surface runoff. Once underground, the additional volume could cause the alteration of subsurface flow paths. Erosion and surface runoff would be mitigated to maintain the current levels of soil erosion, surface runoff, and rock dissolution at current levels.

Adverse impacts to soils and rock would be greater under Alternative 2 than Alternative 1 because of the amount of new land that would be disturbed during construction, as well as the amount of land needed for clearing and cut-and-fill to support the new roadway and ditch. Under Alternative 2, up to approximately 54 acres of new land would be disturbed by construction, while up to approximately 30 acres of new land would be disturbed under Alternative 1. In terms of cut-and-fill, Alternative 1 would require less than 1 foot of cut-and-fill at the roadway and an additional 3 feet along the ditch. In contrast, Alternative 2 would require more cut-and-fill at the roadway and the ditch (16 feet and 25 feet, respectively). Alternative 2 would also require an additional 240 days to construct than Alternative 1, increasing the duration of soil impacts associated with project construction. Overall impacts to soils, geology, and karst features under both action alternatives would not create any perceptible changes in these resources, and their functioning would remain unchanged over the long term.

NATURAL SOUNDSCAPES

Affected Environment

The acoustic environment plays an important role in wildlife communications, behavior, and other ecological processes. Section 4.9 of *Management Policies 2006* directs the NPS to preserve a park's natural soundscape and acoustic environment, which refers to the combination of all the natural sounds, the physical capacity of transmitting those natural sounds, and the interrelationship among the natural sounds of different frequencies and volumes. An intact natural soundscape allows for the intrinsic functioning of wildlife communications and enhances the visitor experience.

A detailed Soundscape Study Report was completed that assessed the existing ambient soundscape and analyzed future impacts for Alternatives 1 and 2 (WSP 2024a). The project corridor is located along the Natchez Trace Parkway and includes 54,000 acres of forested area. The corridor is a recreational road and scenic drive that serves Parkway visitors, permitted commercial users, and local commuter and non-commuter traffic. Although non-permitted commercial users are not supposed to use the Parkway, this use occasionally occurs.

NPS's Natural Sounds and Night Skies Division conducted a baseline acoustic monitoring study near a visitor area in the project corridor in May 2021. The study revealed the primary sources of anthropogenic sounds to be roadway vehicles and aircraft. The hourly time audible for noise indicates the percentage of the hour in which noise, typically sourced from human-generated sources, can be heard. When averaging the hourly time audible for noise across all hours of the day, the sound source analysis revealed that human-generated sounds were heard for 77.1% of the day, while the remaining 22.9% of the day was at a noise-free interval or times without noise. Times without noise are referred to as "natural ambient" and this measure is used to describe the no-noise condition or the period of time when no-noise is present and only natural sounds exist.

The NPS measures three different sound levels when conducting a noise analysis:

- The overall sound level is the combination of the human-generated and natural sounds measured over a duration of time.
- The median natural ambient sound level is the sound level that exists in the absence of human-generated noise.

- The median existing ambient sound level is the median decibel reading that exceeds 50% of the median natural ambient sound level over a measured duration of time.

Ambient sounds tend to fluctuate due to traffic, aircraft flybys, or other influences. The comparison of these three sound levels helps to provide a mid-point of the measurement representing the fluctuating sound level.

The overall sound level in the study area, over the course of one day (a 24-hour time period), was 50 decibels (dBA)[5] for daytime and 46 dBA for nighttime, which is considered to be a moderate sound level and can be compared to the sound of moderate rainfall. The median existing ambient level was 42 dBA for daytime and 35 dBA for nighttime, which is considered a soft sound level and can be compared to the sound of a quiet library or soft whispers. The median natural ambient level was 34 dBA for daytime and 31 dBA for nighttime, which also considered to be a soft sound level (Decibel Pro n.d.). These sound levels are used as criteria for predicted noise impacts according to Section 8.2.3 of NPS *Management Policies 2006*.

The Soundscape Study Report (Appendix F) includes an impact assessment at sensitive noise receptors, including the following locations:

- R1: Colbert Ferry overlook
- R2: Colbert Ferry visitor contact station
- R3: Colbert Ferry ramp and picnic area
- R4: The Undisclosed Cave entrance (includes a bat gate)
- R5: Southeast parking area

Figure 11 shows the location of the noise-sensitive receptors throughout the project corridor. The Undisclosed Cave is located southwest of the Tennessee River Bridge and is inhabited by multiple bat species. The cave is an important ethnographic and cultural resource and is a protected geological resource under the Federal Cave Resource Protection Act of 1988, which categorizes it as a noise-sensitive receptor.

Trends and Planned Actions

Alabama Department of Transportation (ALDOT) traffic data for the area indicate that average daily vehicle traffic along the Tennessee River Bridge will increase from 1,451 in 2019 to 1,668 in 2045, a 15% increase over 15 years (Appendix G). Assuming the same vehicle mix (the ratio of passenger vehicles, medium trucks, heavy trucks, and buses), the preliminary assessment of the noise increment would be around 1 dBA compared to existing conditions, a sound increment that is imperceptible to the human ear. As part of planned actions, the NPS and FHWA are likely to explore traffic noise control options such as quiet pavement types and noise barriers to reduce the potential impacts. Future traffic impacts are predicted using forecasted peak hour vehicle volumes and vehicle mix for 2045 weekday conditions.

Other ongoing actions at the Parkway include bridge and roadway maintenance and repairs, grass mowing, and hazard tree removal. Bridge and roadway maintenance and repair activities are conducted on an as-needed basis and include patching, repaving, and restriping roadway surfaces. The Parkway corridor is maintained with regular mowing during the growing season.

[5] A-weighting is an adjustment applied to sound levels to reflect how a sound is perceived by the human ear. To approximate human hearing sensitivity, A-weighting discounts sounds below 1 kilohertz and above 6 kilohertz.

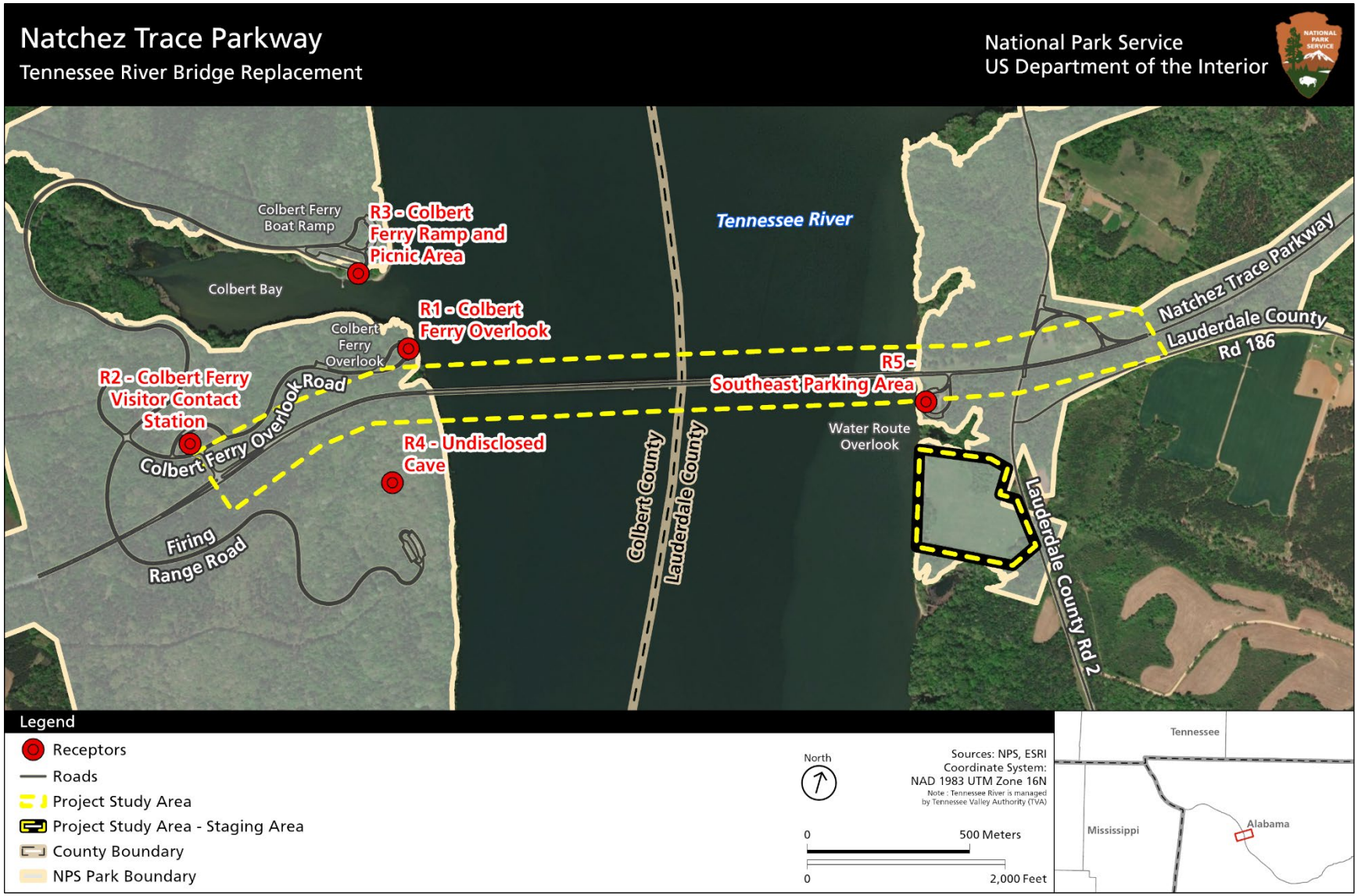


FIGURE 11. NOISE RECEPTORS NEAR THE PROJECT AREA

Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, construction would not occur, but traffic volumes and noise disturbances are expected to increase from the ongoing deterioration and subsequent maintenance of the bridge. The measured daytime sound levels are assumed to represent the sound levels for the No-Action Alternative. Therefore, the No-Action Alternative would have no impact on the existing acoustic environment. The NPS would continue to perform routine maintenance of the Tennessee River Bridge to ensure access. Bridge deterioration may necessitate load limits, which would prevent some vehicles from accessing the bridge. The bridge would eventually reach a state where it no longer meets bridge safety requirements, and the NPS and FHWA would be required to close the bridge to vehicular traffic. Therefore, in approximately 10 to 20 years, this alternative would include the removal and replacement of the bridge once these conditions have occurred. Removal of the bridge and replacement with a new bridge would result in actions and impacts to natural soundscapes likely similar to those expected under the action alternatives.

Impacts Common to Both Action Alternatives

Under both action alternatives, resource protection measures would be implemented to reduce the adverse impacts of noise during construction. Commercial shipping occurs along the navigable central portion of the river. However, because changes to the ships' noise levels or locations of barge traffic are not anticipated, noise from river navigation is not considered in this EA. The navigable channel would remain in the same location, and barge traffic would continue along the same route during and after construction of the new bridge. Barges that would be used specifically for construction work are considered in the construction noise assessment.

Alternative 1

Wildlife

The amount of information available for assessing the effects of noise on wildlife is not as extensive as the information available for humans (Shannon et al. 2016). It was previously accepted that an overall noise level guideline of 60 dBA for continuous noise was considered an appropriate level to limit sound masking for wildlife (Caltrans 2016). To the human ear, this 60-dBA threshold would be similar to hearing the sound of a normal conversation (Decibel Pro n.d.). More recent studies have documented functional responses in terrestrial wildlife starting at an overall sound level of 40 dBA (Shannon et al. 2016; NPS 2020). Disturbance thresholds vary by species, especially among birds (Patón et al. 2012). The effects of noise on aquatic bivalves have not been studied extensively; however, a recent study found that a marine mussel species responded to underwater noise in a laboratory setting by closing its valves during exposure. The response decreased with repeated exposure (Hubert et al. 2022).

The demolition and replacement of the Tennessee River Bridge would generate several changes to the acoustic environment during its construction. For Alternative 1, the anticipated duration of construction is approximately five years, and the predicted construction noise impacts would exceed both the measured daytime median existing ambient sound level and the median natural ambient sound level. The major noise-generating activities include demolition of the existing bridge and construction of the bridge foundations and superstructure. These activities are predicted to generate overall sound level noise impacts in the range of 53 to 74 dBA at the sensitive receptors. The maximum impact predicted at the Undisclosed Cave entrance would be an overall sound level of 74 dBA during the bridge foundation phase. These levels are well above the measured overall sound level and median natural ambient sound level in the project corridor and would have short-term, adverse impacts on the soundscape of the project area. These overall sound levels could result in long-term, adverse impacts on wildlife in the project area from the exceedance of the 40 dBA sound level threshold for noise-induced responses to terrestrial

wildlife. Potential impacts to wildlife are discussed under the "Wildlife, Including Threatened and Endangered Species" section. However, Alternative 1 would be physically farther from the Undisclosed Cave and the forested area to the southwest side of the bridge, resulting in lower noise impacts on wildlife, primarily bats, other mammals, and birds.

Under Alternative 1, peak hour future traffic median existing ambient sound levels are predicted in the range of 39 to 48 dBA at the sensitive receptors and are expected to reach a peak median existing ambient sound level of 48 dBA in daytime at the southeast parking area (R5). These noise levels are predicted to exceed the median existing ambient sound level at all receptors except for the Colbert boat ramp and picnic area (R3) during the daytime. Traffic noise impacts are predicted to exceed the median natural ambient sound level at all receptors. The peak impact, predicted at the southeast parking area (R5) would be a median existing ambient sound level of 48 dBA. The NPS would consider using FHWA's Activity Category A to set a threshold for noise impacts in the project area (FHWA 2017). According to FHWA, Activity Category A is considered for "lands on which serenity and quiet are of extraordinary significance." The overall sound levels for peak hour traffic are predicted in the range of 38 to 59 dBA, which exceed the FHWA outdoor noise abatement criteria of an overall sound level of 56 dBA and could affect wildlife. Under Alternative 1, peak hour traffic noise impacts are predicted to exceed measured median existing ambient nighttime sound levels of 35 dBA by a maximum of 7 dBA; however, this is a conservative prediction because traffic at night is not expected to be at peak levels. Because of this, noise impacts are likely to be minimal and would not result in long-term, adverse impacts to the soundscape of the project area.

Maximum construction impacts are predicted to be above an overall sound level of 70 dBA and would cause adverse impacts on wildlife in the vicinity of the construction zone. Startle responses in wildlife could be induced, and animals could be displaced from the area in both the short term and long term because 40 dBA is the sound level threshold for noise-induced responses to terrestrial wildlife. It is difficult to predict potential impacts on freshwater mussels based on the limited available research; however, noise could disrupt filter feeding during construction activities.

The Soundscape Study Report findings indicate that future traffic median existing ambient sound levels are expected to reach a peak level of 48 dBA for Alternative 1 in daytime at the closest receptor to the bridge, the southeast parking area (R5). Overall sound levels at the Undisclosed Cave entrance are predicted to be between 59 and 74 dBA when construction equipment is operational. Operational peak hour traffic maximum sound levels are predicted to be 45 dBA at the Undisclosed Cave. Potential impacts to bats and other wildlife are discussed under "Wildlife, Including Threatened and Endangered Species." Future 2045 road overall sound levels are predicted to exceed 44 dBA for Alternative 1.

Visitor Experience

The demolition and replacement of the Tennessee River Bridge would generate several changes to the acoustic environment during its construction. For Alternative 1, the anticipated duration of construction is approximately five years, and the predicted construction noise impacts would exceed both the measured daytime median existing ambient sound level and the median natural ambient sound level. The major noise-generating activities include demolition of the existing bridge, and construction of the bridge foundations and superstructure.

Construction noise for Alternative 1 is predicted to generate noise impacts in the overall sound level range of 53 to 74 dBA at the sensitive receptors and would result in noticeable noise increments that could interrupt visitor activities. The FHWA outdoor noise abatement criteria for "lands on which serenity and quiet are of extraordinary significance" is an overall sound level of 56 dBA (FHWA 2017). The predicted range for construction noise would result in noise impacts well above the measured overall sound level and the median natural ambient sound level in the project corridor. The effects of these impacts may include speech interference in the vicinity of the construction equipment and audible construction noise at

a considerable distance that would result in short-term, adverse impacts on the soundscape of the project area.

As indicated above, peak hour future traffic noise levels for Alternative 1 are predicted in the median existing ambient sound level range of 39 to 48 dBA at the sensitive receptors and are expected to reach a peak median existing ambient sound level of 48 dBA in daytime at the southeast parking area (R5). These levels are well below the speech interference overall sound level threshold of 52 dBA. Traffic noise is not expected to adversely affect the ability for hikers or visitors to speak at normal conversational volumes near the Parkway but could affect their ability to hear natural sounds or natural quietness, which many visitors expect to experience when visiting NPS park units. In general, a change in 3 dBA is the minimum difference in level that is perceived by a human being. Therefore, visitors are unlikely to perceive the difference of 1 dBA[6] in future traffic noise levels for Alternative 1.

