TVA PUMPED STORAGE HYDROPOWER
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Jackson County, Alabama and Marion County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

Cooperating Agencies:
U.S. Army Corps of Engineers
U.S. Coast Guard

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COVER SHEET

TVA Pumped Storage Hydropower

Proposed action:	The Tennessee Valley Authority has prepared this Environmental Impact Statement to assess the environmental impacts associated with the construction and operation of new pumped storage hydropower (PSH) storage facilities or expanding an existing PSH facility.
Type of document:	Draft Environmental Impact Statement
Lead agency:	Tennessee Valley Authority
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Abstract:

TVA is considering four alternatives for the construction and operation of Pumped Storage Hydroelectric facilities. In addition to the No Action Alternative (Alternative A), TVA is also considering the construction of a new PSH facility near Rorex Creek (Alternative B) and Widows Creek (Alternative C), both in Jackson County, Alabama. TVA is also considering the expansion of the existing Raccoon Mountain Pumped Storage facility (RPS) in Marion County, Tennessee (Alternative D). The study areas for all three action alternatives total approximately 10,700 acres. The EIS will present existing conditions within each project site for relevant resources and an assessment of potential project-related impacts per currently proposed scenarios at each site.

EXECUTIVE SUMMARY

Introduction

The Tennessee Valley Authority (TVA) prepared this Draft Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts associated with the proposed action to construct and operate a new or expanded pumped storage hydroelectric (PSH) facility. PSH is a type of hydroelectric energy storage that serves the same power supply function as peaking units, but it uses low-cost, off-peak electricity to store energy for generation at peak times. PSH plants pump water to an upper reservoir during periods of low demand and release water to a lower pool to generate electricity during periods of high demand. TVA has identified three potential action alternatives for new PSH development:

- A new PSH located near Rorex Creek, Pisgah, Alabama with an energy generation capacity ranging from 1,200 megawatts (MW) up to 1,600 MW.
- A new PSH located near Widows Creek, Stevenson and Fabius, Alabama with an energy generation capacity ranging from 1,200 MW up to 1,600 MW.
- An 800-MW expansion of the existing Raccoon Mountain PSH, located near Chattanooga, Tennessee

TVA's core statutory objectives under the TVA Act are to provide the people of the Tennessee Valley with low-cost and reliable electricity, environmental stewardship, and a prosperous economy (16 United States Code [U.S.C.] §§ 831 et seq.). Consistent with, and as mandated by the Energy Policy Act of 1992, TVA engages in a long-range, "least-cost planning" process that "evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service to electric customers of [TVA] at the lowest system cost" (16 U.S.C. § 831m-1(b)(1)).

In June 2019, TVA published the 2019 Integrated Resource Plan (IRP) and an associated EIS, which were developed with input from stakeholder groups and the public and provide direction on how best to meet future electricity demand over the next 20 years (TVA 2019a, 2019b). The IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area. TVA's asset strategy incorporated the strategic direction from the 2019 IRP[1] and supports affordable, reliable, and resilient energy for the customers TVA serves. TVA engages in the "least cost planning" process through development of the IRP.

Since the completion of the 2019 IRP, TVA has seen a marked increase in electricity demand and the need for long-duration energy storage. Pumped storage is a versatile asset that provides power generation, long-duration energy storage, and grid balancing, as well as emergency black-start capabilities. Adding a pumped storage facility to the system

[1] TVA is in the process of developing a new IRP. In May 2023, TVA published a Notice of Intent in the Federal Register announcing its plans to prepare an EIS associated with the implementation of the 2025 IRP. The draft 2025 IRP and EIS was published by TVA in September 2024, and development of a final 2025 IRP and EIS is in progress. TVA has reviewed the 2019 IRP and associated EIS and determined that it remains valid and guides future generation planning consistent with least-cost planning principles.

could enable TVA to increase baseload generation sources, such as nuclear, and work in coordination with intermittent resources.

Purpose and Need for Action

The purpose of the Proposed Action is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the 2019 Integrated Resource Plan (IRP) (TVA 2019a) and to meet the demand for electricity by facilitating the integration of additional baseload generation and intermittent resources onto the electric grid. PSH is needed to provide long-duration energy storage to assist with load balancing by allowing baseload technologies, such as nuclear generation, to run nearly full time. This is necessary because these technologies are generally not conducive to following the demand curve and work best when running at a consistent output with limited output variability. PSH is a reliable and proven technology to aid in balancing energy output to meet fluctuating demands. Additionally, PSH is equipped with variable speed turbine technologies that allow greater flexibility in managing grid stability and reliability with less dispatchable generation and greater minute-by-minute variability due to fluctuations in output from intermittent resources.

This Draft EIS evaluates the potential for pumped storage facilities in two areas within Jackson County, Alabama, and an expansion of the existing facility at Raccoon Mountain (RPS). Potential environmental and economic impacts from the construction and operation of pumped storage facilities at each site are also considered.

Alternatives

Alternative A – The No Action Alternative

The No Action Alternative would not meet the purpose and need, but it provides a baseline of conditions against which the impacts of the proposed action alternatives are measured. Under the No Action Alternative, TVA would not develop or expand PSH facilities at any of the project sites. TVA would continue to rely on existing sources of generation to meet generation needs and reserve margin requirements. Existing TVA sources of dispatchable generation include natural gas combined cycle and combustion turbine plants, natural gas aeroderivative plants, and pumped storage. Should demand exceed TVA's generation capacity, TVA would purchase the cheapest available market power.

Alternative B – Construct New Facility Near Rorex Creek (Preferred Alternative)

Under Alternative B, TVA would construct and operate a new PSH facility with a generation capacity between 1,200 MW and 1,600 MW near Tennessee River Mile (TRM) 388 in Pisgah, Alabama. The existing Guntersville Reservoir would serve as the lower pool. This project would include the construction of the upper reservoir, power tunnel, underground powerhouse, switchyard, intake/outflow structure at Guntersville Reservoir (portal), and a 500-kilovolt (kV) project transmission line, as well as relocations of existing 500-kV transmission lines in the project area. The Rorex Creek study area is approximately 4,848 acres and is primarily owned by private landowners with some TVA property on the mountainside and near the river. The study area includes greenfield areas and areas that were previously surface mined for coal.

Specific components of this alternative include the following:

- Construction of an upper reservoir on the Sand Mountain plateau that would have a usable volume up to approximately 48,000 acre-feet and would be surrounded by a dam ranging in height from 40 to 120 feet above the existing ground surface.
- Construction of an underground powerhouse containing four or six variable speed pump-turbine/generator-motor units with an individual unit rating between 260 MW up to 400 MW with a combined rated generating capacity between 1,200 MW up to 1,600 MW.
- Construction of two parallel water conveyance systems (each water conveyance system connected to two units each) consisting of a gated vertical upper reservoir inlet/outlet structure, vertical shaft, high-pressure headrace tunnel, manifold, penstocks, draft tubes, tailrace tunnels, and a gated horizontal lower reservoir inlet/outlet structure.
- Various upgrades and improvements to the existing access roads leading to the project area and new roads within the project site.
- Construction of a permanent barge docking area to facilitate the transport of construction equipment and materials to the site via barge.
- Construction of a new bridge extending from County Road (CR) 558 and crossing Guntersville Reservoir; construction of a new road extending from the new bridge to the upper bluff near the sites; various improvements to existing roads in proximity to and extending from the sites toward the town of Pisgah; and construction of a permanent barge port facility for loading and unloading materials and equipment. Other required local infrastructure improvements are to be determined.
- Construction of new transformer yard and switchyard facilities that would connect to the existing, currently unused double circuit 500-kV transmission line that extends from the Bellefonte Property for approximately 14.7 miles northwest to an interconnection with the existing Madison-Widows Creek 500-kV line at CR 39 (Figure 2-2). Vegetation within the transmission line corridor would be cleared to a width of 300 feet and upgrades would be completed, as necessary.
- Rerouting two existing 500-kV lines around the perimeter of the upper reservoir, resulting in a total of about 5.2 miles of new 500-kV transmission line and removal of about four miles of existing 500-kV transmission lines.

Alternative C – Construct New Facility Near Widows Creek

Under Alternative C, TVA would construct and operate a new PSH facility with a generation capacity of 1,200 MW up to 1,600 MW near TRM 408 in the area near Stevenson and Fabius, Alabama, and Guntersville Reservoir would serve as the lower pool. The Widows Creek study area is on approximately 4,600 acres of greenfield property that is primarily owned by private landowners, with some TVA property on the mountainside and near the river. This alternative would include the construction of the upper reservoir, power tunnel, underground powerhouse, switchyard, intake/outflow structure at Guntersville Reservoir (portal), and a 500-kV project transmission line.

Specific components of this alternative include the following:

- Construction of an upper reservoir on the Sand Mountain plateau that would have a usable volume of approximately 25,600 acre-feet.
- Construction of an underground powerhouse containing four or six 400-MW variable speed pump-turbine and generator-motor units with a combined rated generating capacity between 1,200 MW up to 1,600 MW.
- Construction of two parallel water conveyance systems (each water conveyance system connected to two units each) consisting of a gated vertical upper reservoir inlet/outlet structure, vertical shaft, high-pressure headrace tunnel, manifold, penstocks, draft tubes, tailrace tunnels, and a gated horizontal lower reservoir inlet/outlet structure.
- Various upgrades and improvements to the existing access roads leading to the project area, new roads within the project area, and construction of a permanent barge port facility for loading and unloading materials and equipment. Other required local infrastructure improvements are yet to be determined. If this alternative is selected, additional infrastructure improvements not assessed in this EIS would be evaluated in a separate NEPA review when designs are further developed.
- Construction of new transformer yard and switchyard facilities.
- Because the design, location, and requirements for potential future off-site transmission line development, upgrades, or both are too speculative at this time, the potential environmental impacts from these actions are not evaluated in this Draft EIS. As applicable, additional transmission line(s) and upgrades would be evaluated in a separate NEPA review.

Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would install and operate a second underground powerhouse (800 MW) at TVA's existing RPS facility near Chattanooga, Tennessee (Figure 2-8). The second powerhouse would use water from the existing upper reservoir, drawing the pool down deeper than the present operation for each cycle. This alternative could also include increasing the storage capacity of the upper reservoir through excavation within the existing reservoir footprint. The new plant facility would be sited on lands owned by TVA. The project study area for this alternative includes about 1,500 acres of TVA-owned land adjacent to the existing facility.

The proposed Raccoon Mountain II site would use the existing Raccoon Mountain PSH upper reservoir infrastructure along with the construction of new powerhouse and transmission facilities.

Specific components of this alternative include the following:

- Use of the existing Raccoon Mountain upper reservoir.
- Use of the existing Nickajack Reservoir as the lower reservoir.