Alternative 2

Wildlife

For Alternative 2, the anticipated duration of construction is approximately six years, and the predicted construction noise impacts would exceed both the measured daytime median existing ambient sound level and the median natural ambient sound level. These construction activities are predicted to generate noise impacts in the range of 41 to 76 dBA at the sensitive receptors. The maximum impact predicted at the Colbert Ferry overlook (R1) would be 76 dBA during the bridge foundation phase. Along with major activities of construction (i.e., foundation and superstructure construction and demolition of the existing bridge), Alternative 2 would also require extensive clearing of forested land in the southwest portion of the project area for a new roadway alignment, closer to the Undisclosed Cave. Alternative 2 would require more tree removal with a commensurate use of chainsaws and associated equipment, and construction activities would be physically closer to the Undisclosed Cave and the forested area to the southwest side of the bridge, resulting in higher noise impacts on wildlife. These activities would result in short-term, adverse impacts on the soundscape of the project area. However, land clearing would reduce natural noise barriers and further increase the range of potential noise impacts that could continue over the long term.

Future peak hour traffic operational noise impacts for Alternative 2 are predicted to be similar to those for Alternative 1, in the median existing ambient sound level range of 38 to 47 dBA, with a difference of approximately 1 dBA. This 1 dBA difference is due to the horizontal difference between the two alternatives. These noise levels would exceed the median existing ambient daytime and nighttime sound levels at all receptors except for the Colbert boat ramp and picnic area (R3) during daytime. Traffic noise impacts are predicted to exceed the median natural ambient sound level at all receptors. The peak impact predicted at the southeast parking area (R5) for Alternative 2 would be a median existing ambient sound level of 47 dBA, which would exceed the measured median existing ambient sound level and median natural ambient sound level for both daytime and nighttime. The overall sound levels for peak hour traffic are predicted in the range of 37 to 59 dBA. The FHWA noise abatement criteria for “lands of which serenity and quiet are of extraordinary importance” is an overall sound level of 56 dBA (FHWA 2017). The overall sound levels for peak hour traffic for Alternative 2 are expected to exceed the FHWA outdoor noise abatement criteria; however, noise impacts are not likely to result in long-term, adverse impacts to the soundscape of the project area.

Maximum construction impacts are predicted to be above an overall sound level of 76 dBA and would cause adverse impacts on wildlife in the vicinity of the construction zone. Startle responses in wildlife

[6] The overall sound level threshold of 52 dBA minus the upper median existing ambient sound level range of 48 dBA equals 4 dBA. A change of 3 dBA is the minimum difference perceived by a human being. The remaining 1 dBA is unlikely to be perceived by a human being.

could be induced, and animals could be displaced from the area throughout the construction period. Construction noise could disrupt filter feeding in freshwater mussels. Noise levels at the Undisclosed Cave entrance are predicted to reach a maximum of 74 dBA during construction and an operational peak hour traffic maximum of 45 dBA. Potential impacts to wildlife are discussed below under "Wildlife, Including Threatened and Endangered Species."

The Soundscape Study Report findings indicate that peak hour future traffic noise levels are expected to reach a peak median existing ambient sound level of 47 dBA for Alternative 2 in daytime at the southeast parking area (R5). These levels are expected to exceed the overall 40 dBA sound level threshold for noise-induced responses to terrestrial wildlife, except for the Colbert Ferry ramp and picnic area (R3).

Visitor Experience

For Alternative 2, the anticipated duration of construction is approximately six years, and the predicted construction noise impacts would exceed both the measured daytime median existing ambient sound level and the median natural ambient sound level. These construction activities are predicted to generate noise impacts in the range of 41 to 76 dBA at the receptors. The maximum impact predicted at the Colbert Ferry overlook (R1) would be 76 dBA during the bridge foundation phase. Along with major activities of construction (i.e., foundations and superstructure construction and demolition of the existing bridge), Alternative 2 would also require clearance of up to approximately 8 acres of forested land in the southwest portion of the project area for a new roadway alignment, closer to the Undisclosed Cave. These activities would result in long-term, adverse impacts on the soundscape of the project area.

Construction noise for Alternative 2 would result in noise increments that can be categorized as long-term, adverse impacts on the visitor experience. These activities are predicted to generate noise impacts in the overall sound level range of 41 to 76 dBA at the sensitive receptors. As noted above, the FHWA noise abatement criteria for "lands of which serenity and quiet are of extraordinary importance" is an overall sound level of 56 dBA (FHWA 2017). The predicted range would result in noise impacts well above the measured overall sound level and the median natural ambient sound level in the project corridor. The effects of these impacts may include speech interference in the vicinity of the construction equipment and audible construction noise at a considerable distance.

For Alternative 2, peak hour future traffic noise levels are predicted in the median existing ambient sound level range of 38 to 47 dBA at the sensitive receptors and are expected to reach a peak median existing ambient sound level of 47 dBA in daytime at the southeast parking area (R5). These levels are well below the speech interference overall sound level threshold of 52 dBA. Traffic noise is not expected to adversely affect the ability for hikers or visitors to speak at normal conversational volumes near the Parkway; however, noise levels are predicted to exceed the 40 dBA sound level threshold for noise-induced responses to terrestrial wildlife and could affect visitors' ability to hear natural sounds or natural quietness, which many visitors expect to experience when visiting NPS park units. In general, a change in 3 dBA is the minimum difference in level that is perceived by a human being. Therefore, visitors are unlikely to perceive the difference of 2 dBA[7] in future traffic noise levels for Alternative 2.

Cumulative Impacts

The impacts of past, ongoing, and reasonably foreseeable planned actions are included in the "Trends and Planned Actions" section above and described in Appendix D. Past, ongoing, and reasonably foreseeable actions include bridge and roadway maintenance, repairs, and hazard tree removal on an as-needed basis, including patching, repaving, and restriping roadway surfaces. The Parkway is also maintained with regular mowing during the growing season. As mentioned in the "Environmental Justice" section of

[7] The overall sound level threshold of 52 dBA minus the upper median existing ambient sound level range of 47 dBA equals 5 dBA. A change of 3 dBA is the minimum difference perceived by a human being. The remaining 2 dBA is unlikely to be perceived by a human being.

Chapter 3, average daily vehicle traffic along the Tennessee River Bridge would increase from 1,451 in 2019 to 1,668 in 2045, a 15% increase over 15 years (Appendix G). Assuming no changes to the current vehicle mix (the ratio of passenger cars, medium trucks, heavy trucks, and buses), the future noise increment is expected to be around 1 dBA in the project area.

Under the No-Action Alternative, short-term, adverse impacts to the existing soundscape would occur during the eventual bridge construction. The 1-dBA increment in future sound level for the No-Action Alternative would result in an overall minimal cumulative impact on visitor experience and on wildlife in the project corridor.

Under both Alternatives 1 and 2, short-term, adverse impacts to the existing soundscape would occur during construction; however, when combined with the effects of past, ongoing, and reasonably foreseeable actions, both action alternatives would contribute a slight adverse increment to the overall adverse cumulative impact on natural soundscapes.

Conclusion

Under the No-Action Alternative, the bridge would continue to operate under current conditions. However, the NPS would continue to perform routine maintenance and repairs of the Tennessee River Bridge, which would adversely affect the existing acoustic environment in the short term. When eventual bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.

Under Alternative 1, impacts to wildlife, including a startle response, would occur as a result of increased sound during construction. Noise levels may also affect some species of birds and could disrupt filter feeding of mussels. Impacts to bats are expected to be minimal—modeled noise levels at the Undisclosed Cave entrance are low, and these noise levels decrease farther within the cave. Under Alternative 2, these impacts would be similar. Therefore, under both alternatives, impacts on wildlife species from noise would likely result in long-term, adverse impacts. Additional potential impacts to bats and other wildlife are discussed under "Wildlife, Including Threatened and Endangered Species."

Related to visitor use, under Alternative 1, construction would generate noise that would result in noticeable noise increments that could interrupt visitor experience activities. These impacts would be short term and adverse. Under Alternative 2, impacts would be slightly greater than under Alternative 1 because of additional tree clearing and construction activities closer to the Undisclosed Cave, but these impacts would still be short term and adverse during construction.

Under Alternative 1, noise from operation would exceed the 40 dBA noise level threshold for noise-induced responses to terrestrial wildlife and could affect visitors' ability to hear natural sounds or natural quietness near the Parkway. Visitors are unlikely to perceive the difference of 1 dBA in future traffic noise levels for Alternative 1; however, overall noise levels are predicted to increase, resulting in long-term, adverse impacts to the soundscape of the project area after construction and during operation. Under Alternative 2, impacts would be similar to those described for Alternative 1 due to similar operating conditions.

Both action alternatives would contribute a slight adverse increment to the overall adverse cumulative impact on natural soundscapes.

WILDLIFE, INCLUDING THREATENED AND ENDANGERED SPECIES

Affected Environment

This section describes existing conditions for threatened and endangered species and discusses general wildlife that are likely to occur in the project area.

Threatened and Endangered Species

Federally listed species are those species listed as endangered or threatened under the Endangered Species Act (ESA). For the purposes of the following discussion, federally listed species also include species that are candidates or have been proposed for listing under the ESA. Alabama does not have a state law equivalent to the ESA, so species do not have regulatory protection as state endangered or threatened species. However, some species receive state-level protection through other state regulatory mechanisms. Additionally, Alabama's State Wildlife Action Plan ranks species based on conservation need (ANHP 2022).

The project area provides suitable habitat for federally listed and state-protected or ranked species, including bats and freshwater mussels. Habitats in the project area consist of upland forests, riverine habitat, riparian and floodplain habitats, and grassland (agricultural lease). Federally listed and state-protected or ranked species that could occur in the project area are shown in Table 7. Species habitat preferences and occurrence in the project area are discussed in the sections that follow. The project area does not contain critical habitat for any federally listed species.

TABLE 7. FEDERALLY LISTED AND STATE-PROTECTED OR RANKED SPECIES POTENTIALLY OCCURRING IN THE PROJECT AREA

Species	Federal Status	State Status	State Rank
Bats			
Indiana Bat (*Myotis sodalis*)	Endangered	State Protected	S2
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened	State Protected	S2
Gray Bat (*Myotis grisescens*)	Endangered	State Protected	S2
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	–	S3
Little brown bat (*Myotis lucifugus*)	Under Review	State Protected	S3
Freshwater Mussels			
Dromedary Pearlymussel (*Dromus dromas*)	Endangered	State Protected	SX
Pink Mucket (*Lampsilis abrupta*)	Endangered	State Protected	S1
Rough Pigtoe (*Pleurobema plenum*)	Endangered	State Protected	S1
Rock Pocketbook (*Arcidens confragosus*)	–	PSM	S3
Pocketbook (*Lampsilis ovata*)	–	PSM	S2
Black Sandshell (*Ligumia recta*)	–	PSM	S2
Ohio Pigtoe (*Pleurobema cordatum*)	–	PSM	S2
Pink Papershell (*Potamilus ohiensis*)	–	PSM	S3
Kidneyshell (*Ptychobranchus fasciolaris*)	–	PSM	S2
Purple Lilliput (*Toxolasma lividum*)	–	PSM	S2
Lilliput (*Toxolasma parvum*)	–	PSM	S3
Fawnsfoot (*Truncilla donaciformis*)	–	PSM	S3

Species	Federal Status	State Status	State Rank
Deertoe (*Truncilla truncata*)	–	PSM	S1
Butterflies			
Monarch Butterfly (*Danaus plexippus*)	Candidate	–	–

Source: USFWS 2023a; ANHP 2022
Notes: State Protected – Species protected by Regulation 220-2-.92 (Nongame Species Regulation).
Partial Status Mussels (PSM) – All mussel species not listed as a protected species under the Invertebrate Species Regulation are partially protected by other regulations of the Alabama Game, Fish, and Fur Bearing Animals Regulations. Regulation 220-2-.104 prohibits the commercial harvest of all but the 11 mussel species for which commercial harvest is legal. Regulation 220-2-.52 prohibits the take, capture, kill, or attempt to take, capture, or kill of any freshwater mussel from Wheeler Lake from Guntersville Dam downstream to the mouth of Shoal Creek and from the upstream end or head of Hobbs Island downstream to Whitesburg Bridge, Pickwick Lake from Wilson Dam downstream to the upper end or head of Seven Mile Island, Wilson Lake from Wheeler Dam downstream to the mouth of Town Creek on the south bank and the mouth of Bluewater Creek on the north bank, and the Cahaba River.
State Rank Definitions – S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S5 = Secure; SX = Presumed Extirpated

Bats

Woodland, riparian, and grassland habitats in the project area provide roosting and foraging opportunities for bats. Surveys were conducted in portions the project area in August 2022 to determine the presence or absence of bat species during a four-day timeframe. Surveys were conducted at two sites using mist net capture techniques. The field surveys also characterized potential bat habitat and qualitatively assessed the overall suitability of bat habitat in the project area. The project area was found to contain suitable bat habitat including potential roost trees, aquatic resources, flight corridors, and feeding areas. Forests in the project area consist of mid-successional, moderately mesic sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), American elm (*Ulmus americana*), boxelder (*Acer negundo*), shortleaf pine (*Pinus echinata*), and mixed forest communities. Summer roosting habitat in the project area was generally observed to be of moderate quality. Early to mid-successional trees species displaying cavities or trees displaying sloughing bark were also observed in the project area. Feeding areas including canopy gaps, open fields, herbaceous fields, and stream corridors occur within or near the project area. Trails, roads, and forest openings in the project area provide travel corridors for bats (AllStar 2022).

An Undisclosed Cave within the Parkway is known to provide winter habitat for some bat species. Two entrances to the Undisclosed Cave are located nearby but outside the project area (approximately 0.1 miles south). The cave was historically a maternity colony habitat for gray bats, but none have been observed since the early 2000s (AllStar 2022). The NPS recently installed a cave gate to prevent human trespassing in the Undisclosed Cave and disturbing the cave ecosystem, while allowing bats to enter and exit freely (Figure 12). As part of the 2022 summer bat surveys, acoustic monitoring was conducted near the two Undisclosed Cave entrances to identify bats that may be emerging from during evening hours (AllStar 2022). No federally listed species were detected during this summer survey. For the past 10 years, NPS staff have intermittently conducted winter surveys in this cave and have regularly documented roosting tricolored bats. In winter of 2022, NPS and US Fish and Wildlife Service (USFWS) biologists observed two tricolored bats, one of which appeared to be infected with white-nose syndrome (WNS), a fungal disease caused by the bacteria *Pseudogymnoascus destructans* that has resulted in severe declines in some North American bat populations. This was the first time NPS staff observed a bat with WNS in the Undisclosed Cave (NPS 2023a). The presence of tricolored bat in the project area is discussed in greater detail below.

FIGURE 12. GATED ENTRANCES TO THE UNDISCLOSED CAVE

Currently, rocky cliffs near the project area are known to provide roosting habitat for eastern small-footed bat (*Myotis leibii*) and big brown bat (*Eptesicus fuscus*). Maternity colonies of big brown bats have been discovered in the expansion joints of the Tennessee River Bridge in recent years (AllStar 2022). Neither of these species are federally listed or state-protected or ranked.

Mist net and acoustic monitoring surveys confirmed the presence of four species of bats (eastern small-footed bat, big brown bat, eastern red bat [*Lasiurus borealis*], and evening bat [*Nycticeius humeralis*]) but did not detect any federally listed or state-protected or ranked species. The survey report concludes that Indiana bat and northern long-eared bat are likely absent from the project area. Similarly, the report concludes that the lack of any recorded emergence of gray bats from the Undisclosed Cave in recent decades suggests that the cave is not currently used as maternity habitat (AllStar 2022). However, discussions between the NPS and USFWS revealed that USFWS still considers the Undisclosed Cave to be maternity habitat for gray bat and considers the species to be potentially present (USFWS, Rowell, pers. comm. 2024). The survey report was transmitted to USFWS on September 20, 2022.

Some species of North American bats have experienced severe population declines because of WNS, a fungal disease that is highly contagious among many bat species. WNS is considered the main driver of population decline and is the major ongoing threat to all the federally listed bats potentially occurring in the project area except gray bat, which appears to be less susceptible to the disease than other species (USFWS 2023b). WNS was first confirmed in Lauderdale County in 2011 and was confirmed in Colbert County shortly thereafter in 2014 (WNS Response Team 2023). Although no bats in flight were observed with WNS, Parkway biologists have confirmed the presence of the disease by observing roosting bats infected with WNS within the Undisclosed Cave (NPS 2023a). A summary of habitat preferences and potential occurrence in the project area is provided below for each federally listed species.