- Use of existing yards, roads, and facilities to the extent possible. Existing roads in proximity to the site, other local infrastructure, or both would be improved, as necessary.
- Construction of an underground powerhouse enclosing two variable speed pump-turbine/generator-motor units and associated equipment with a combined installed generating capacity of 800 MW.
- Construction of upper and lower upper reservoir inlet/outlet structures.
- Construction of a water conveyance system consisting of a headrace tunnel and shaft, two penstocks, two draft tubes, and a tailrace tunnel.
- Construction of a new transformer yard located above the proposed underground powerhouse.
- Construction of a new switchyard located in proximity to the existing switchyard.
- Because the design, location, and requirements for potential future off-site transmission line development, upgrades, or both are too speculative at this time, the potential environmental impacts from these actions are not evaluated in this Draft EIS. As applicable, additional transmission line(s) and upgrades will be evaluated in a separate NEPA review.

Effects of the Preferred Alternative

TVA has identified Alternative B (Construct New Facility Near Rorex Creek) as its Preferred Alternative. Under Alternative B, TVA would construct a new 1,200-MW up to 1,600-MW pumped storage hydropower facility in Jackson County, Alabama, near Pisgah. The following sections provide a summary of the environmental effects of the proposed alternative by resource area.

Vegetation

Affected Environment

The Rorex Creek study area encompasses approximately 4,848 acres. It spans both sides of Guntersville Reservoir along the Tennessee River. The study area is located within the Southwestern Appalachians Ecoregion (Level III) and the following Level IV Ecoregions: Sequatchie Valley (68b), which encompasses Guntersville Reservoir, and the portion of the study area on the west side of the reservoir; Plateau Escarpment (68c); and Southern Table Plateaus (68d) (Griffith et al. 2001a). The study area comprises evergreen forest (8.6 percent), mixed conifer-deciduous forest (9.3 percent), deciduous forest (40.3 percent), scrub-shrub (3.7 percent), herbaceous, crops, and pasture (19.3 percent), wetlands (3.7 percent), open water (9.7 percent), and developed (5.4 percent) landcover types. The following rare plant communities are also present in the study area: Appalachian Forested Acidic Seep, Shumard Oak-Chinquapin Oak Mesic Limestone Forest, Cumberland Plateau Willow Oak Pond, Alabama Cumberland Sandstone Glade, limestone glade and barren, and forested escarpment slope spring head. Numerous species flagged as invasive by the Alabama Invasive Plant Council are also present.

Environmental Consequences

The construction of Alternative B would include surface disturbance on up to 2,270 acres of vegetation (excluding barren land, open water and developed land uses), the majority of which has been previously disturbed through right-of-way (ROW) maintenance, logging, mining, or agriculture. Six discrete occurrences totaling approximately 2.5 acres of sandstone glades occur within or very near to the project disturbance area and would be degraded or removed. TVA is committed to restoration of habitat associated with this community with a goal of 1 to 3 (impacted to restored acreage) ratio to offset impacts resulting from project activities. TVA botanists would work to design and implement appropriate restoration activities either within the proposed Rorex Creek TVA property or to a nearby location. Additional conservation measures will be implemented to protect and feature one or more occurrences of this globally imperiled community for public education through the installation of a guided boardwalk with educational signage. However, because of the state and global rarity of this community and the potential loss of a significant number of occurrences and total acreage within the disturbance area, impacts as a result of project activities would still likely be significant. Approximately 0.4 acres of Shumard Oak-Chinquapin Oak Mesic Limestone Forest would also be disturbed. TVA concludes Alternative B will have significant adverse effects on sensitive vegetation communities and minor effects on previously disturbed or locally common communities.

Wildlife

Affected Environment

The Rorex Creek study area includes a wide array of wildlife habitats that support species common to the region. Habitats within the study area include the Guntersville Reservoir and its floodplain; the Sequatchie Valley, a chain of long thin islands and peninsulas partially attached to the shoreline on either side of Guntersville Reservoir; and a steep, rocky escarpment slope that rises approximately 1,000 feet to a large plateau on top of Sand Mountain. During field studies, biologists recorded observations of nine mammal species, 14 reptile species, 9 amphibian species, and 86 bird species. The study area supports a heron rookery and multiple bald eagle and osprey nests.

Environmental Consequences

The construction of Alternative B would include the permanent removal of wildlife habitat within 1,166 acres of forest and approximately 681 acres of herbaceous and scrub-shrub vegetation. Temporary disturbance to additional habitats would also occur during construction. Due to the existing nature of the landscape, construction of the project's generating facilities would not result in forest fragmentation. While the off-site transmission line would occupy existing right-of-way, the existing transmission line is not energized, and TVA has not managed vegetation in the corridor for over 15 years. Where tree clearing would be needed to maintain clearance from the new line (approximately 170 acres), some forest fragmentation would occur. TVA has committed to best management practices (BMPs) that would minimize impacts on wildlife. TVA concludes Alternative B will have minor temporary adverse effects on local wildlife associated with construction noise and habitat loss.

Threatened, Endangered, and Rare Species

<u>Affected Environment</u>

TVA referred to the U.S. Fish and Wildlife Service's Information for Planning and Consultation tool (IPaC), the Alabama Natural Heritage Program, and TVA's internal Regional Natural Heritage Database to identify federally listed and rare species with the potential to occur in the Rorex Creek study area. Species listed as threatened, endangered, or proposed for listing under the Endangered Species Act (ESA) with potential to occur in the study area are the endangered green pitcher plant (*Sarracenia oreophila*), Morefield's leather flower (*Clematis morefieldii*), gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*) and pink mucket (*Lampsilis abrupta*); the threatened American Heart's-tongue fern (*Asplenium scolopendrium* var. *americanum*), Price's potato-bean (*Apios priceana*), and northern long-eared bat (*Myotis septentrionalis*); the proposed endangered tricolored bat (*Permimyotis subflavus*) and eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*); the proposed threatened monarch butterfly (*Dananus plexippus*), and the experimental, non-essential population of whooping crane (*Grus americana*). Additionally, this review identified three amphibians, one arthropod, four mussels, one fish, and 53 plants with a state status or rank of S1, S2, or S3; and 14 birds of conservation concern or otherwise protected by federal statutes.

<u>Environmental Consequences</u>

The construction of Alternative B would remove forests that provide summer roosting and foraging habitats for bats. TVA would implement seasonal tree clearing near potentially sensitive areas for federally protected bat species in the study area on the west side of Guntersville Reservoir, install cave gates at important hibernacula within the study area and the region, and conduct seismic studies to determine the potential for noise and vibration impacts on bats. TVA would continue to monitor caves within the Rorex Creek study area to document seasonal use and monitor local bat populations in conjunction with state, federal, and non-governmental organization partners as a part of white-nose syndrome response efforts to monitor bat populations.

With the use of avoidance, minimization, and conservation measures, TVA has determined implementation of Alternative B may affect but is not likely to adversely affect American Hart's tongue fern, green pitcher-plant, Morefield's leather flower, Price's potato-bean, gray bat, Indiana bat, northern long-eared bat, and pink mucket. This alternative would not jeopardize the continued existence of tricolored bat, eastern hellbender, whooping crane, or monarch butterfly. Construction and operation of the project would have significant adverse effects on several rare plant species including Alabama snowwreath (*Neviusia alabamensis*), woodland coreopsis (*Coreopsis major*), fame flower (*Phemeranthus sp.*), granite flatsedge (*Cyperus granitophilus*), Harper's dodder (*Cuscuta harperi*), and creeping aster (*Eurybia surculosa*). TVA would work to avoid impacting these species' occurrences; however, avoidance cannot be guaranteed. Additional rare or sensitive species located within the limits of disturbance would be subject to minor adverse effects, including Gattinger's prairie clover (*Dalea gattingeri*), yellow wood (*Cladrastis kentukea*), flatrock pimpernel (*Lindernia monticola*), southern rein orchid (*Platanthera flava* var. *flava*), elf orphine (*Sedum smallii*), wahoo (Euonymus atropurpureus)~~,~~ and cream avens (*Geum virginianum*).

Surface Waters

Affected Environment

Surface water features within the Rorex Creek study area include a portion of the Guntersville Reservoir, an existing impoundment on the Tennessee River, as well as numerous streams and ponds. The escarpment generally drains directly into the reservoir, while drainage on the plateau (on the east side of the reservoir) generally flows to the south and east towards Rorex Creek, which subsequently flows to the reservoir. Several streams are also present on the west side of the reservoir. Surface water features for the Rorex Creek study area include approximately 42 intermittent or perennial streams, 60 ephemeral channels, and 29 ponds. A total of 10,357 linear feet of perennial streams, 26,621 linear feet of intermittent streams, and 51,245 linear feet of ephemeral streams were identified during Rorex Creek study area field surveys.

Environmental Consequences

Within the Rorex Creek disturbance area, approximately 5,468 linear feet of perennial streams, 14,480 linear feet of intermittent streams, and approximately 28,149 linear feet of ephemeral streams are expected to be permanently impacted by construction activities. TVA would obtain the necessary Section 404/401 Clean Water Act (CWA) permits and complete required compensatory mitigation to ensure the proposed impacts are compensated to the extent deemed appropriate such that functions and values remain at the current capacity within larger affected basins. Project operation would result in changes to the Guntersville Reservoir water surface elevations with a range of up to 0.5 feet greater and 0.25 feet lower than current levels under non high flow or flood flow regimes in Guntersville Reservoir. Any project-related changes in temperature in Guntersville Reservoir would dissipate within three miles of the intake/outflow structure. TVA anticipates there would be minor effects on surface waters associated with the construction and operation of the project under the preferred alternative.

Aquatic Ecology

Affected Environment

The Rorex Creek study area is within the Town Creek-Guntersville Reservoir Watershed and the Rorex Creek-Jones Creek Watershed. Surface water features are described in the Surface Waters Section. Major streams include Jones Creek, Rorex Creek, and Town Creek.

Environmental Consequences

Construction activities within Guntersville Reservoir may result in localized loss of aquatic habitats and mortality for nonmobile, benthic organisms. Areas in which localized habitat losses are anticipated include shoreline areas that are subject to shoreline stabilization, areas within the cofferdam, areas located within the footprint of the barge facility, and areas within the footprint of the bridge. Avoidance of the construction areas by mobile species decreases mortality and nonlethal adverse impacts to those individuals. Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for construction may result in adverse effects on aquatic ecosystems. Potential impacts related to accidental spills would be minimized by designating storage areas for fuel and lubricants on the project site that are equipped with appropriate spill containment measures in accordance with a site-specific spill prevention, control, and countermeasure (SPCC) plan. Most of the construction-related impacts to aquatic habitats related to construction within Guntersville Reservoir would be temporary and minor.