Indiana Bat – During winter, large colonies of Indiana bats hibernate in caves or abandoned mines known as hibernacula. During spring staging and fall swarming, Indiana bats tend to remain within 5 to 10 miles of the hibernaculum. USFWS and the Alabama Ecological Services Field Office report that 10 caves in Alabama are known or believed to harbor Indiana bat winter populations, including one in Lauderdale County (USFWS 2023c). However, no known hibernacula are within the immediate vicinity of the project area. In summer, Indiana bats roost under the loose bark of dead or dying trees greater than 5 inches diameter or in trees with loose or exfoliating bark (such as shagbark hickory [*Carya ovata*]), cracks, crevices, or hollows (USFWS 2007).

As of 2019, USFWS estimated the total Indiana bat population in Alabama at approximately 90 individuals (USFWS 2019). This species has not been previously reported at the Parkway (NPS

2023b). USFWS analyses (2018a) also suggest that Indiana bats avoid roosting along roads; indicating that only 2% of Indiana bat primary roosts were within 100 feet of a road. The location of the project area adjacent to a major roadway further suggests that the project area does not likely provide suitable habitat for Indiana bat, and the lack of detections during 2022 bat surveys suggests the probable absence of Indiana bat within the project area during summer.

Northern Long-eared Bat – Northern long-eared bats have a similar life history and habitat requirements as Indiana bats. Like Indiana bats, northern long-eared bats hibernate in caves or mines during winter and migrate to roosting habitats during spring. This species was discovered for the first time in southern Mississippi roosting in culverts and under a bridge along the Parkway; however, no known hibernacula are located nearby. Additionally, the lack of detections during 2022 bat surveys suggests probable absence of northern long-eared bat within the project area during summer.

Gray Bat – Gray bat is a cave-obligate species, meaning that the species inhabits caves or cave-like structures year-round. The species occupies cold hibernating caves or mines in winter and warmer caves during summer (USFWS 2009). It is estimated that more than 95% of the species range-wide population hibernate in only 15 caves (USFWS 2023b). While gray bats prefer caves, summer colonies have been documented using dams, mines, quarries, concrete box culverts, and the undersides of bridges. As noted above, the Undisclosed Cave is still recognized as maternity colony habitat for gray bats, but none have been confirmed residing in the cave for approximately 20 years (NPS 2023a).

Tricolored Bat – During the spring, summer, and fall, tricolored bats primarily roost among live and dead leaf clusters of live or recently dead deciduous hardwood trees, rather than snags (USFWS 2021a); they roost in caves in winter.

The lack of detections during 2022 bat surveys suggests the probable absence of tricolored bat within the project area during summer. As noted above, the NPS regularly conducts winter surveys at the Undisclosed Cave and usually identifies several individual tricolored bats. NPS biologists observed two tricolored bats during the most recent survey in winter 2022 (NPS 2023a). Therefore, tricolored bat is known to be present in the Undisclosed Cave during winter. As a result, USFWS considers the Undisclosed Cave a hibernaculum (USFWS, Rowell, pers. comm. 2024). Because tricolored bats use the Undisclosed Cave for winter hibernation, the species could be present during fall swarming (usually September 1–November 15) and spring staging (usually March 15–April 30) and are considered present within a 3-mile radius of the Undisclosed Cave during fall swarming and spring staging.

Mussels

The Tennessee River has historically supported among the most diverse assemblage of freshwater mussels in the world. The portion of the Tennessee River in the project area is known to support state-ranked freshwater mussel species of concern and includes suitable habitat for federally listed species. To evaluate current freshwater mussel fauna in the project area and characterize habitat conditions, a qualitative freshwater mussel survey, approved by USFWS and the Alabama Department of Conservation and Natural Resources, was conducted over a six-day period in October 2022. Diving surveys were conducted in the Tennessee River along transects north and south of the bridge but excluded the navigational channel as well as areas near the riverbanks that do not provide suitable freshwater mussel habitat. During the survey, live mussels were collected and cataloged along with relic shells. These data were compiled and analyzed to evaluate species richness, which is described in the survey report. Habitat was characterized through observation during the diving transects and with sonar. Habitat within the survey area was highly homogeneous and lacustrine in nature. Substrates were predominated by silt and were uniform in composition and depth (AllStar 2023).

The freshwater mussel survey located 4,929 live freshwater mussels representing 22 unique species. An additional four species were represented through relic shells. No federally listed species or relic shells were located during the survey. USFWS confirmed its acceptance of the survey findings on February 23,

2023. However, live mussels representing seven state-protected or ranked species were collected during the survey, and relic shells were found for three additional state species (AllStar 2023).

Dromedary Pearlymussel – Habitat for dromedary pearlymussel consists of shoals that include a stable mixture of gravel and clean sand. This species historically occurred in the portion of the Tennessee River in the project area, but native populations have been extirpated from the Tennessee River (USFWS 2020a). In 2001, USFWS reintroduced a nonessential experimental population of dromedary pearlymussel in the Tennessee River upstream of the project area (66 *Federal Register* 32250). The downstream boundary of the nonessential experimental designation is approximately 10 river miles upstream of the project area. Therefore, this species is not likely to occur in the project area.

Pink Mucket – The habitat requirements of pink mucket are similar to those of dromedary pearlymussel, as described above. Pink mucket is present in the southern bend of the Tennessee River in northern Alabama but has not been documented in the segment of the river within the Parkway. The nearest known occurrence was in the tailwaters of the Wilson Dam, approximately 10 river miles upstream, where a single live mussel was found during the most recent known sampling survey in 2009 (USFWS 2018b). Therefore, this species is not likely to occur in the project area.

Rough Pigtoe – The habitat requirements of rough pigtoe are similar to those of dromedary pearlymussel and pink mucket, as described above. Rough pigtoe is considered extremely rare in the Tennessee River, and its current status and population trend is uncertain. Qualitative mussel surveys were conducted in the tailwaters of Wilson Dam, approximately 10 river miles upstream of the project area, in 2017 and 2018. The surveys yielded 18 rough pigtoe mussels after 178 survey hours (USFWS 2021b). This species is not likely to occur in the project area.

Other State-Protected or Ranked Species

The habitat requirements of other state-protected or ranked species shown in Table 7 are similar to those of the federally listed species described above.

Little Brown Bat

The habitat requirements of little brown bats are similar to those of Indiana bats and northern long-eared bats. Little brown bats have historically been found statewide in Alabama but are now considered rare with no known breeding colonies in the state (AWF 2023). Although little brown bats have previously been reported at the Parkway, there have not been any recent observations of the species (NPS 2023a), and no little brown bats were detected during the 2022 summer bat surveys or other more recent surveys. Therefore, it is not likely to be present.

Monarch Butterfly

Monarch butterflies occur throughout the contiguous United States in two distinct populations, east and west of the Rocky Mountains. In eastern North America, monarch butterflies travel north in the spring from their wintering grounds in Mexico, north to Canada, over two to three successive generations, breeding along the way before returning to their wintering sites. Monarch butterfly breeding and migratory habitat generally consists of meadows with a diversity of nectar-producing flowering vegetation and an adequate abundance of milkweed. Monarch butterfly populations have decreased dramatically in recent years because of habitat loss and degradation, exposure to pesticides, and the effects of climate change. Sources of habitat loss and degradation include conversion of grasslands to agriculture, urban development, and widespread use of herbicides (USFWS 2020b).

The Parkway generally does not provide suitable habitat for monarch butterfly because much of it is forested and mowed. However, this species has been documented in the Parkway and is likely to be seasonally present during migration.

General Wildlife

General wildlife do not have a special protected status at either the federal or state level. General wildlife in the project area includes mammals, birds, reptiles, amphibians, fish, freshwater mussels, and insects. The deciduous forest lining the Parkway provides refuge for 33 confirmed mammal species with white-tailed deer (*Odocoileus virginianus*) being the most common. Additionally present are coyote, fox, bats, and armadillos (NPS 2024b). Currently, rocky cliffs near the project area are known to provide roosting habitat for eastern small-footed bat and big brown bat. Field surveys confirmed the presence of maternity bat colonies within the project area, specifically, in the expansion joints of the Tennessee River Bridge. Further information regarding bats is provided above in the "Threatened and Endangered Species" section. Also present within the project area, but more difficult to detect are reptiles and amphibians including turtles, snakes, frogs, and salamanders. Common reptiles and amphibians include the eastern box turtle (*Terrapene carolina*), black racer snake (*Coluber constrictor*), spotted salamander (*Ambystoma maculatum*) and southern leopard frogs (*Lithobates sphenocephalus*). Although the forest hosts various species within the project area, the Tennessee River also provides refuge for an array of aquatic species such as fish and freshwater mussels. Common fish that may frequent the project area include different bass species, catfish (*Siluriformes*), trout (*Salmo trutta*), and freshwater drum (*Aplodinotus grunniens*). Smaller fish may include minnows, darters and shad. Freshwater mussels are discussed above in the "Threatened and Endangered Species" section.

Species common to both habitat types are birds and insects. Common bird species include songbirds, passerines, raptors, and wading birds. The Tennessee River provides suitable habitat for a number of wading birds such as the great blue heron (*Ardea herodias*), great egret (*Ardea alba*) and the double-crested cormorant (*Phalacrocorax auritus*), while the forested portions of the project area provide habitat for songbirds and passerines, including the northern cardinal (*Cardinalis cardinalis*), cedar waxwing (*Bombycilla cedrorum*), and scarlet tanager (*Piranga olivacea*). Swallows (*Hirundo* spp.) commonly use the structure of the Tennessee River Bridge for nesting. Common insects that may use the project area include willow flies (*Ephemeroptera*), eastern firefly (*Photinus pyralis*), and the common green bottle fly (*Lucilia sericata*).

Trends and Planned Actions

Populations of the threatened and endangered species described above are generally declining throughout their ranges. As noted above, bat populations are declining primarily because of WNS, although wind energy-related mortality and habitat loss are also factors; freshwater mussel populations in the Tennessee River have been severely affected by alteration and destruction of river and stream habitat due to impoundment, and monarch butterfly populations are declining because of habitat loss and degradation. Climate change poses an ongoing challenge for many species, including those discussed above, and is expected to result in ongoing changes to habitats, temperature, and precipitation patterns in the coming decades.

Planned or ongoing NPS habitat enhancement actions at the Parkway (e.g., cave habitat preservation at the Undisclosed Cave) may benefit these species. Additionally, ongoing improvements in the design and operation of hydropower and navigation dams on the Tennessee River could improve conditions for freshwater mussels.

Other ongoing actions at the Parkway include bridge and roadway maintenance and repairs, corridor maintenance and repairs, and hazard tree removal. Bridge and roadway maintenance and repair activities are conducted on an as-needed basis and include patching, repaving, and restriping roadway surfaces. The Parkway corridor is maintained with regular mowing during the growing season, and trimmers are used to keep vegetation low around signposts. Herbicides are only used as necessary to control nonnative or invasive vegetation such as Johnson grass or Cogon grass. To protect public safety, dead trees that could fall within the roadway are removed, as needed. Trees are marked for removal during the dormant season and removed later in the year to avoid potential disturbances to roosting bats during the maternal season.

Trees are generally felled and left to decompose in the forests along the Parkway corridor. If a storm blows trees down in the road, they are cleared from the road and sometimes hauled away. These ongoing actions result in noise and visual cues that could disturb federally listed bats but are part of the existing baseline conditions at the Parkway.

As part of its ongoing forest management efforts, the Parkway conducts prescribed burning in the forests on the south side of the Tennessee River Bridge. The NPS consults with USFWS prior to each burn season to avoid potential impacts on listed species (i.e., bats).

Environmental Consequences

This section analyzes the potential effects of the alternatives on wildlife, including federally listed and state-protected or ranked species, generally referred to below as protected species. Federally listed and state-protected or ranked species that the alternatives could affect can be categorized into three species groups: bats, freshwater mussels, and insects (monarch butterfly). The potential effects of the alternatives would be similar for species within each group. Therefore, potential effects of various stressors associated with the alternatives are described for each species group. Potential stressors associated with actions that may affect protected species include vegetation/tree removal, noise and visual disturbances, turbidity and sedimentation, and other habitat loss or alternation.

Where appropriate, the discussion of impacts common to both action alternatives has been consolidated, and specific differences unique to individual alternatives are described under the corresponding headings—specifically impacts to bats and mussels that would be the same under both action alternatives are discussed together. A discussion of potential effects on general wildlife is also provided.

No-Action Alternative

Under the No-Action Alternative, no changes or improvements to the Tennessee River Bridge would occur. Therefore, there would be no new impacts on wildlife including federally listed and state-protected or ranked species or their habitats associated with construction activities. Ongoing impacts associated with operation and maintenance and repair of the existing bridge and roadway (e.g., noise and visual disturbances) would remain the same as under existing conditions. However, the frequency of emergency maintenance could increase over time as the bridge continues to deteriorate, resulting in increased frequency of noise and visual disturbances that could affect wildlife including federally listed or state-protected bats in the project area during the duration of these maintenance actions. These impacts would be temporary, although recurring, and could result in transient disturbances to bats, but they are not expected to create any long-term changes in behavior or habitat use in the area.

The eventual removal of the bridge would result in additional noise and visual disturbances that could affect bats, and temporary increases in turbidity and sedimentation that could degrade riverine habitat and negatively affect federally listed and state-protected mussels and their fish hosts. These temporary impacts would be limited to the demolition and construction period. Once constructed, noise and visual cues from the operation of the new bridge would be similar to those under existing conditions. Anticipated noise levels associated with bridge demolition and construction and operation of the new bridge and roadway are described under “Natural Soundscapes.” Permanent loss of bat roosting habitat (e.g., tree clearing) could occur if the area or alignment of the new bridge changes or expands compared to the existing bridge. However, forest edges immediately adjacent to the roadway do not provide high-quality habitat for bats or most other species. Additional disturbances to terrestrial species or habitats associated with staging areas could occur. Potential impacts from demolition, construction, and operation of a new bridge, including habitat loss or alteration, are not expected to affect any federally listed or state-protected or ranked species at the population level. The magnitude and duration of potential impacts on federally listed and state-protected species would depend on the methods used for bridge removal and construction, the locations of staging areas, and the new bridge design and alignment.

Impacts Common to Both Action Alternatives

Bats

Tree Removal – Both action alternatives would require permanent removal of upland, mostly forested habitat, to accommodate the new roadway alignment and bridge approaches. No tree removal would be required for construction staging because staging areas would be contained within the boundaries of the project, in either paved or previously disturbed areas, including an agricultural lease area just southeast of the Tennessee River Bridge. These areas do not contain forested habitat. Potential impacts could include temporary or permanent loss or degradation of foraging and/or roosting habitat and travel corridors. Tree removal could also result in injury or death to individual bats, particularly during spring when bats may enter torpor (hibernation) periodically and during the period when non-volant pups are present (USFWS 2018a). Under the action alternatives, tree removal would be timed to avoid the active season for bats, making injury or mortality to bats unlikely (see Appendix B). For corridor maintenance, the NPS would continue to remove hazard trees that could fall on the road on an as-needed basis to protect public safety; however, removal of hazard trees would be timed to avoid the active season to the extent practicable to protect public safety. Therefore, injury or mortality to bats during tree removal is unlikely.

Under both action alternatives, the amount of suitable roosting habitat that would be removed for project construction (up to approximately 6 acres of forested habitat would be removed under Alternative 1, and up to 8 acres would be removed under Alternative 2) would represent a small loss of roosting habitat relative to the amount of suitable roosting habitat in the Parkway (29,063 acres)—a total loss of approximately <1% of the total forested habitat in the Parkway under Alternative 1 and approximately <1% under Alternative 2. However, removal of forested habitat under Alternative 1 and Alternative 2 would represent a loss of approximately 14% and 23%, respectively, of the total amount of forested habitat in the project area (up to approximately 43 acres). Given the amount of roosting habitat that would be lost relative to the amount of available habitat outside the project area, including elsewhere in the Parkway, and with the implementation of the conservation measures listed above, negative impacts from tree removal are not anticipated.

Under both action alternatives, resource protection measures would be implemented to avoid or minimize negative impacts on bats and other wildlife. These measures would include preconstruction surveys to determine the presence or absence of sensitive and/or protected species, seasonal restrictions on tree clearing to avoid the active season for bats, and restoring the agricultural lease area to natural/riparian forest habitat upon completion of construction/staging activities. A complete list of resource protection measures can be found in Appendix B.

Noise and Visual Disturbances – Under the action alternatives, bats would be intermittently exposed to noise and visual disturbances during demolition and construction (including delivery and disposal of materials), and when normal operation of the bridge resumes. These potential stressors are discussed together because distinguishing between wildlife responses to noise and visual cues is often difficult. Anticipated noise levels under the action alternatives are described above in the "Natural Soundscapes" section.