Operation of a new PSH facility under Alternative B could result in impacts to aquatic ecology as a result of potential thermal alterations, inadvertent chemical releases, alteration of flow, and entrainment and impingement of fish and shellfish. Expected low intake velocities and the presence of a zone of passage outside of the area of influence would be expected to minimize impacts of entrainment and impingement at the intake structure. Impacts of impingement and entrainment on fish communities within Guntersville Reservoir would be expected to be minor.

Wetlands

Affected Environment

Field surveys resulted in the delineation of approximately 188 acres of wetlands within the Rorex Creek study area. Emergent, scrub-shrub, and forested wetlands within the study area primarily occur along streams and drainages and adjacent to Guntersville Reservoir. There are forested wetlands along some of the banks of the reservoir that grade into scrub-shrub and emergent wetlands. Most of the wetlands within the study area are considered low to moderate value, primarily due to past disturbances and presence of invasive species. However, some of the wetlands along the edge of the reservoir and adjacent to islands in the reservoir may be considered as superior quality mainly due to size and diversity of habitats.

Environmental Consequences

Approximately 137.4 acres of wetlands would be disturbed or filled by the proposed activities. This includes 92.9 acres of wetlands within the footprint of the proposed upper reservoir, associated conduits, new bridge and roadway, staging areas around the tunnel entrance, and other associated structures required for the development of the Rorex Creek site. Filled wetlands also include wetlands within the footprint of the proposed spoils disposal area along the eastern bank of the reservoir, which is necessary for full site build-out and grading in support of needed infrastructure. The functions of disturbed or filled wetlands would be lost. In addition, approximately 44.1 acres of forested wetlands within the off-site transmission line corridor would be converted to emergent or scrub-shrub wetlands. Approximately 142 acres of open water within Guntersville Reservoir would be disturbed or filled by the proposed activities.

Impacts on wetlands under Alternative B would be considered moderate due to the amount of potential wetland impacts associated with this alternative. However, loss of wetland habitat due to wetland fill would be compensated through wetland mitigation banking (or other acceptable method). Loss of wetland functions and values from forested wetland clearing would be compensated for at the discretion of state regulators and in accordance with Executive Order (EO) 11990. With mitigation requirements in place that ensure no net loss of wetland function, impacts on wetlands at the 10-digit hydrologic unit code (HUC) watershed level would be moderate.

Floodplains

Affected Environment

The Rorex Creek study area is located on Guntersville Reservoir, in Jackson County, Alabama, between about Tennessee River miles 389 and 395. In total, the Tennessee River Basin drains approximately 40,910 square miles, gradually sloping from southwest Virginia to Chattanooga (NWS 2024). The total Tennessee River drainage area is approximately 23,300 square miles at the Rorex Creek study area.

Environmental Consequences

The preferred alternative would require both excavation and fill to construct an upper reservoir with a dam embankment footprint of approximately 10 to 17 million cubic yards, including a usable volume up to approximately 48,000 acre-feet and would be surrounded by a dam ranging in height from 40 to 120 feet above the existing ground surface, construction of a roadway bridge over the Tennessee River, a barge loading facility, roads, parking areas, and placement of material excavated during construction of the upper reservoir along the Tennessee River. Up to approximately 1,600 acre-feet of net fill would be placed within the 100-year floodplain, which is the area below the 100-year flood elevation of 604.2 feet. Up to approximately 250 acre-feet of net fill would be placed within the Power Storage Zone, which is that area between elevations 593.0 and 595.0 feet, the range within which TVA normally maintains the water surface elevation of the Guntersville Reservoir. Overall, up to about 2,000 acre-feet of net fill would be placed within the Flood Storage Zone, which is that area between elevations of 593.0 feet and the 500-year flood elevation of 605.7 feet.

Impacts on floodplains and flood risk under Alternative B would result from the construction of dams, embankments, and upper reservoir; miscellaneous yards and facilities, upper and lower reservoir inlet/outlet structures, placement of fill and/or material excavated during construction, roads and access ways, a bridge across the Tennessee River, transformers and switchyards, and transmission facilities. Approximately 2,077 acres of ground disturbance are expected. TVA would minimize increases in flood elevations and work with Jackson County floodplain officials to ensure the fill and other project components would comply with local floodplain regulations. Thus, the effects of implementation of the preferred alternative on floodplains would be minor to moderate, and in compliance with EO11988.

Geology and Soils

Affected Environment

The Rorex Creek study area is within the Cumberland Plateau Section of the Appalachian Plateaus, underlain by a bedrock of limestone, shale, coal, and sandstone. The depth to bedrock is about 0 to 30 feet, with an average of approximately 5 feet in the upper reservoir area. A review of U.S. Geological Survey (USGS) topographic maps indicates the presence of sinkholes and/or topographic depressions at Middlebrook Point, Stogsdill Point, and Stogsdill Sink, in the Rorex Creek study area. Talus and colluvium are also noted at the Rorex Creek study area, in several areas along Sand Mountain and on the shoreline of Guntersville Reservoir. The most common soil type is limestone rockland rough (18.7 percent), with a parent material of residuum weathered from limestone; a stony, silty, clayey soil profile; and a very low to moderately low ability to transmit water (0.00 to 0.07 inches per hour). Rough stony land and rolling stony land with Muskingum soil material are also well-represented (16.6 percent and 12.0 percent, respectively). While the most well-represented soil profiles of the Rorex Creek study area are stoney, these series generally occur in a contiguous area closest to the Tennessee River; ground disturbance will occur more on the silty, loamy soils—much of them with hydric characteristics—toward the eastern portion of the study area.

Environmental Consequences

Impacts on geology and soils under Alternative B would result from the construction of dams, embankments, and upper reservoir; tunnels, caverns, and shafts; miscellaneous yards and facilities, upper and lower reservoir inlet/outlet structures, roads and access ways, transformers and switchyards, and transmission facilities. Underground excavation will require drilling and blasting. Approximately 2,077 acres of ground disturbance are expected. An estimated 10 to 17 million cubic yards of material will be required for dam embankment. TVA will implement stability support measures to limit the risk of landslides, stabilize slopes, and control leakage. No major geologic hazards are anticipated with the implementation of these measures. Construction will include development of site-specific stormwater pollution prevention plans (SWPPPs) that identify BMPs to minimize the potential for erosion during construction. Thus, the effects of implementation of the preferred alternative on soils would be minor.

Groundwater

Affected Environment

The Rorex Creek study area is underlain by the Tennessee River Valley (Valley) and Ridge Aquifer system. Recharge in Valley and Ridge aquifers occurs when precipitation falls on outcrop areas, percolating downward through Pennsylvanian rock along steeply inclined fractures. Shale is typically considered to have a very low permeability that impedes vertical flow and causes much of the water to move horizontally through sandstone and conglomerate beds until it emerges in the form of springs. Well records from the Geological Survey of Alabama (GSA) within the vicinity of Rorex Creek generally estimate yields of about 10 to 15 gallons per minute. Water quality is generally satisfactory for municipal suppliers and other purposes.

Environmental Consequences

During construction and operation, water within the upper reservoir has the potential to seep into the surrounding rock and soil substrates. As such, seepage can cause groundwater levels to rise locally, and the infiltration of contaminated surface water has the potential to contaminate groundwater. Seepage from the upper reservoir would be prevented using seepage control techniques to be determined as project design progresses, but may include techniques such as grout curtains, localized grouting, or seepage barriers (e.g., liners). Indirect contamination of groundwater from contaminated surface water infiltration would be avoided, minimized, and mitigated through stormwater BMPs and an SPCC plan.

Operation of Alternative B would not alter the quantity of existing groundwater flow as groundwater will not be used to fill the upper reservoir; however, depending on groundwater elevations and site-specific hydrogeologic features with respect to the underground facilities, groundwater flow may be displaced around underground facilities potentially leading to alterations in groundwater flow paths. Additionally, grouting done to reduce impacts to dewatering may alter existing groundwater flow patterns. Overall TVA anticipates construction and operation of the preferred alternative would have minor temporary effects associated with excavation, tunneling, and blasting during construction and water seepage during operation. Any permanent effects on groundwater flow associated with the presence of subsurface facilities would also be minor.

Land Use and Prime Farmland

Affected Environment

Land use within the Rorex Creek study area is rural and agricultural with forested areas. The study area contains all or portions of approximately 79 parcels, 16 of which are owned by TVA. The remaining 63 parcels represent land owned by private individuals or entities. The escarpment along the east side of the reservoir is rocky, forested terrain with an elevation change of approximately 800 feet from the reservoir to the top of the escarpment. The plateau at the top of the escarpment is primarily composed of rural residential land with pastures, agricultural fields, loblolly pine plantations, shallow abandoned mine pit ponds and wetlands, and transmission line easements. TVA-owned portions of the study area are managed pursuant to the Guntersville Reservoir Land Management Plan and are not subject to county or local zoning regulations. Additionally, Jackson County does not have zoning laws, nor are building permits required in areas outside the jurisdiction of a municipality.

Based on information obtained from USDA NRCS (2025), approximately 2,272 acres of the Rorex Creek study area and associated offsite transmission line corridor have soil types that are considered prime farmland, farmland of statewide importance, or prime farmland if drained. On average, this represents roughly 46 percent of the total area within the Rorex Creek study area and transmission line corridor.

Environmental Consequences

Under the preferred alternative, construction activities associated with the development of the PSH facility would occur within a 2,077-acre disturbance area (not including the existing off-site transmission line corridor). These activities would require the acquisition of privately owned land by TVA and the conversion of residential, agricultural, and forested lands on the east side of Guntersville Reservoir to industrial or mixed land uses associated with a PSH facility and developed recreation. It is anticipated that recreation facilities would be similar to existing facilities at RPS, and would likely include hiking and biking trails, boat ramps, picnic areas, and overlooks. Final design and specific recreational amenities would be determined as part of final project design and may require additional permitting and NEPA review. Lands along the shoreline are currently allocated for specific uses in TVA's Guntersville Reservoir Land Management Plan (RLMP). The RLMP parcels associated with the PSH facility would be removed from the plan and TVA's Comprehensive Valleywide Land Plan (TVA 2011) data would be updated.

Direct impacts on prime farmland soils would occur from construction activities. Approximately 65 percent (1,639 acres) of the 2,077 acres of land anticipated to be disturbed during the construction of the proposed PSH facility and associated infrastructure improvements consist of prime farmland soils. These effects have a USDA Farmland

Conversion Impact Rating of 160.4. Based on the impact rating, effects on prime farmland would be minor and would not notably impact regional agriculture or crop production.