Increases in noise levels or visual disturbance in an area can temporarily or permanently alter bat behaviors. The intensity of these impacts depends on the novelty of the disturbance in an area, proximity of the disturbance to active roosts, and the frequency and duration of disturbances (USFWS 2018a). Studies have shown that bats tend to avoid areas with high levels of noise and visual disturbance, such as transportation corridors; other studies have found that bats may tolerate substantial levels of noise and visual disturbance and did not document noticeable shifts behavioral patterns or roosting site selection. Studies also have found that bats appear to become habituated to ongoing noise and visual disturbances, suggesting that impacts decrease over time following construction of new projects (USFWS 2018a). Bats that occur in the project area are likely habituated to a certain degree of background noise and visual

disturbance associated with vehicle traffic on the roadway, boat traffic on the river, ongoing corridor clearing and road maintenance and repairs, and various visitor use activities in the Parkway.

Noise levels would be greatest during demolition of the existing bridge and construction of the new bridge. Although bats in the project area are likely habituated to a degree of noise and visual disturbance, project construction would result in noise levels and visual cues that are greater than baseline conditions. The only federally listed bat species that may be present during summer is gray bat, which could roost in the Undisclosed Cave, although it has not been documented there in recent decades. Because no other federally listed bat species were documented from surveys in the project area during summer, they would not be affected by noise during that time. Noise during project construction would travel beyond the immediate construction area and would be detectible in other portions of the project area, including adjacent Undisclosed Cave, which provides wintering habitat for tricolored bat. Additionally, tricolored bats could be exposed to noise from demolition and construction during fall swarming and spring staging within a 3-mile radius of the Undisclosed Cave. However, noise at the Undisclosed Cave is not expected to reach levels that would disturb hibernating or roosting bats. Similarly, demolition and construction noise is not likely to affect tricolored bats in the vicinity of the cave during fall swarming or spring staging because explosives would not be used for demolition. Noise levels are expected to return to baseline conditions following construction. As noted above, tree clearing would be timed to avoid the active season for bats. Therefore, noise from tree clearing would not affect federally listed bats.

Bats would also be exposed to noise as a result of ongoing operation of the bridge and during periodic maintenance and repair activities, including corridor clearing (mowing), road and bridge maintenance, and hazard tree removal. However, noise associated with operation and maintenance activities is not expected to increase compared to baseline conditions, so there would be no new impacts as a result of operation and maintenance. To the extent practicable, construction, maintenance, and repairs would occur during the daytime, when bats are normally roosting, limiting the potential for disruption of foraging.

Although unlikely, the potential for nighttime work and use of lighting could affect bats. Heavy equipment, vehicles, and/or surveying equipment can emit ultrasonic noise that disrupts bat behaviors and could threaten their presence within the area. Mitigation measures could include minimizing the use of light at night and turning off lights after work is completed; minimizing the amount of light and shielding lights downward; and using lights that minimize impacts to wildlife such as color temperature lights lower than 2100 degrees kelvin.

Most federally listed and state-protected or ranked bat species are not likely to occur in the project area based on a lack of suitable high-quality habitat, limited population size and range, and lack of documented occurrences historically or in recent years. While listed bat species have been documented elsewhere on the Parkway, the 2022 summer bat survey results suggest that these species do not currently occur in the project area during summer. Of the four federally listed bat species, only tricolored bats are likely to be present on the landscape, and only during the fall swarming and spring staging timeframes, prior to entering the Undisclosed Cave for winer hibernation and immediately after exiting the cave after hibernation. While gray bats are not thought to currently use the cave as a summer maternity roost, no impacts to the cave are anticipated. Therefore, gray bats are not likely to be affected should they return.

Overall, in the context of the temporary nature of increased noise and visual disturbances and the likelihood of most federally listed and state-protected or ranked species being absent from the project area (especially during construction), negative impacts to bats associated with these stressors would be temporary, lasting only as long as the duration of construction.

Mussels

As noted above, mussel surveys conducted in 2022 did not detect any federally listed mussels or relic shells, and USFWS confirmed its acceptance of the survey findings on February 23, 2023.

Habitat Loss or Alteration – Under the action alternatives, in-water work associated with removal of the existing bridge and replacement with a new bridge would result in permanent and temporary impacts to benthic habitats in the Tennessee River. Removal of the existing bridge abutment and piers would temporarily affect approximately 0.1 acres of benthic habitat and an additional 0.7 acres to accommodate a temporary work platform. Alignments under both alternatives would use the same number of abutments and piers. Placement of the bridge abutment and piers would result in up to approximately 2 acres of permanent loss of suitable habitat for freshwater mussels. Although the amount of permanent habitat loss from placement of bridge abutment and piers would be the same under both action alternatives, the locations would differ. However, because the habitat is the same, there would be no meaningful difference in impacts between the two action alternatives.

Native dromedary pearlymussel populations are extirpated in the Tennessee River, and neither pink mucket nor rough pigtoe are likely to be present in the project area based on their small population sizes and lack of documented occurrences in recent years and decades. Therefore, the loss or alteration of benthic habitat that would occur under the action alternatives is not likely to affect federally listed mussels. As noted in the "Natural Soundscapes" section, noise during project construction could disrupt filter feeding. However, potential noise-related impacts are not likely to affect mussels at the population level or over the long term. Given the small amount of benthic habitat that would be permanently lost relative to the amount of available habitat in the Tennessee River, and the temporary nature of construction noise, the action alternatives are not expected to affect any federally listed or state-protected or ranked species freshwater mussel species at the population level, and long lasting, negative impacts from habitat loss or alteration would be small in comparison to the available habitat for mussels. Overall, the action alternatives would result in temporary and permanent, negative impacts to freshwater mussels from habitat loss and disturbance; however, impacts to federally listed mussels are not anticipated because federally listed mussels are not expected to occur in the project area.

Turbidity and Sedimentation – Removal of the existing bridge and replacement with a new bridge would result in temporary increases in turbidity and sedimentation in the portion of the Tennessee River within the project area. High turbidity levels affect freshwater mussels by irritating, damaging, or clogging their gills (Loar et al. 1980; USFWS 1985). Turbidity in the water column can also inhibit filter feeding, resulting in nutritional stress or mortality (Loosanoff 1962; USFWS 1985). Sedimentation can blanket the clean, rocky substrates that are usually found in clear, fast-flowing rivers and streams with soft sediments where freshwater mussels occur. Sedimentation can also indirectly affect mussels because it can affect host-fish populations by smothering fish eggs or filling interstitial spaces in rocky substrates, thereby reducing habitat for juvenile fish (Loar et al. 1980; USFWS 1985). Siltation, primarily associated with poor agricultural practices and deforestation, is considered a major factor that has affected historical freshwater mussel abundance and diversity across much of North America, including in the Tennessee River basin (USFWS 1985). Implementing the resource protection measures listed in Appendix B, which include measures for erosion and sediment control, would limit negative impacts on freshwater mussel habitat in the project area. A complete list of resource protection measures can be found in Appendix B.

Given that federally listed freshwater mussels are not likely to be present in the project area and with the implementation of the proposed resource protection measures (see Appendix B), impacts on federally listed mussels are unlikely to occur. If threatened or endangered mussels are observed, additional consultation with USFWS would occur. Potential negative impacts on freshwater mussels associated with turbidity and sedimentation would be temporary and limited to the duration of project construction.

<u>Monarch Butterfly</u>

The action alternatives would not affect monarch butterfly because the project area does not provide suitable habitat (i.e., meadows) for the species.

General Wildlife

In general, both action alternatives would result in minor, temporary, negative impacts on wildlife as a result of habitat loss/disturbance, noise, and visual disturbances. Both action alternatives would require permanent removal of upland, mostly forested habitat as well as benthic habitat. Negative impacts on wildlife would include temporary displacement and or disturbance to the species close to the implemented project activities; however, both terrestrial and aquatic species would likely avoid the area during project implementation. As noted above in the "Mussels" subsection, the amount of lost habitat would be the same under both action alternatives. Turbidity and sedimentation as a result of construction would impact mussels and fish similarly because it would reduce both species' habitats, affect feeding, and clog their gills. Construction activities would likely result in mortality of small animals, burrowing invertebrates, and benthic organisms. Tree removal would impact birds and bats similarly because it would result in the loss of nesting habitat and travel corridors. After construction, the lease for staging areas would end, and the area would be allowed to naturally revegetate. Mitigation measures, provided in Appendix B, provide detailed efforts that would help alleviate impacts to species, specifically bats.

Mitigation measures for non-listed bats include performing site inspections for potential bat roosting prior to any bridge removal. If bats are using the bridge, demolition would be initiated between November 15 and March 31 to avoid and minimize disturbance. If a maternity colony were present, construction would not be initiated between May 15 and August 15. Further information regarding impacts to bats is discussed above in the "Bats" subsection. Although habitat for terrestrial and aquatic species would be lost, considerable suitable habitat is available adjacent to the project area and throughout the Parkway. Due to the availability of adjacent suitable habitat and the implementation of mitigation measures, permanent, negative impacts are not expected.

Similarly, noise and the presence of construction equipment and crews necessary for the replacement of the bridge could temporarily disturb some wildlife species. Any noise associated with the project is unlikely to reach levels that would cause tricolored bats to flush roost trees during fall swarming or spring staging. Impacts would not be permanent because noise levels would return to baseline conditions upon completion of construction. Human-made noise could affect terrestrial and aquatic wildlife because animals rely on sounds to communicate, find food, and detect predators. However, species that occur in the project area are accustomed to frequent nearby traffic and noise from the existing high levels of Parkway use. Anticipated noise levels under the action alternatives are described above in the "Natural Soundscapes" section. Due to the temporary nature of construction and the availability of similar habitats outside the project area, negative impacts associated with this stressor are expected to be minor and temporary.

Although unlikely, the potential for nighttime work and use of lighting poses an additional threat to wildlife. Artificial light at night can be detrimental for both plant and animal species, especially in a historically dark area because it disrupts predator/prey relationships. Artificial glare impacts wetland animals disrupting reproduction cycles for amphibians, and migratory birds that navigate by moonlight go off course and into areas where collisions could lead to increased mortality. As noted above in the "Bats" section, mitigation measures could include minimizing the use of light at night and ensuring lights are turned off after work has completed, minimizing the amount of light and shielding lights downward, and only using lights that minimize impacts to wildlife such as color temperature lights lower than 2100 degrees kelvin, which measures the color temperature of a light source.

Alternative 1

Bats

Under Alternative 1, up to approximately 6 acres of upland, mostly forested habitat would be permanently removed to accommodate the new roadway alignment and bridge approaches. As noted above, the loss of roosting and foraging habitat would be small relative to the amount of suitable habitat in the Parkway and

surrounding areas. Of the two action alternatives, Alternative 1 is anticipated to have fewer impacts because of the smaller area of tree removal and shorter construction period compared to Alternative 2. Potential impacts from noise and visual disturbances are described under "Impacts Common to Both Action Alternatives."

Mussels

Impacts on freshwater mussels would be the same as described under "Impacts Common to Both Action Alternatives." No federally listed mussels would be affected because they are not expected to occur in the project area.

General Wildlife

General wildlife would experience negative impacts under Alternative 1 because the disturbed footprint would be up to approximately 6 acres, and the duration of the project would be 1,360 days. Impacts on general wildlife would be similar under both action alternatives with only a difference in acres of disturbed area and duration. As noted above, wildlife within the up to approximately 6 acres of upland, forested habitat would experience displacement and disturbance from the removal of trees/vegetation and the presence of construction equipment and crews. Aquatic species would experience the same impacts as discussed under the "Impacts Common to Both Action Alternatives," but for a short period.

Alternative 2

Bats

Like Alternative 1, the types of potential impacts on listed bats under Alternative 2 would be the same as those described under "Impacts Common to Both Action Alternatives." However, the intensity and duration of impacts would differ, with Alternative 2 resulting in greater impacts as a result of the increased area of tree removal (up to approximately 8 acres), construction occurring closer to the Undisclosed Cave, and a longer construction period (approximately 1,600 days).

Mussels

Impacts on freshwater mussels would be the same as those described for Alternative 1. No federally listed mussels would be affected because they are not expected to occur in the project area.

General Wildlife

The types of impacts general wildlife would experience under Alternative 2 would be the same as those described under "Impacts Common to Both Action Alternatives." However, Alternative 2 would require the removal of up to approximately 8 acres of habitat and a total estimated construction time of approximately 1,600 days. Impacts under Alternative 2 are still anticipated to be minor and temporary.

Cumulative Impacts

The impacts of past, ongoing, and reasonably foreseeable planned actions are included in the "Trends and Planned Actions" section above and described in Appendix D. Past, ongoing, and reasonably foreseeable actions include habitat enhancement at the Undisclosed Cave, ongoing improvements in the design and operation of hydropower and navigation dams on the Tennessee River, ongoing bridge and roadway maintenance, and periodic prescribed burning. Habitat enhancement at the Undisclosed Cave and improvements in the design and operation of dams would benefit bats and mussels, including threatened and endangered species, over the long term. Ongoing bridge and roadway maintenance and repair and prescribed burning would result in ongoing temporary disturbances to wildlife, including threatened and endangered bats and mussels, but would not negatively affect these species permanently.

Under the No-Action Alternative, noise, visual disturbances, and habitat loss and alteration associated with the eventual removal and replacement of the bridge would have temporary and permanent, negative impacts on individual wildlife including threatened and endangered species (bats and freshwater mussels).

When combined with the effects of past, ongoing, and reasonably foreseeable actions, cumulative impacts would be negative, with the No-Action Alternative contributing a slight negative increment to the overall negative cumulative impact on wildlife including threatened and endangered species in the project area.

Under Alternative 1, noise, visual disturbances, and habitat loss and alteration would have temporary and permanent, negative impacts on individual wildlife including threatened and endangered species (bats). When combined with the effects of past, ongoing, and reasonably foreseeable actions, cumulative impacts would be negative, with Alternative 1 contributing a slight negative increment to the overall negative cumulative impact on wildlife including threatened and endangered species in the project area.

Under Alternative 2, noise, visual disturbances, and habitat loss and alteration would result in temporary and permanent, negative impacts to individual wildlife including threatened and endangered species (bats). When combined with the effects of past, ongoing, and reasonably foreseeable actions, cumulative impacts would be negative, with Alternative 2 contributing a slight negative increment to the overall negative cumulative impact on wildlife including threatened and endangered species in the project area. There would be no measurable difference in the contribution of Alternative 2 to the overall cumulative impact compared to Alternative 1 based on the differences in impacts on habitat and the difference in construction duration between the two alternatives.

Conclusion

Under both action alternatives, bridge demolition and construction would have temporary and permanent, negative impacts on individual wildlife. Potential impacts would include noise and visual disturbances and habitat loss or alteration from tree clearing and in-water work. Negative impacts to federally listed bats from noise and visual disturbances would only have the potential to occur during fall swarming and spring staging (tricolored bat). However, impacts from noise and visual cues would be minimal because the project area is already exposed to high levels of baseline disturbance associated with the roadway. Although the Undisclosed Cave is used for winter hibernation (tricolored bat) and could host summer roosting colonies of gray bats, should they return to the Parkway, noise is not expected to reach levels that would disturb hibernating or roosting bats. Negative impacts to bats would be greater under Alternative 2 because of the additional tree clearing, the construction closer to the Undisclosed Cave, and a longer construction period. Alternative 2 would require permanent removal of up to approximately 8 acres of forested habitat to accommodate the new roadway alignment and bridge approaches, which would increase the permanent loss of habitat by up to approximately 2 acres compared to Alternative 1. Because of the longer construction period, impacts from noise would occur over a longer period of time, resulting in additional impacts compared to Alternative 1.

Impacts to freshwater mussels would be approximately the same under both action alternatives; however, construction-related impacts would occur for a longer duration under Alternative 2 because it would require an additional 240 days to construct compared to Alternative 1. No federally listed mussels would be affected because they are not expected to occur in the project area. Impacts to general wildlife, including threatened and endangered species, under the No-Action Alternative would be similar to those described for the action alternatives because the bridge would eventually be demolished and replaced, but impacts would occur at a later time (in approximately 10 to 20 years). Therefore, although the impacts general wildlife would experience under Alternative 2 are the same as Alternative 1, the extent and duration would be greater.

Both action alternatives would contribute a slight negative increment to the overall negative cumulative impact on wildlife, including threatened and endangered species, although no effects are expected to rise to the level of take for federally listed species.

VISITOR USE AND EXPERIENCE

Affected Environment

The Parkway is a 444-mile unit of the NPS and scenic drive through three states. It roughly follows the Old Natchez Trace, a historic travel corridor used by Native Americans, European settlers, slave traders, soldiers, and US presidents. Today, people can enjoy a scenic drive as well as hiking, bicycling, and horseback riding along the Parkway (NPS 2023c). In the 10-year period from 2013 through 2022, the Parkway averaged 6,159,057 recreational visits and 8,462,184 non-recreational visits annually (NPS 2023d).

The Tennessee River Bridge connects western Colbert County, including the town of Cherokee, to western Lauderdale County, including the town of Waterloo. The Tennessee River Bridge provides a vital link across the Tennessee River for communities of northwestern Alabama; the next closest bridge is approximately 20 miles away in Florence on the north side of the Tennessee River and approximately 25 miles away in Sheffield on the south side of the Tennessee River. The primary roadways intersecting the Parkway near the project area include Colbert CR 21 (North Pike), Lauderdale CR 2, and Lauderdale CR 14 (Waterloo Road). Each of these county roads has one lane in each direction and no paved shoulders. The bridge serves communities, commuters, and recreational users of the Parkway. The Parkway intersects the Trail of Tears National Historic Trail at the Tennessee River Bridge and again roughly 3 miles north of the Tennessee River Bridge. The east side of bridge provides access to an overlook, known as the Trail of Tears Water Route Overlook, with parking and historical information on the Trail of Tears Water Route (NPS 2021).

Residents of Colbert County use the Tennessee River Bridge to access historic sites, as well as Brush Creek Park in the town of Waterloo. This 50-acre park offers a boat launch, primitive camping, and picnic pavilions with individual picnic tables (Lauderdale County Government n.d.). The Parkway intersects with the Rock Springs Nature Trail, a half-mile hiking trail that offers opportunities to view wildlife (e.g., beavers, salamanders, and a wide variety of birds, particularly migrating hummingbirds) on the east side of the project area (Alabama Birding Trails n.d.). The Colbert Ferry Boat Ramp Area is located on the western side of the Tennessee River Bridge, and residents of Lauderdale County use the bridge to access recreational amenities offered there, such as trails for biking and walking, boat ramps for small watercraft, an overlook for scenic viewing, and campgrounds designed for primitive camping. Collectively the Colbert Ferry Boat Ramp Area includes the Colbert Ferry Bicycle Camp, Colbert Ferry Visitor Center, Colbert Stand Trail, Colbert Ferry Overlook, Colbert Ferry boat ramp, and the Colbert Ferry picnic area.

In addition to the recreational opportunities offered by Colbert Ferry Boat Ramp Area, additional opportunities for recreation in and near the project area include wildlife viewing, exploring cultural landscapes, and cycling. There are many opportunities for wildlife viewing along the Parkway, which contains diverse ecosystems and habitats for nearly 1,500 plant species, 33 mammal species, 134 bird species, and 70 species of reptiles and amphibians (NPS 2022). As a designated national scenic byway, All-American Road, and bicycling route, the Parkway is an important treasure for modern travelers to experience historic and scenic landscapes. During the public engagement process, commenters noted that the Tennessee River Bridge offers a safe route for cyclists wishing to cross the Tennessee River, particularly because many state and county roads in the area do not provide designated bicycle infrastructure and have traffic conditions that make cycling unsafe.

Level of service (LOS) is a performance measure widely used in the transportation industry. The *Highway Capacity Manual and American Association of State Highway and Transportation Officials Green Book* defines LOS as a "performance indicator of a traveler's satisfaction with the trip," characterizing the quality of traffic operating conditions in terms of traffic performance measures related to speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience (AASHTO 2018; Toth

2017). The Parkway experiences infrequent congestion, with a posted speed limit of 50 mph. Average vehicle speeds on the Parkway near the project area are 55 mph. Between November 9, 2022, and November 15, 2022, 6,046 vehicles crossed the Tennessee River Bridge. Table 8 shows the number and percent of vehicle crossings during that period by vehicle type.

TABLE 8. VEHICLE CROSSINGS IN THE PROJECT AREA BY TYPE (NOVEMBER 2022)

	Bikes	Cars and Trailers	2-Axle Long	Buses	2-Axle 6-Tire	3-Axle Single	<5-Axle Double	Not Classed
Number	84	3,543	1,804	14	382	36	144	37
Percent	1.4%	58.6%	29.8%	0.2%	6.3%	0.6%	2.4%	0.6%

Near the project area, US-72 (HWY 72) and AL-20 (HWY 20) travel through the cities of Florence and Muscle Shoals; they provide access between urban and rural communities and facilitate commercial and industrial vehicular traffic in the region. HWY 72 is characterized as a high-speed, high-mobility corridor. The posted speed limit on HWY 72 is 65 mph, with lower posted limits within urban areas such as the town of Cherokee, the city of Tuscumbia, and the unincorporated communities of Barton and Pride. The posted speed limit on HWY 20 is 55 mph. The Shoals Area Metropolitan Planning Organization has expressed concerns that recent development trends have threatened the corridor's high-speed status and therefore its long-term economic viability (Shoals Area Metropolitan Planning Organization 2009).

Trends and Planned Actions

Preventive maintenance is a critical component of an agency's asset management plan for roadways and provides a cost-effective means of extending a roadway's useful life (FHWA 2016). NPS staff will continue to perform regularly scheduled preventive maintenance procedures and preservation techniques to help prevent deterioration of assets and extend asset lifecycles (NPS 2018). Preservation and preventive maintenance activities can include clearing overgrown vegetation, resurfacing, and repairing weather-related damage.

Average daily vehicle traffic along the Tennessee River Bridge is projected to increase from 1,451 in 2019 to 1,668 in 2045, a growth of 0.5% per year. Greater traffic volume on roads near the cities of Florence and Muscle Shoals will increase congestion levels in the future unless road capacity is increased. The Tennessee River Bridge Traffic Study (Appendix G) predicts a 1.75% annual growth rate in traffic flows along the affected portion of the Parkway. From 2017 to 2021, Lauderdale CR 14 had an average annual traffic growth rate of 11.8% east of the Parkway and 8.1% west of the Parkway, although the average annual change from 2013 to 2021 was 0.7% and -1.2%, respectively. Colbert CR 21 experienced a minimal average annual change in traffic volume south of the Parkway and a 17.0% decrease in traffic volume north of the Parkway since 2013 with a 3.8% increase since 2017.

As of August 2024, there are no road construction projects underway in Colbert County. One road construction project is underway in Lauderdale County, a road widening project east of Florence (ALDOT 2023). This project is located outside the project area but along the proposed detour route. In 2022 and 2023, ALDOT solicited bids for several road projects in Colbert and Lauderdale Counties, including a structure demolition along HWY 72 in Florence. In 2022, the Northwest Alabama Council of Local Governments received funding to produce a study and design for the at-grade railroad crossing near Montgomery Avenue in Sheffield, and this project may produce additional congestion in the Muscle Shoals area (USDOT 2022). Ongoing construction projects decrease road traffic capacity, and cumulative impacts to congestion from the simultaneous completion of the proposed project may further reduce LOS. However, future completion of additional road construction projects may increase connectivity and improve LOS near the project area.

Climate change affects natural and cultural resources within national park system units and can affect visitation patterns. Where, when, and how many people visit parks is likely to change with continued warming (NPS 2024c). For example, visitors may avoid traveling during extremely warm months in the project area. The high-visitation season for travelers may also extend across additional weeks to months as warm weather persists.

Environmental Consequences

No-Action Alternative

The deteriorating physical condition of the bridge could affect the frequency of maintenance and repairs and would require recurrent bridge closures and detours to address maintenance and repair activities. Ongoing impacts associated with operation and maintenance and repair of the existing bridge and roadway would remain the same as under existing conditions.

However, the frequency of emergency maintenance could increase over time as the bridge continues to deteriorate, resulting in increased frequency of noise and visual disturbances that could affect visitor use and experience during the duration of these maintenance activities. These impacts would be short term, although recurring, and could interrupt visitor experience.

Maintenance and repair activities could also close the bridge or areas around it for a short period, and people may experience temporary disruptions to accessing activities that require using the bridge for access. Visitors would not be able to enjoy the views from their moving vehicle as they travel over the bridge. Visitors could, however, enjoy views from the shore of the Tennessee River and other nearby stationary viewing points. During periodic bridge closure for maintenance and repair activities, visitor use and experience would be impacted because visitors would need to use an approximately 42-mile detour (approximately 1 hour) to reach the Parkway and recreation resources in the project area. During the closure, impacts on visitor use and experience would be short term and adverse from decreased connectivity to the Parkway and the project area from the detour.

The bridge would eventually reach a state where it no longer meets safety requirements, and the NPS and FHWA would be required to close the bridge to vehicular traffic. Therefore, in approximately 10 to 20 years, this alternative would include the eventual removal and replacement of the existing bridge once these conditions have occurred. Removal of the bridge and replacement with a new bridge would result in actions and impacts to visitor use and experience likely similar to those expected under the active alternatives. However, because the anticipated closure duration to reconstruct a new bridge is unknown at this time, the adverse impacts would be long term compared to the two action alternatives.

Impacts Common to Both Action Alternatives

The Parkway's foundation document states that high-quality recreational experiences are a fundamental resource and value. As a result, impacts on visitor use and experience from the action alternatives are identified through this lens. High-quality recreational experiences for the Parkway include enjoying scenic pull-outs, scenic driving, hiking trails, biking, fishing, camping, and natural and cultural resources, to name a few. Vehicular safety refers to the safe movement and travel speed of vehicles through the project area, including traffic circulation. A safe road network provides vehicles with adequate sight distances at corners, intersections, and parking areas; minimizes the possibility for conflicts among motorized vehicles, pedestrians, and bicyclists; and allows for vehicles to easily stay within their travel lanes. Potential impacts on traffic and transportation as they relate to visitor use and experience are assessed based on changes to traffic operation conditions and the ability of visitors to access and experience the Parkway.

Both action alternatives include removing the existing bridge and replacing it with a new bridge. Replacement and removal require the use of construction equipment and other materials, which would create short-term, adverse visual and auditory impacts for visitor use and experience (see "Natural

Soundscapes" for additional analysis). These impacts would be short term and are expected to last the duration of any construction activities.

Removal of the bridge would also result in short-term, adverse impacts to visitor use and experience due to traffic delays and lack of direct access to nearby recreation resources. While access to the Trail of Tears National Historic Trail, Rock Springs Nature Trail, and Colbert Ferry Boat Ramp Area would be accessible during construction, visitors would be required to use the proposed detour route to indirectly access these resources during the duration of the bridge closure. However, access to the Trail of Tears Water Route Overlook and parking area would be closed during construction for safety reasons.

Under Alternative 1, the existing bridge would be closed to the public for approximately two years, and all visitors would be detoured off-site during this period while the bridge is removed and replaced. Total construction under Alternative 1 is anticipated to last approximately five years. Under Alternative 2, the existing bridge would be closed to the public for approximately six months, and all visitors would be detoured off-site while the bridge is being removed. Total construction under Alternative 2 is anticipated to last approximately six years. Therefore, impacts to visitor use and experience would occur for a longer duration as a result of the approximate two-year detour under Alternative 1, compared to the approximate six-month detour under Alternative 2.

Under both action alternatives, resource protection measures would be implemented to reduce the adverse impacts of noise and visual changes. While the exact nature of visual changes to the bridge are unknown at this time, it is likely that the bridge would be slightly wider than the current bridge and may be higher to support modern beam heights. These changes are not expected to create adverse visual impacts because the massing of the bridge would generally be the same as that of the current bridge with slight differences. The number of piers would be reduced, providing beneficial visual impacts. These measures would include limiting the use of heavy construction equipment to hours when nearby areas experience low use, painting retaining walls and other architectural features to match the aesthetics of the existing bridge, and storing construction equipment in locations that are less visible from common overlook points along the Tennessee River. Resource protection measures would reduce, but not eliminate, the magnitude of adverse noise and visual impacts from project construction.

Alternative 1

Under Alternative 1, construction-related activities and associated impacts to visitor use and experience may occur throughout the entire period of project construction.

Access and Experience

During construction, short-term, adverse impacts on visitor use would result from visible staging areas, noise disruptions, and increased emissions. Staging equipment and materials would be visible during construction. Although this is common for construction sites, it would create an additional adverse effect on visitor use and experience, detracting from the natural scenery. Noise levels and emissions from construction equipment would also cause temporary disruptions to visitors at recreation or natural areas, such as the Colbert Ferry Boat Ramp Area. Construction noise from heavy equipment is expected to generate a maximum noise level of 95 dBA at 50 feet, which would attenuate to 55 dBA at a distance of 1 mile. Because 55 dBA is the average level of outdoor background noise, noise impacts can be projected within a 1-mile radius of the construction area. Changes in topography can reduce noise levels, and environmental factors, such as wind and water, can also mask some of the construction noise. Noise and emissions from construction equipment would cause temporary disruptions to visitors at recreation or natural areas, including the Colbert Ferry Boat Ramp Area, Rock Springs Nature Trail, and nearby overlook areas. However, in areas located farther from the construction site and adjacent to the Tennessee River, the soundscape would still be dominated by the flowing water. Therefore, short-term, adverse impacts on the visitor use and experience from construction noise and emissions are anticipated, but would only last for the duration of the removal and replacement of the bridge activities.

The new bridge and roadway alignment would require tree removal and cut-and-fill of the slopes along the Tennessee River, which would result in short-term, adverse impacts on visitor use and experience by detracting from the visual quality and character in the project area during and after construction. Following construction, views and vistas along the bridge and Parkway would be restored, where possible, and vegetation is anticipated to return within 5 to 10 years.

Overall safety would be improved by addressing the current structural deficiencies of the bridge. The new bridge could include a 5-foot sidewalk along the southern side to separate pedestrians and cyclists from vehicles, adding safety and comfort for individuals who want to enjoy the views from the bridge or cross the bridge to access Parkway resources. If the final design does not include a walkway, wider shoulders would improve safety for cyclists. The replacement of the 37 existing piers with up to 27 piers may result in an increased level of safety for recreational boating activities. A reduction in the number of piers would widen the space boaters have to pass under the bridge. Visitors would continue to enjoy the views from their moving vehicles as they pass over the bridge. Areas cleared and restored after construction would be most visible in the short-term and would gradually diminish over the long term as vegetation is reestablished. Implementing the resource protection measures described in Appendix B would reduce long-term, adverse impacts on revegetation efforts in the project area. Visitors would continue to enjoy the same level of access, recreational activities, and ability to experience the natural and cultural qualities of the Parkway.

Connectivity

Implementation of Alternative 1 would result in short-term, adverse impacts to visitor use and experience because the bridge would be closed to visitors and drivers during construction, resulting in the loss of direct access to the Parkway and traffic delays from the detour. According to the Traffic Study (Appendix G), the proposed detour during construction of Alternative 1 would reroute approximately 6,044 vehicles per week, increasing traffic demand on HWY 20 and HWY 72 through Muscle Shoals and Florence. The delay would lengthen local commute times and emergency vehicle response times, and detours may increase congestion on nearby roads. Nearly all uses of the Tennessee River Bridge would be eliminated during the closure period, and the closure may reduce access and use of adjacent portions of the Parkway and nearby recreation resources, such as the Colbert Ferry Boat Ramp Area. As a result, visitors accessing the Parkway from the north could expect approximately 60 minutes of additional travel time to reach the Colbert Ferry Boat Ramp Area, Trail of Tears National Historic Trail, and other recreational activities in the area such as the nature trails. Similarly, visitors accessing the Parkway from the south could expect an additional 60 minutes of travel to reach the Rock Springs Nature Trail. Therefore, short-term, adverse impacts on visitor use and experience from traffic delays and the proposed detour route are anticipated with connectivity and visitor access being restored after construction is complete.

Under Alternative 1, long-term, beneficial impacts to visitor use and experience are expected, particularly from addressing safety deficiencies and for bicycle and pedestrian use along the bridge if a 5-foot sidewalk on the southern side of the bridge is constructed or from the widening of shoulders if the sidewalk is not constructed. Visitors would also be able to enjoy the views in their moving vehicle as they pass over the bridge. The replacement bridge would address issues affecting visitor use of the Tennessee River Bridge and adjacent areas of the Parkway by providing a safe and reliable bridge for crossing the Tennessee River along the Parkway. Replacing the bridge under this alternative would also reduce the need for maintenance and repair, closures, and load limits; increase access for nonmotorized users; and improve visitor experience over the long-term.

Alternative 2

Impacts on visitor use and experience under Alternative 2 would be similar to those described under Alternative 1, except that the duration of impacts associated with construction-related activities and

associated impacts to visitor use and experience may occur throughout the approximately six-year project construction duration.

Access and Experience

Impacts to visitor access and experience would be similar as those described for Alternative 1. However, construction-related activities, including associated construction noise and emissions, and the required detour routes to access resources, are expected to occur over 6 years.

Connectivity

Similar to Alternative 1, impacts to visitor use and experience related to staging equipment and materials would be short term and adverse. After construction, visitors would experience the long-term, beneficial impacts from the new bridge, including the reduction of the need for maintenance and repair, closures, and load limits; increased access to recreation resources; and an improved visitor experience.

Cumulative Impacts

Past, ongoing, and reasonably foreseeable actions that could affect visitor use and experience in the project area are described above in the "Trends and Planned Actions" section. Present and reasonably foreseeable actions that could affect visitor use and experience include bridge maintenance and repair activities that would close the bridge and could result in short- or long-term traffic closures and detours until access to the bridge is restored.