Navigation

Affected Environment

Water flow in the Tennessee River is managed by TVA for flood control, navigation, power generation, water quality, water supply, and recreation. Navigation can be impacted by flow and water level. Occurrences of high water can result in impacts on navigation from swift currents, heavy loads of debris, and degradation or loss of aids to navigation. Occurrences of low water can further result in impacts on navigation through reduced channel widths and draft limitations. Two bridges are present in the vicinity of the Rorex Creek study area, the CSX Railroad Bridge at TRM 414.4 and the Captain John Snodgrass Highway Bridge (State Highway 117) at TRM 403.1. These bridges have a vertical clearance at regulated high water of 51.1 feet and 59.7 feet, in the raised position for the railroad bridge, respectively. There are 10 aerial power crossings in this section of the Tennessee River, the lowest of which has a vertical elevation at regulated high water at 78 feet. Flow and pool elevation in Guntersville Reservoir are managed by TVA. The target summer pool level is about elevation 595 feet and the target winter pool elevation is around 593 to 593.5 feet (TVA 2023c). Presently, the typical daily fluctuations in the Guntersville reservoir pool level are on the order of about 0.5 foot per day.

Environmental Consequences

Project construction has potential to affect river navigation through increases in barge traffic and construction of a cofferdam during construction of the intake/outflow structure on Guntersville Reservoir, and construction of a new bridge over the reservoir which would include placement of bridge piers on either side of the navigation channel. TVA will consult with the U.S. Coast Guard and USACE (both cooperating agencies for this Draft EIS) during the final design of the bridge piers to ensure there are no adverse effects on navigation. Changes in the water surface elevation of Guntersville Reservoir during project operations would be on the order of 0.5 foot higher and 0.25 foot lower than current conditions under non high flow or flood flow regimes in Guntersville Reservoir and would have negligible effects on navigation. Energy dissipation structures and navigational aids, such as blinking lights, will be used in the lower reservoir around the intake/outflow structure to mitigate potential localized effects on navigation associated with project operation.

Natural Areas, Parks, and Recreation

Affected Environment

There are eight managed natural areas, one conservation easement, and one county park within five miles of the Rorex Creek study area. The project transmission line corridor crosses or is adjacent to several parcels of the James D. Martin/Skyline Wildlife Management Area (WMA), managed by the Alabama Department of Conservation of Natural Resources (ADCNR). Apart from developed recreational facilities, there are also opportunities for dispersed recreation on Guntersville Reservoir. Dispersed recreation occurs in an undeveloped setting and includes informal activities such as hiking, nature observation, primitive camping, backpacking, horseback riding, cycling, boating, canoeing, fishing, rock climbing, off-road all-terrain vehicle use, and scenic driving.

Environmental Consequences

The construction of the PSH facility may impact managed and natural areas due to noise associated with construction and vehicles hauling materials on-site. Because of their distances from the site (0.5 miles to 5.0 miles), and with the implementation of BMPs, (e.g., fugitive dust control measures and soil erosion prevention measures), no direct impacts on these areas would be anticipated. The proposed transmission line corridor would cross the James D. Martin/Skyline WMA, which covers over 60,000 acres throughout northeast Alabama, most of which would remain unaffected by project activities. Due to the implementation of proper BMPs and the minimal amount of disturbance within the James D. Martin/Skyline WMA, impacts from project construction and operation are expected to be minor. Project construction would be visible and audible from the surface of Guntersville Reservoir and would have temporary, localized minor effects on boaters during the construction period. During project operations, boaters would see current flowing through the project tailrace between the inlet/outlet structure and Guntersville Reservoir. TVA would construct energy dissipation structures, similar to those at the Raccoon Mountain facility, that disperse currents and ensure these flows do not present a safety or operation concern for recreational boaters. As a project component, TVA would include recreational amenities in the project development. Examples of these amenities include green spaces; hiking, biking, and nature trails; picnic areas; a public boat launch on Guntersville Reservoir; a fishing pier; and pavilions. TVA would consult with the local community during further development and design of these resources. Thus, project operation would be expected to have a significant long-term beneficial effect on recreation opportunities in the project area.

Cultural and Historic Resources

Affected Environment

A total of 30 previously recorded archaeological sites, 30 newly identified archaeological sites, and 16 isolated finds were recorded during surveys in the Rorex Creek study area. Eleven archaeological sites are recommended as eligible for the National Register of Historic Places (NRHP). An additional three sites are considered unassessed since they were not fully investigated. The remaining sites and isolated finds investigated were recommended ineligible for the NRHP. The 71 architectural resources surveyed as part of the current undertaking were recommended ineligible for listing in the NRHP due to a lack of historic significance and/or poor integrity. Additional areas, located beyond the Rorex Creek project area surveyed as part of the current undertaking, were examined during a desktop review and viewshed analysis for the newly proposed transmission line for the Rorex Creek project. The analysis indicated one additional NRHP-eligible and two unassessed historic architectural resources are located within the cultural resources APE.

Environmental Consequences

Based on the current design of the proposed action, there is only one archaeological site that is unassessed for its NRHP eligibility that falls within the limits of disturbance for the proposed Rorex Creek facility. In order to ensure there are no impacts to the unassessed site within the limits of disturbance, TVA will avoid the site within the proposed project area by restricting project activities to the existing roadbed. If the road requires widening, fabric will be laid down across the portions of the site outside of the roadbed and gravel will be placed atop the fabric. Adherence to these avoidance measures will ensure there are no impacts to the site should it be found to be eligible during future investigations. If this site cannot be avoided, additional investigations to assess eligibility would be required and mitigation of adverse effects may be necessary. No additional archaeological sites or historic architectural resources that are unassessed for their NRHP eligibility, or are recommended or determined eligible or potentially eligible and located within the cultural resources area of potential effect (APE) will be impacted by the proposed undertaking in the Rorex Creek survey area. Consultation is currently ongoing for this portion of the project with the Alabama State Historic Preservation Office (SHPO) and federally-recognized Indian tribes.