Under the No-Action Alternative, the eventual removal of the bridge would have a long-term, adverse impact on a visitor's ability to directly access nearby recreational areas and facilities in the project area using the bridge. These actions would have adverse impacts on visitors, and may require changes in plans or activities, because the Parkway would no longer be contiguous. Visitors would be required to use a permanent detour route to access the remaining portions of the Parkway until a new bridge was constructed. When combined with the effects of past, ongoing, and reasonably foreseeable actions, the No-Action Alternative would contribute a long-term, adverse impact on visitor use and experience in the project area until a new bridge is constructed.

Under Alternative 1, the replacement of the bridge would have a short-term, adverse impact on a visitor's ability to access nearby recreational areas and facilities in the project area due to the bridge closure. While access to the Trail of Tears National Historic Trail, Rock Springs Nature Trail, and Colbert Ferry Boat Ramp Area site would be maintained, visitors would be required to access those resources using the proposed detour route for approximately two years. During construction, tree removal, and noise would also result in an adverse impact on visitors' experiences along the Parkway. However, these impacts would only occur during the closure of the bridge due to construction.

Under Alternative 2, impacts to visitor access and experiences would be similar to those described for Alternative 1, except that the duration of impacts associated with construction-related activities would occur for approximately six months. When combined with the effects of past, ongoing, and reasonably foreseeable actions, Alternatives 1 and 2 could contribute to short-term, adverse impacts on visitor use and experience and contribute to the overall cumulative impacts in the surrounding project area. However, because these impacts are anticipated to occur only during the closure of the bridge for construction, long-term, adverse impacts are not anticipated; therefore, Alternatives 1 and 2 would not adversely impact visitor use and experience after project completion and would provide long-term, beneficial impacts by providing a structurally sound bridge for the future.

Conclusion

Under both action alternatives, short-term, adverse impacts on visitor use would result from visible staging areas, reduced direct access, noise disruptions, and increased emissions throughout the duration of construction activities. During construction, the bridge would be closed to visitors and drivers, resulting

in the loss of direct access to the Parkway and traffic delays from the detour. Under both alternatives visitors would have short-term, adverse impacts to accessing certain recreational amenities, either from the delay of reaching the site due to the detour or temporary closure.

Under Alternative 1, the new bridge and roadway alignment would require some tree removal and cut-and-fill of the slopes along the Tennessee River, which would result in short-term, adverse impacts on visitor use and experience by detracting from the visual quality and character in the project area during and after construction. Under Alternative 2, associated construction noise and emissions are expected to occur over a longer period because the period of construction is expected to be longer.

Once completed, both action alternatives would have long-term, beneficial impacts on visitor use and experience by improving visitor safety and access to recreational and cultural resources along the Parkway. Additionally, if the proposed 5-foot walkway is constructed, it would provide a dedicated bicycle and pedestrian passage over the bridge.

Implementation of the No-Action Alternative would result in overall long-term, adverse impacts on existing visitor use and experience of the Tennessee River Bridge and the Parkway from changes in the visual nature of the area. Additionally, the eventual removal and replacement of the bridge in approximately 10 to 20 years would have short-term, adverse impacts on visitor use and experience from traffic delays, lack of direct access to nearby roadways and communities, and lack of overall connectivity on the Parkway during construction. No long-term, adverse cumulative impacts are expected under either action alternative.

WATER RESOURCES AND WATER QUALITY

Affected Environment

Water Features

The project area is located within the Colbert Creek–Pickwick Lake subwatershed of the Tennessee River basin. Fifteen water features are present in the project area, of which the largest is the Tennessee River. The Tennessee River is a perennial water of the United States and a traditional navigable water (i.e., waters that are subject to the ebb and flow of the tide and/or are used to transport commerce). The river covers approximately 64 acres of the project area, flowing from southeast to northwest (Volkert 2022; WSP 2024b), and drains through a series of dams to the Ohio River.

The remaining 14 water features within the project area are ephemeral channels (i.e., streams that flow only in direct response to precipitation) and cover a combined area of 9,171 square feet within the project boundary (Volkert 2022). These ephemeral features include two unnamed tributaries identified by the national hydrography data set that flow through the project area into the Tennessee River (USGS 2024). One tributary is located on the west side of the river and covers approximately 1 acre of the project area. The other tributary is located on the east side of the river, past Lauderdale CR 2, and covers less than 1 acre of the project area (WSP 2024b). Another unnamed tributary flows just south of the potential staging area but is beyond the project area. Colbert Creek is also present outside the project area, connecting to the Tennessee River approximately 0.2 miles northwest of the bridge. Each feature has a bed and bank and is of varying length and width. The stream beds are located above the water table year-round and are primarily fed by runoff from rain or snowmelt. Based on precipitation averages for Florence, Alabama, average annual precipitation in the project area is up to 41.26 inches, falling for an average of 178.6 days. Meanwhile, snow falls for an average of 7.3 days in Florence and aggregates up to 1.69 inches (Weather U.S. 2023). For a discussion of wetlands or groundwater, see Appendix A.

Dams

The closest dams to the project area are the Wilson Dam, located approximately 19 miles upstream from the bridge, and the Pickwick Landing Dam, located approximately 26.5 miles downstream from the

bridge. Wilson Dam was built from 1918 to 1924, while Pickwick Landing Dam was built from 1934 to 1938. Both dams are hydroelectric and are owned and operated by TVA. Wilson Dam is the largest conventional hydroelectric facility in the TVA system (USACE n.d.; TVA n.d.; TVA 2024a,b).

TVA manages the water level of the Tennessee River through dams like Wilson and Pickwick Landing. Wilson Dam has a flood-storage capacity of 50,500 acre-feet, while Pickwick Landing Dam has a flood-storage capacity of 492,700 acre-feet (TVA 2024a,b). Historically, the Tennessee River routinely flooded, causing major issues for those who lived in the area. To combat flooding, the Tennessee River has been dammed numerous times. TVA uses the dams and reservoirs to keep flooding under control by managing water levels differently through different times of the year. Despite these holds and releases of water, the main-river reservoirs do not fluctuate as much as the tributaries, and the waters at Wilson Reservoir and Pickwick Landing Reservoir have only fluctuated a few feet since the start of 2022 (TVA 2023a,b).

Water Quality

Pollutants (i.e., chemicals, trash, metals, and pathogens) are often found in waterways from sources such as agricultural and urban runoff, storm sewers, atmospheric deposition, industrial leaks, or purposeful dumping. The Alabama Department of Environmental Management conducted an Integrated Water Quality Monitoring and Assessment study to determine the types of pollutants and overall water quality in Alabama waterways. The report provides information on tributaries and reservoirs both upstream and downstream from the project area that met applicable water quality standards or were considered impaired. Table 9 provides the study's categorization of water quality. Categories are based on readily available chemical, physical, and/or biological data collected during the previous six years (ADEM 2022a). Table 10 provides a list of waters upstream and downstream from the project area and their impairment status (ADEM 2022a,b).

TABLE 9. WATER QUALITY CATEGORIZATIONS

Category	Category Description
1	Waters meet all applicable water quality standards.
2	Available data for waters supports a determination that some water quality standards are met; however, there is insufficient data to determine whether remaining water quality standards are met. Attainment status is unknown because data is insufficient.
2A	Available data does not satisfy minimum data requirements, but there is a *high potential* for use impairment based on the limited data.
2B	Available data does not satisfy minimum data requirements, but there is a *low potential* for use impairment based on the limited data.
3	There is no data or information to determine whether any applicable water quality standard. Unassessed.
4	Applicable water quality standards are not met, but establishment of a total maximum daily load is not required.
4A	All total maximum daily loads needed to result in attainment of all water quality standards have been approved or established.
4B	Waters in which control measures are expected to address all major pollutant sources and attain applicable water quality standards in a reasonable period of time.
4C	Waters in which the impairment is not caused by a pollutant (human-made) but by natural causes or pollution such as an invasive species.

Category	Category Description
5	Waters in which a pollutant (human-made) has caused or is suspected of causing impairment (applicable water quality standards are not being attained). Waters in this category comprise the state's list of impaired waters or §303(d) list.

Source: ADEM 2022a

TABLE 10. IMPAIRMENT STATUS OF NEARBY WATERWAYS

Waterbody Name	Proximity to Project Site	Category	Pollutant	Source	Year Listed to Alabama §303(d) List
Tennessee River (Wilson Lake)	Upstream (21.50 miles)	5	Nutrients	Agriculture	2016
Pond Creek	Upstream (20.25 miles)	5	Metals (arsenic, cyanide, mercury); organic enrichment (biochemical oxygen demand)	Crop production (non-irrigated), natural, urban runoff/storm sewers	1996 – organic enrichment 2006 – metals
Sweetwater Creek	Upstream (19.50 miles)	5	Habitat alterations	Channelization, streambank modification	2016
Cypress Creek (Pickwick Lake)	Upstream (17.25 miles)	5	Metals (mercury)	Atmospheric deposition	2016
Spring Creek (Pickwick Lake)	Upstream (15.25 miles)	5	Nutrients; pathogen (*E. Coli*)	Agriculture; pasture grazing	2014
Little Bear Creek	Upstream (12.50 miles)	5	Metals (mercury); pathogens (*E. Coli*)	Atmospheric deposition; pasture grazing	2020 – metals 2022 – pathogens
Cane Creek (Pickwick Lake)	Upstream (7.25 miles)	5	Metals (mercury); pathogens (*E. Coli*)	Atmospheric Deposition; Pasture Grazing	2022
Tennessee River (Pickwick Lake)	On-site	5	Metals (mercury)	Atmospheric deposition	2022
Colbert Creek	Downstream (0.20 miles)	1	None	None	N/A
Bluff Creek	Downstream (3.0 miles)	5	Pathogens (*E. Coli*)	Pasture grazing	2022
Bear Creek (Pickwick Lake)	Downstream (11.50 miles)	5	Nutrients; metals (mercury)	Agriculture; atmospheric deposition	2014 – nutrients 2022 – metals

Source: ADEM 2022a,b

Floodplains

The NPS prepared a floodplain Statement of Findings (FSOF) for the project (see Appendix H). The FSOF describes the rationale for selection of a floodplain site, quantifies flood conditions and associated hazards for management decision-making, discloses the resources and risk associated with the chosen site, and documents how impacts on floodplain natural resources are or would be minimized or mitigated. During and after the production of the FSOF, the Federal Emergency Management Agency (FEMA) National Flood Hazard Layer data was reviewed for the area. Most of the FEMA 100-year floodplain (Zone A) is located within the banks of the Tennessee River and overlaps approximately 64 acres of the project area, as shown in Figure 13 (FEMA 2009, 2010; WSP 2023b, 2024b). Within the staging area, the 100-year floodplain fluctuates between 35 and 40 feet inland from the edge of the eroded bluff adjacent to the Tennessee River. This puts the 100-year floodplain boundary just inside the existing tree line adjacent to the agricultural lease area. The FSOF determined that no portions of the project area are mapped within the 500-year floodplain (Zone B or Zone X) (FEMA 2009, 2010; WSP 2023b, 2024b). Approximately 82 acres of project area (60 in the project area and 22 in the staging area) are in the Area of Minimal Flood Hazard (WSP 2023b, WSP 2024b).

Trends and Planned Actions

Intensity and variability in precipitation are expected to increase in Alabama as a result of climate change. Floods and droughts are expected to become more severe, while higher intensity and more frequent rainfall could lead to high sediment runoff and increased water levels. The Wilson and Pickwick Landing Dams would mitigate issues of flooding or droughts by managing the Tennessee River's water levels accordingly. Warmer temperatures are expected to decrease the amount of water recharging rivers and groundwater by 2.5% to 5%, which may deplete water resources (USEPA 2016b). Additionally, water quality has declined in the area, with increased reports of microplastics in the Tennessee River and fish consumption advisories (Ward 2021, ADPH 2022).

Several past, ongoing, and reasonably foreseeable actions in the area may affect water resources. The city of Florence finished construction of the River Heritage Trail project in May 2024 to provide a bicycle and pedestrian trail from River Heritage Park to the Patton Island Overlook as well as several overlook points on the Tennessee River (City of Florence 2023). Impacts to water resources occurred due to construction activities and the creation of permanent structures on the edge of the Tennessee River. Other plans include local river cleanups and related programming; local application of pesticides, insecticides, and fertilizer; dam improvements; and routine maintenance. River cleanup activities would improve water quality. Local use of insecticides and pesticides to control insects would have no impacts on water quality due to the nature and safe application of the insecticides; water quality impacts may occur from the application and runoff of fertilizer. Dam improvements may temporarily impact water levels or quality but would keep future flooding under control. Routine maintenance may increase the frequency of water quality and floodplain disturbance due to construction activities or the potential for accidental spills from construction vehicles or human error.

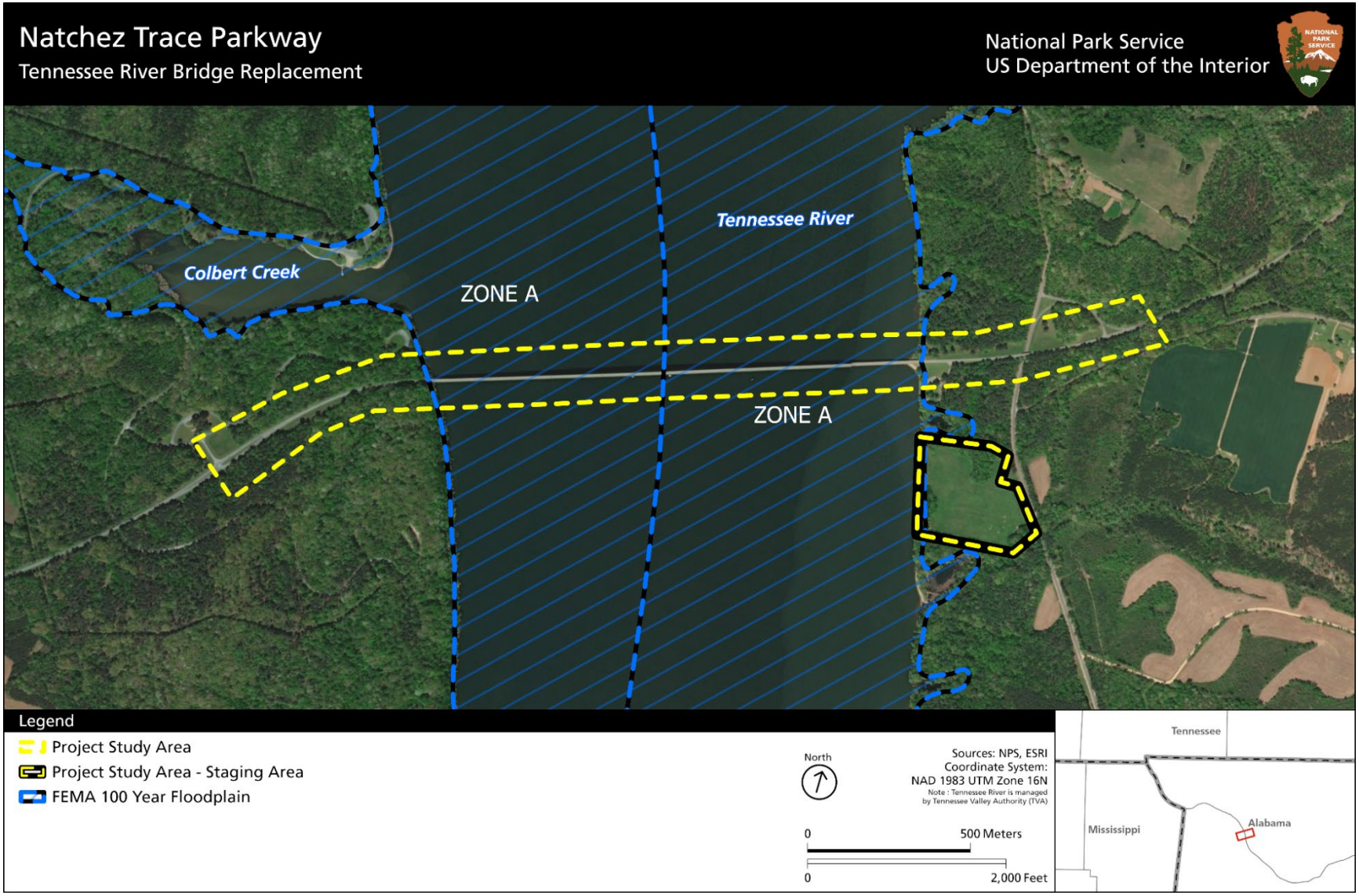


FIGURE 13. 100-YEAR REGULATORY FLOODPLAIN

Environmental Consequences

This section describes the potential impacts of the alternatives on water resources. Water resources analyzed include water features, water quality, and floodplains. Impacts are analyzed quantitatively, by calculating the acreage or mileage of water resources that the alternatives would affect, or qualitatively, by assessing the extent, impact mechanism, and impact characteristics.

No-Action Alternative

Under the No-Action Alternative, water features, including the Tennessee River and nearby creeks and tributaries, would continue to be subject to flooding events, erosion, and natural changes. The current bridge alignment would remain unchanged. Periodic maintenance and repair would continue and would increase over time as the bridge deteriorates. There would be no changes to the Tennessee River or nearby tributaries.

Under the No-Action Alternative, the Tennessee River would continue to experience water quality issues from natural waterway changes, erosion, flooding events, and surrounding sources (i.e., agricultural and urban runoff, storm sewers, atmospheric deposition, industrial leaks, and purposeful dumping). Short-term, adverse impacts to water quality from maintenance and repair of the existing bridge would continue. Without replacement, the need for bridge maintenance and repairs would continue to increase to maintain the serviceable life of the existing bridge. Increased frequency of maintenance activities would increase the chance and frequency of water quality impacts, such as sedimentation by erosion or accidental spills. No long-term water quality impacts are expected while the existing bridge continues to function.

Under the No-Action Alternative, floodplains would continue to be subjected to flooding events, erosion, and natural changes. Similar to water quality, short-term, adverse impacts to floodplains from maintenance and repair of the existing bridge would continue. Both the roadway and bridge would likely need more maintenance and repairs as the road surface condition declines and as bridge components continue to deteriorate and lose strength. Increased frequency of maintenance activities would increase the chance and frequency of floodplain impacts, such as damage to vegetation or erosion of soil.

Overall, the bridge would eventually reach a state where it no longer meets safety requirements, and the NPS and FHWA would be required to close the bridge to vehicular traffic. Therefore, in approximately 10 to 20 years, this alternative would include the eventual removal and replacement of the existing bridge once these conditions have occurred. Eventual removal of the bridge and replacement with a new bridge would result in actions and impacts to water resources, including water features, water quality, and floodplains, likely similar to those expected under the action alternatives.

Impacts Common to Both Action Alternatives

Water Features

Under both action alternatives, the NPS would replace the Tennessee River Bridge, which would result in impacts to water features. The new bridge would include 27 piers constructed in the river; however, no long-term impacts to water features are expected from the presence of the piers. The piers would not hinder the river or alter its route; natural flow patterns no longer exist in this portion of the Tennessee River due to nearby dams and necessary water flow management. The existing 37 piers would remain in place and would be cut; therefore, there would be no impacts to the Tennessee River. While the project would construct permanent embankments on the riverbanks for the approaches of the new bridge, the river's characteristics (i.e., flow, direction, and width) would not be altered. Under both action alternatives, approximately 10,000 to 15,000 cubic feet of riprap could be placed at each of the bridge abutments to protect the sides of the river from erosion, mitigating potential adverse impacts to the sides of the river. No long-term impacts to water features are expected.

Demolition and construction activities associated with the replacement of the bridge would have short-term, adverse impacts on water features. In-water construction would involve pier installation

activities (i.e., drilling) within the river channel. Construction may temporarily affect the river flow around active work sites through the use of construction platforms, barges, and cofferdams. However, no long-term impacts from changes in river flow are expected because the flow changes would not hinder the river or alter its route. Additionally, establishing and using the staging area (and any additional staging areas) would not impact water features because they would not alter the river's characteristics (i.e., flow, direction, or width). Construction platforms and barges would be removed after construction, and the flow of the river as it was prior to construction would resume.

Project construction may disrupt the natural hydrology of some ephemeral channels in the project area, leading to short-term increases in runoff, erosion, and sedimentation of downstream waters. However, resource protection measures described in Appendix B include following appropriate construction procedures (e.g., limiting disturbances to roadsides and other areas inside the project area, complying with and meeting all relevant requirements under the Clean Water Act, temporarily suspending any ground-disturbing activities during large precipitation events, reestablishing natural drainage patterns, and restoring vegetation along any disturbed stormwater conveyance). Following these measures would mitigate short-term impacts to ephemeral streams. Long-term impacts to ephemeral channels in the project area are not expected. No impacts on Colbert Creek are expected because the creek is outside the project area.

Once the existing bridge has been removed and the new bridge constructed, the temporarily disturbed areas would be returned to pre-existing conditions. Operation, maintenance, and repair activities would continue after the construction of the new bridge and would have impacts similar to those under existing conditions.

Water Quality

Under both action alternatives, replacing the Tennessee River Bridge would result in short-term, adverse impacts to water quality from construction and stating activities. Long-term impacts to water quality are not expected.

Vegetation clearing, grading, and establishing the staging area southeast of the bridge would increase runoff of disturbed soil into the river. Construction vehicles would loosen soil and introduce sediment into the river. Construction activities in the river (installation of temporary staging platforms with piles to support loads and the construction of the 27 piers for the new bridge) would disturb the river bottom and cause sedimentation and turbidity impacts, resulting in short-term, adverse impacts to water quality. Impacts to water quality would be mitigated by the implementation of resource protection measures. Permanent and temporary erosion and sediment control measures would be implemented before and throughout the length of the project. Approximately 10,000 to 15,000 cubic feet of riprap could be placed at each bridge abutment to protect against erosion of soil into the river. Additional drainage and sediment controls are listed in Appendix B and include the use of silt fencing, filter fabric, sediment ponds, check dams, and immediate mulching of exposed areas to minimize sedimentation and turbidity effects. The project would comply with and meet all relevant requirements under the Clean Water Act. Accidental spills, introduction of debris, or other human-made errors would be mitigated by adhering to a spill prevention control and countermeasures plan.

After construction of the new bridge is complete, disturbed sediment in the water is expected to settle; additional soil and debris would no longer be introduced from construction vehicle activities; and the agricultural lease area associated with the construction staging area would be restored to a riparian forest. Operation, maintenance, and repair activities would continue after the construction of the new bridge and would have impacts similar to those under existing conditions. Water quality is expected to return to preconstruction quality once the project is complete, and areas temporarily disturbed during construction would be restored as close as possible to natural conditions. The presence of the 27 piers for the new bridge and 37 piers from the old bridge would have no impacts on water quality.

Floodplains

Implementation of either action alternative would result in both short- and long-term disturbance to floodplains. Potential impacts to floodplains were determined by analyzing the project area overlap with FEMA-designated floodplains, as well as overlap into the flood elevation and flood hazard area. The project area overlaps with approximately 64 acres of the FEMA 100-year floodplain, the majority of which is within the banks of the Tennessee River (FEMA 2009, 2010; WSP 2023b, 2024b).

Under both action alternatives, impacts to floodplain would occur during all construction phases. Vegetation clearing and grading would occur during the establishment of the staging area, which would disturb up to approximately 24 acres of floodplain. Building the embankments for the approaches to the new bridge would also disturb floodplains. Construction vehicles could crush or destroy vegetation and disturb soil, temporarily altering the floodplain hydrology via changes in water infiltration and increased susceptibility to erosion. The use of cofferdams would temporarily impact floodplains via benthic habitat disturbance. The installation of temporary staging platforms in the water would require piles to support loads, which would result in short-term, adverse impacts to floodplains; disturbance west of the bridge from these platforms would be approximately 14,400 square feet, while disturbance from the platforms to the east of the bridge would be approximately 40,800 square feet. The construction of the 27 piers in the river for the new bridge would permanently remove approximately 40,500 to 67,500 square feet of floodplain, resulting in long-term, adverse impacts to floodplains. The use of barges and other in-water work that would not disturb the river bottom would have no impact on floodplains. Operation, maintenance, and repair activities would continue after the construction of the new bridge and would have impacts similar to those under existing conditions. These impacts would be mitigated by adhering to resource protection measures, such as adherence to applicable floodplain standards, limiting construction or clearing of vegetation within the floodplain, avoiding the introduction of nonnative invasive plants during floodplain restoration and using native seed mix, restoring the agricultural lease area to natural/riparian forest habitat, and implementing floodplain protections in accordance with NPS Director's Order 77-2: *Floodplain Management*. A complete list of resource protection measures can be found in Appendix B. After construction of the new bridge and removal of the old bridge is complete, cofferdams and staging platforms would be removed, and disturbed areas such as the staging area would be allowed to return to riparian forest. In the area where the old bridge would be removed, no impacts would occur to floodplains with the continued presence of the 37 piers.

Alternative 1

In addition to "Impacts Common to Both Action Alternatives," actions unique under Alternative 1 that would impact water resources include the skewed alignment of the bridge and its associated clearing, excavation, and disturbance. Because the bridge would remain on the existing alignment on the western end and the eastern end of the bridge would partially skew to the south on a new alignment, disturbance of water resources under Alternative 1 would be less than under Alternative 2. There would be approximately 101 feet of clearing and excavation, and up to approximately 17 acres of land disturbance. Additional actions unique to Alternative 1 that would affect water resources include the extension of a drainage structure and duration of construction. The extension of the drainage structure would be approximately 30 feet, and the duration for construction activities would be five years.

Water Features

Under Alternative 1, no additional impacts to water features would occur. Clearing, excavation, and land disturbance could cause short-term, adverse impacts to ephemeral streams by disrupting their natural hydrology. Activities conducted under Alternative 1 would adhere to the resource protection measures noted in Appendix B, and ephemeral streams would be allowed to return to their natural flow after construction is complete. The flow of water in the Tennessee River would not be hindered or have its route changed. No long-term impacts to water features are expected under Alternative 1, and short-term impacts to water features would end once construction is complete.

Water Quality

Under Alternative 1, clearing, excavation, and in-water work would have short-term, adverse impacts on water quality by increasing erosion and sedimentation in the river. However, water quality is expected to return to normal after construction is complete. Water quality impacts would be mitigated throughout the construction process by following the resource protection measures described in Appendix B, including implementing an erosion control plan and other best practices to limit the transport of sediment into the waterways, suspending ground-disturbing activities during large precipitation events, and using silt fencing, filter fabric, temporary sediment ponds, and temporary or permanent check dams to minimize sedimentation and turbidity effects. No long-term impacts to water quality are expected under Alternative 1.

Floodplains

Impacts to floodplains under Alternative 1 would be similar to those described under "Impacts Common to Both Action Alternatives." Vegetation clearing, excavation, and in-water work would have short- and long-term, adverse impacts on floodplains. Alternative 1 would disturb up to approximately 34 acres of floodplains, of which less than approximately 1 acre would be removed on land, and approximately 40,500 to 67,500 square feet would be removed in-water from pier installation, totaling up to approximately 2 acres of overall floodplain removal. Long-term, adverse impacts to floodplains are expected from the construction of the new bridge alignment on the east side of the river; the old bridge alignment on the west side of the river would be used for the new bridge. However, impacts on floodplains would be long term and beneficial because the old alignment would be allowed to return to riparian forest once the old bridge is removed, resulting in a net increase of approximately 1 acre of floodplains. Short-term, adverse impacts from ground disturbance would also occur from the 30-foot extension of the drainage system; floodplains would be allowed to revegetate after construction is complete.

Alternative 2

In addition to "Impacts Common to Both Action Alternatives," actions unique under Alternative 2 that would affect water resources include shifting the alignment of the bridge 50 feet south of the current alignment and the associated clearing, excavation, and disturbance. Because the bridge would move to a new alignment, there would be more disturbance of water resources under Alternative 2 (i.e., totaling approximately 295 feet of clearing and excavation and up to approximately 19 acres of land disturbance). Additional actions unique to Alternative 2 that would impact water resources include an extension of a drainage structure (by 180 feet) and the duration of construction (six years).

Water Features

Impacts to water features under Alternative 2 would be the similar to the impacts described for Alternative 1.

Water Quality

Impacts to water quality under Alternative 2 would be similar to impacts described for Alternative 1. However, more clearing and excavation activities would occur under Alternative 2 compared to Alternative 1, resulting in additional short-term impacts to water quality. Water quality impacts would be mitigated through the use of the mitigation measures, as discussed under Alternative 1. Water quality is expected to return to normal after construction is complete. No long-term impacts to water quality are expected.

Floodplains

Under Alternative 2, there would be short-and long-term, adverse impacts to floodplains from the removal of up to approximately 2 acres of floodplains on land and approximately 40,500 to 67,500 square feet in-

water, totaling up to approximately 3 acres of overall floodplain removal. The loss of floodplains under Alternative 2 is due to the construction of the new bridge alignment south of the old bridge alignment, creating the need for two new embankments and tie-ins to the existing roadway. However, long-term, beneficial impacts on floodplains would occur because the embankments of the old alignment would be allowed to return to riparian forest once the old bridge is removed, resulting in the net increase of approximately 1.5 acres of reclaimed floodplain. Short-term, adverse impacts to floodplains would also occur from the 180-foot extension of the drainage system due to ground disturbance; however, those floodplains would be allowed to revegetate after construction is complete.

Cumulative Impacts

The impacts of past, ongoing, and reasonably foreseeable actions are described above in the "Trends and Planned Actions" section and in Appendix D. Actions include the city of Florence's River Heritage Trail Project; local river cleanup activities and related programs; local application of insecticides, pesticides, and fertilizer; dam improvements; and routine maintenance and repairs. Colbert County's plan to replace waterlines and actuators would occur outside the project area and would have no impacts on water resources. The River Heritage Trail project was complete as of May 2024, and had short- and long-term impacts on water resources from construction efforts and the creation of permanent, new structures near the river, respectively. Local river cleanups would benefit water quality in the region. Application of insecticides, pesticides, and fertilizer in the area would not affect water features, but may adversely impact floodplain health and water quality from runoff. Dam improvements may temporarily impact water levels or quality, but would keep future flooding under control. Routine maintenance and repair would likely have short-term impacts on water quality and floodplains from construction activities that result in erosion, accidental pollution, or vegetation clearing.

Erosion that leads to sedimentation and turbidity, removal of floodplain vegetation, altered water flow, and disturbance to the riverbed associated with the eventual removal and replacement of the bridge under the No-Action Alternative would have short- and long-term, adverse impacts on water features, water quality, and floodplains. When combined with the effects of past, ongoing, and reasonably foreseeable actions, cumulative impacts would be adverse, with the No-Action Alternative contributing a slight adverse increment to the overall adverse cumulative impact on water resources in the project area.

Erosion that leads to sedimentation and turbidity, removal of floodplain vegetation, altered water flow, and disturbance to the riverbed associated with the eventual removal and replacement of the bridge under Alternative 1 would have short- and long-term, adverse impacts on water features, water quality, and floodplains. When combined with the effects of past, ongoing, and reasonably foreseeable actions, cumulative impacts would be adverse, particular regarding floodplains, with Alternative 1 contributing a slight adverse increment to the overall adverse cumulative impact on water resources in the project area.

Like Alternative 1, erosion that leads to sedimentation and turbidity, removal of floodplain vegetation, altered water flow, and disturbance to the riverbed associated with the eventual removal and replacement of the bridge under Alternative 2 would have short- and long-term, adverse impacts on water features, water quality, and floodplains. When combined with the effects of past, ongoing, and reasonably foreseeable actions, impacts would be adverse, particularly regarding floodplains, with Alternative 2 contributing a slight adverse increment to the overall adverse cumulative impact on water resources in the project area. There would be limited differences in the contribution of Alternative 2 to the overall cumulative impact compared to Alternative 1 on water resources. Impacts to floodplains would contribute slightly more to cumulative impacts under Alternative 2 compared to Alternative 1.

Conclusion

Under both action alternatives, bridge removal and construction would have short- and long-term, adverse impacts on water resources, including water features, water quality, and floodplains. Potential impacts would include erosion that leads to sedimentation and turbidity, removal of floodplain vegetation, altered

water flow, and disturbance to the riverbed as a result of clearing, grading, excavation, use of heavy construction equipment, and in-water work.

Impacts to water features would be similar under both action alternatives. Adverse impacts to water quality and floodplains would be greater under Alternative 2 because additional excavation, disturbance to floodplains and the riverbed, and in-water work would occur compared to Alternative 1. Long-term, beneficial impacts to floodplains would occur under both action alternatives because some of the floodplains would be reclaimed after the removal of the old bridge. However, fewer acres of floodplains would be disturbed under Alternative 1, resulting in a slightly greater beneficial impact than Alternative 2 once the floodplains are reclaimed.

Impacts to water resources under the No-Action Alternative would be similar to those described for the action alternatives because the bridge would eventually be demolished and replaced, but these impacts would occur in the future (approximately 10 to 20 years). Both action alternatives would contribute an adverse increment to the overall adverse cumulative impact on water resources.

COMPARISON OF POTENTIAL RESOURCE IMPACTS BY ALTERNATIVES

A comparative summary of the potential resource impacts by alternative are described in Table 11.

TABLE 11. COMPARISON OF POTENTIAL RESOURCE IMPACTS BY ALTERNATIVES

Impact Topics	No Action	Alternative 1	Alternative 2
Cultural Resources	No impacts on cultural resources while existing conditions are maintained. When bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Long-term, adverse impact to the Natchez Trace Parkway Historic District and the Tennessee River Bridge/Colbert Ferry Boat Ramp Area/Water Route Overlook Cultural Landscape. The east side of the bridge and Parkway would be realigned, resulting in less of an adverse impact to the cultural landscape (compared to Alternative 2).	Long-term, adverse impact to the Natchez Trace Parkway Historic District and the Tennessee River Bridge/Colbert Ferry Boat Ramp Area/Water Route Overlook Cultural Landscape. Both sides of the bridge would be realigned, resulting in more of an adverse impact to the cultural landscape (compared to Alternative 1).
Environmental Justice	No impacts on communities with environmental justice concerns while existing conditions are maintained. Short-term, adverse impacts on communities with environmental justice concerns from increased frequency of maintenance and repairs. When bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2. However, the overall long-term impacts would have a disproportionate and adverse impact on communities with environmental justice concerns compared to the general public because planning and updated studies would need to be conducted to develop plans for the eventual replacement of the bridge, and funding would need to be secured.	Alternative 1 would require a bridge closure of approximately 2 years, therefore, communities with environmental justice concerns would experience adverse impacts during that time period. Short-term, adverse impacts would be related to access to community resources, regional businesses, employment destinations, goods and services in adjacent communities, and emergency services. Short-term, adverse impacts would also be related to increased financial burden due to altered travel patterns from detour route. Short-term, beneficial impacts on the local economy due to the employment of local workers and the use of local materials.	Alternative 2 would require a shorter bridge closure duration than Alternative 1; therefore, communities with environmental justice concerns would experience adverse impacts for a shorter period compared to Alternative 1. Short-term, adverse impacts would be related to access to community resources, regional businesses, employment destinations, goods and services in adjacent communities, and emergency services. Short-term, adverse impacts would also be related to increased financial burden due to altered travel patterns from detour route. Short-term, beneficial impacts on the local economy due to the employment of local workers and the use of local materials.

Impact Topics	No Action	Alternative 1	Alternative 2
Geological Resources	No impacts on geological resources while existing conditions are maintained. Short-term, adverse impacts on geological resources from increased frequency of maintenance and repairs. When bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Construction would result in short-term, adverse impacts to soil from disturbance due to construction/demolition activities, excavation, and construction vehicle traffic. Construction of bridge support piers and bridge abutments would not impact bedrock because the permitted tools do not generate vibratory or percussive waves strong enough to affect the rock matrix. Construction could result in permanent, adverse impacts to karst if bedrock is exposed by soil erosion and worn away by cycles of runoff and ponding.	Impacts on soil and rock would be greater under Alternative 2 than under Alternative 1 because of the amount of new land that would be disturbed during construction, as well as the amount of land needed for clearing and cut-and-fill to support the new roadway and ditch. However, impacts would still be short term and adverse. Consistent with Alternative 1, construction of bridge support piers and bridge abutments would not impact bedrock. Consistent with Alternative 1, construction could result in permanent, adverse impacts due to dissolution of bedrock exposed by cycles of runoff and ponding.
Natural Soundscapes	No impacts on the existing acoustic environment while existing conditions are maintained. Short-term, adverse impacts on natural soundscapes from increased frequency of maintenance and repairs. When eventual bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Construction would result in short-term, adverse impacts on the soundscape. Impacts on wildlife from noise would result in long-term, adverse impacts. Impacts on visitor experience from construction noise would result in short-term, adverse impacts to the natural soundscape. Impacts on visitor experience from future traffic noise would likely be imperceivable.	Construction impacts would be slightly greater than under Alternative 1 but would still be short term and adverse on the soundscape. Impacts on wildlife from noise would result in long-term, adverse impacts. Impacts on visitor experience from construction noise would result in long-term, adverse impacts to the natural soundscape. Impacts on visitor experience from future traffic noise would likely be imperceivable.

Impact Topics	No Action	Alternative 1	Alternative 2
Wildlife, Including Threatened and Endangered Species	No impacts on wildlife, including threatened and endangered species or their habitats, while existing conditions are maintained. Temporary impacts would result from ongoing maintenance and repairs. When eventual bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Wildlife, including threatened and endangered species, would experience temporary impacts as a result of noise, visual disturbances, turbidity and sedimentation. Permanent impacts would result from habitat removal.	The types of impacts general wildlife, and threatened and endangered species, would experience under Alternative 2 such as noise, visual disturbances, and habitat removal, would be the same as Alternative 1; however, the extent and duration would be greater under Alternative 2. Impacts under Alternative 2 are still anticipated to be minor and temporary.
Visitor Use and Experience	Increased maintenance and repair would result in short-term, adverse impacts due to visual and auditory disruptions. Eventual bridge removal and replacement would result in short- and long-term, adverse impacts from visual and auditory disruptions, traffic delays, and loss of connectivity. No impacts on visitor use and experience while existing conditions are maintained. Short-term, adverse impacts on visitor use and experience from increased frequency of maintenance and repairs. When eventual bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Construction would result in short-term, adverse impacts from visual and auditory disruptions, bridge closures, traffic delays, and connectivity loss. The new bridge would have long-term, beneficial impacts by improving visitor safety and access to recreational, natural, and cultural resources.	Adverse impacts would be slightly greater than under Alternative 1 but would still be short term and adverse, lasting the duration of construction. Similar long-term, beneficial impacts as Alternative 1.

Impact Topics	No Action	Alternative 1	Alternative 2
Water Resources and Water Quality	No impacts on water resources while existing conditions are maintained. Short-term, adverse impacts on existing water resources from increased frequency of maintenance and repairs. When eventual bridge replacement is necessary, impacts would be similar to Alternatives 1 and 2.	Short-term, adverse impacts to water resources from vegetation clearing, erosion, altered water flow, and disturbed riverbed during bridge removal and construction. Long-term, adverse impacts to water resources from removal of floodplains from where the new bridge would be built on a partial new alignment. Long-term, beneficial impacts to water resources from reclaimed floodplains where the old bridge would be removed.	Similar short-term, impacts as Alternative 1. Similar long-term, adverse impacts as Alternative 1; however, more adverse impacts to water resources from excavation, disturbance to floodplains and the riverbed, and in-water work needed for Alternative 2. Similar long-term, beneficial impacts as Alternative 1 from the eventual floodplain reclamation; however, more floodplain acreage would be disturbed under Alternative 2.

CHAPTER 4: CONSULTATION AND COORDINATION

INTRODUCTION

This chapter describes the consultation and coordination conducted during the preparation of this EA. The civic engagement process for the project began in October 2022. A detailed description of the civic engagement/early consultation process and the agency consultation initiated during the development of the EA is summarized below.

PUBLIC PARTICIPATION

The Public Involvement Process

Public involvement is an essential component of the NEPA planning process. The NPS released a project newsletter on October 21, 2022, providing the public with background on the proposed project, the purpose and need for the project, potential preliminary options, the planning process, and how to comment on the newsletter. The document was published on the NPS Planning, Environment, and Public Comment (PEPC) website at: https://parkplanning.nps.gov/JohnCoffeeMemorialBridge.

The civic engagement period was open for 30 days from October 21, 2022, to November 28, 2022. The NPS considered all comments from members of the public and any written comments emailed or mailed to park headquarters, entered the comments into PEPC, and included them in the overall project record.

In general, commenters were concerned about how closing the bridge entirely could affect the local community. They also expressed concern over the proposed detour route, which would add an additional hour to commute times and could lead to employment displacement and decrease visitation along and surrounding the Parkway, which could affect small businesses and the local economy. Commenters were concerned about no longer having access to parks and recreation facilities located along the south side of the bridge and expressed concerns about potential safety hazards, including fire and emergency response times. Commenters generally supported the reconstruction of the bridge due to safety concerns but were most supportive of the alternative that would keep the existing bridge open while the new bridge is constructed either to the north or south of the existing bridge.

In addition to the press release and newsletter, the NPS held one virtual public meeting and two in-person meetings. The virtual public meeting was held over Zoom on October 25, 2022, from 5:00 p.m. to 6:30 p.m. During the virtual public meeting, the project planning team presented the details of the proposed preliminary options as well as the project background. The public was encouraged to participate by asking questions over a live question-and-answer (Q&A) platform in Zoom. Six people attended the virtual meeting.

The in-person public meetings were held from 5:00 to 6:30 p.m. on November 2, 2022, in Cherokee, Alabama at the Cherokee Senior Center and on November 3, 2022, in Florence, Alabama at the Florence-Lauderdale Public Library. During the in-person public meetings, the project planning team presented the details of the proposed preliminary options as well as the project background. The public was encouraged to participate by asking questions and submitting comments. An estimated total of 35 people attended both in-person meetings. Eighty-five pieces of correspondence were received during the public comment period.

The NPS issued a newsletter discussing project updates to interested individuals and organizations on the NPS PEPC website on April 30, 2024, notifying them of project updates that had occurred since the civic engagement period in October–November 2022. The newsletter included information on the two action alternatives carried forward for detailed analysis and the No-Action Alternative. The newsletter also provided updates on the studies conducted to analyze known resources in the project area to gain a better understanding of the extent of potential impacts to resources.

Public Comment on the Environmental Assessment

The EA will be available for formal public and agency review for 30 days. Interested individuals, agencies, and organizations will be notified of its availability. The EA will be available for public review on the NPS PEPC website: https://parkplanning.nps.gov/projectHome.cfm?ProjectID=99418.

AGENCY CONSULTATION

The NPS initiated consultation with relevant agencies during the preparation of this EA and provided a copy of the EA for review. This consultation is discussed in more detail below.

US Fish and Wildlife Service

Endangered Species Act, Section 7 Consultation

Section 7 of the ESA requires federal agencies to consult with USFWS to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. In accordance with Section 7 of the ESA, the NPS prepared a Biological Evaluation for USFWS on August 18, 2023. Based on the biological analysis of potential impacts from replacing the Tennessee River Bridge, the NPS requested concurrence from USFWS that all potential effects from the proposed action to federally listed, proposed, and candidate species would be insignificant or discountable and the proposed action may affect but is not likely to adversely affect the gray bat, Indiana bat, little brown bat, northern long-eared bat, or tricolored bat. There is no designated critical habitat within the project area; therefore, the proposed action would have no effect on critical habitat for any listed species. Further, the proposed action would have no effect on dromedary pearly mussel because this species is extirpated from the project area and is not likely to adversely affect pink mucket or rough pigtoe based on the likely absence of these species from the project area and the limited amount of benthic disturbance.

Alabama State Historic Preservation Office

National Historic Preservation Act, Section 106 Consultation

Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties. Compliance with Section 106 of the NHPA was carried out separately but concurrently with the planning process for the EA. As required by Section 106 of the NHPA, the NPS is consulting with the Alabama SHPO as a consulting party.

In March 2022, the NPS sent a letter to the Alabama Historical Commission (AHC) requesting consultation in accordance with Section 106 of the NHPA. On April 6, 2022, AHC accepted consultation status.

In March 2023, the NPS transmitted the draft John Coffee Memorial Bridge Cultural Landscape, Natchez Trace Parkway CLI, and Alabama SHPO Determination of Eligibility Form for review to AHC. On April 20, 2023, AHC agreed with the determination that the Tennessee River Bridge Water Route Overlook Cultural Landscape is eligible under Criteria A, B, C, and possibly D. AHC also concurred that demolition of the bridge would result in an adverse effect and noted that the new alignment may have an adverse effect on the cultural landscape. On July 2, 2024, AHC concurred with the results and recommendations of the Assessment of Effect documentation.

On June 16, 2023, a draft ethnographic report was provided to the Alabama SHPO for review and comment. The Alabama SHPO responded with comments within 30 days of receiving the report, and these comments were fully addressed in the revised and final ethnographic reports.

On June 10, 2024, the NPS requested review and comment on the internal draft EA from the Alabama SHPO so the NPS could incorporate feedback before the EA was finalized and released for public review. No comments were received within the 30-day review period.

On September 8, 2024, the NPS requested review and comment on the second internal draft EA from the Alabama SHPO so the NPS could incorporate feedback before the EA was finalized and released for public review. No comments were received within the 30-day review period.

The NPS is preparing a Programmatic Agreement for this effort. This draft document is provided in Appendix E. Any comments that are received during public review of the EA, as related to the Programmatic Agreement, will be addressed prior to finalizing the NPS decision document for this EA. The NPS will complete the Section 106 consultation process, including executing the Programmatic Agreement. The process will reflect ongoing consultation with the Alabama SHPO and other consulting parties, including TVA, FHWA, USACE, and USCG, and the Native American Tribes (see below) consulted as concurring parties.

Tribal Nations

National Historic Preservation Act, Section 106 Consultation

As required by Section 106 of the NHPA, the NPS is consulting with federally recognized Native American Tribes that are culturally or historically affiliated with the Parkway. In March 2022, the NPS initiated consultation with the following Tribal Nations as consulting parties: Absentee-Shawnee Tribe of Indians of Oklahoma, the Alabama-Quassarte Tribal Town, the Alabama-Coushatta Tribe of Texas, the Cherokee Nation, the Chitimacha Tribe of Louisiana, the Eastern Band of Cherokee Indians, the Eastern Shawnee Tribe, the Jena Band of Choctaw Indians, the Kialegee Tribal Town, the Miccosukee Tribe of Indians of Florida, the Mississippi Band of Choctaw Indians, the Muscogee (Creek) Nation, the Poarch Band of Creek Indians, the Seminole Nation of Oklahoma, the Seminole Tribe of Florida, the Shawnee Tribe, the Chickasaw Nation, the Thlopthlocco Tribal Town, the Tunica-Biloxi Tribe of Louisiana, and the United Keetoowah Band of Cherokee Indians. Between March 29 and July 8, 2022, the NPS received responses from the following: Cherokee Nation, the Chickasaw Nation, the Choctaw Nation, the Eastern Shawnee Tribe, the Muscogee (Creek) Nation, the Poarch Band of Creek Indians, and the Shawnee Tribe, accepting status as consulting parties. Several Tribes requested that the NPS conduct a cultural resource survey to ensure that the project would not adversely impact any resources of cultural or archeological significance.

On September 8, 2022, the NPS and project staff held a Tribal Consultation Meeting with the aforementioned Tribes to discuss the archeological and ethnographic studies. The project staff conducted interviews for the ethnographic study with Jeffrey Bibbee with the Alabama Trail of Tears Association at the request of the Cherokee Nation on January 12, 2023; LaDonna Brown, Kirk Perry, and Adam Drannon with the Chickasaw Nation on November 10, 2022; RaeLynn Butler with the Muscogee (Creek) Nation on November 29, 2022; and Larry Haikey and Billy Bailey with the Poarch Band of Creek Indians on January 31, 2023. The Shawnee Tribe did not wish to participate in the study, but it did provide the NPS with a list of approved resources to use for the study.

On June 16, 2023, a draft ethnographic report was provided to the Tribes for review and comment. The Chickasaw Nation and the Muscogee (Creek) Nation responded with comments within 30 days of receiving the report, and these comments were fully addressed in the revised and final ethnographic reports. Consultation with the Chickasaw Nation is ongoing.

On June 10, 2024, the NPS requested review and comment on the internal draft EA from the Tribes so the NPS could incorporate feedback before the EA was finalized and released for public review. No comments were received within the 30-day review period.

On September 8, 2024, the NPS requested review and comment on the second internal draft EA from the Tribes so the NPS could incorporate feedback before the EA was finalized and released for public review. No comments were received within the 30-day review period.

The NPS will complete the Section 106 consultation process prior to finalizing the decision document for this EA, and ongoing consultation with traditionally associated Native American Tribes (the Chickasaw Nation, Muscogee (Creek) Nation, Poarch Band of Creek Indians, Cherokee Nation, and Shawnee Tribe are concurring parties for this undertaking). Furthermore, if the Tribes provide additional information on ethnographic resources or traditional uses, the NPS will work with concerned parties to resolve any potential impacts associated with the project.

Cooperating Agencies

Federal Highway Administration, US Coast Guard, US Army Corps of Engineers, and Tennessee Valley Authority

The NPS is consulting with FHWA, USCG, USACE, and TVA as cooperating agencies for this project. FHWA developed the conceptual design for the project, and the agency is continuing to work with the NPS to revise the designs to limit the potential impacts on natural and cultural resources.

On October 6, 2021, the NPS sent an invitation to USCG, USACE, and TVA, requesting their involvement on the project as a cooperating agency. The NPS received acceptance letters from USCG, USACE, and TVA within 30 days of receiving the invitation.

On June 10, 2024, the NPS requested review and comment on the internal draft EA from the cooperating agencies so the NPS could incorporate feedback before the EA was finalized and released for public review. The NPS received comments from the USACE and TVA within 30 days of receiving the draft document, and the comments are fully addressed in the revised draft document.

On September 8, 2024, the NPS requested review and comment on the second internal draft EA from the cooperating agencies so the NPS could incorporate feedback before the EA was finalized and released for public review. The NPS received comments from the USACE and TVA within 30 days of receiving the draft document, and these comments are fully addressed in the revised document.

Consultation efforts are ongoing with the cooperating agencies.