Visual Resources

Affected Environment

The Rorex Creek study area is located near Pisgah, Alabama, on the east and west sides of Guntersville Reservoir. The landscape is characterized by ridges running in a general southwest to northeast direction. The area along the reservoir is gently rolling with an average elevation of 600 feet. Moving to the east, the elevation rises to a rolling plateau up to an elevation of 1,400 feet. The higher terrain areas are more heavily forested than the lower elevations along the river valley and are mostly marshland. Based on the above characteristics, the scenic attractiveness of the affected environment at the Rorex Creek study area is considered to be common to minimal, whereas the scenic integrity is considered to be moderate. The scenic value class of a landscape is determined by combining levels of scenic attractiveness, scenic integrity, and visibility and can be excellent, good, fair, or poor. Based on the criteria used for this analysis, the overall scenic class for the affected environment is considered to be fair.

Environmental *Consequences*

During the approximately 5.5-year construction period, there would be minor, temporary impacts due to increased personnel and heavy construction equipment such as large trucks and cranes coupled with disturbances of clearing and grading, extensive rock excavation, and laydown and staging areas.

Long-term impacts resulting from the construction of the Rorex Creek PSH would include visible alterations to the existing landscape associated with the upper and lower reservoirs, dam structures, and bridge, as well as the proposed 500-kV switchyard and the new transmission structures and overhead wires associated with the new reconfigured 500-kV transmission lines. The industrial elements from the Bellefonte Nuclear Power Plant and utility structures already in place within the project area currently contribute visual discord with the landscape, contributing to the landscape’s ability to absorb negative visual change. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be somewhat affected by the construction of the Rorex Creek PSH facility, the attractiveness rating would remain common to minimal. To visual receptors on the plateau, the only feature of the upper reservoir that would be visible is the dam encircling the reservoir. Local topography providing views over the top of the dam and into the reservoir would be limited. For most visual receptors, the upper reservoir would appear to be a grassy knoll and would not change scenic integrity. Therefore, overall visual impacts resulting from the implementation of the preferred alternative would be moderate.

Public Health and Safety

Affected Environment

The majority of the Rorex Creek study area is located east of Guntersville Reservoir, near the Town of Pisgah, Alabama. The study area also extends west of the reservoir into an unincorporated area north of the City of Scottsboro. Police service in the area is provided by the Pisgah Police Department, as well as the Jackson County Sheriff's Office. The Pisgah Fire Department is located approximately two miles east of the Rorex Creek study area and provides fire protection to Pisgah and the surrounding area. Highlands Medical Center, an Adult Level III trauma center, is approximately 20 miles west of the study area in Scottsboro.

Environmental Consequences

Public health and safety hazards could result from increased roadway traffic during construction, hazardous materials spills, use of explosives, and electrical hazards. To minimize the adverse impact of traffic, traffic procedures would be established to minimize potential safety concerns and addressed in the health and safety plans followed by construction contractor(s). TVA would develop a site-specific SPCC plan, which would minimize the potential of a spill during the drainage and disposal of oil and fluids and instruct on-site workers how to contain and clean up any potential spills. Explosives would be managed under the direction of a state-licensed blaster. TVA's Standardized Programs and Processes related to maintaining safety would be strictly adhered to during the operation of the proposed action. The overall impact of the preferred alternative on public health and safety would be minor.

Solid and Hazardous Waste

Affected Environment

ADEM data were reviewed to identify Brownfields/Voluntary Cleanup Program sites in the Rorex Creek study area. These are sites for which any real estate activities such as development, redevelopment, expansion, or reuse could be complicated by the presence of a hazardous substance. No such sites are in the Rorex Creek study area (ADEM 2025). No underground storage tanks or Enforcement and Compliance History Online (ECHO) sites are located in the project area.

Environmental Consequences

Construction and operation of the project would involve the use of potentially hazardous materials like lubricants, solvents, pesticides, and fuels brought to the project location. During construction and operation of the preferred alternative, TVA will comply with measures identified in TVA's spill prevention and response procedures to prevent and contain accidental spills of any material and ensure that inadvertent spills are contained, cleaned up, and disposed of appropriately. As such, impacts associated with the generation of solid and hazardous waste from the proposed project would be minor.

Transportation

Affected Environment

The primary modes of transport to the Rorex Creek study area are via waterway (Guntersville Reservoir) and roadway networks. The study area is directly accessible from the east via Jackson CR 88, which is a paved one-lane road lacking pavement markings or shoulders near the study area. In the town of Pisgah, CR 88 turns into a two-lane, undivided road. CR 88's nearest connection to a state or national highway is Alabama State Route 71, approximately three miles east of the study area and approximately 1.5 miles past Pisgah. U.S. Route 72 is the primary arterial roadway on the west side of Guntersville Reservoir. Access to the Bellefonte Nuclear Power Plant property and the western portion of the study area is provided from US 72 via CR 588, which currently dead ends at the reservoir.

Environmental Consequences

Traffic generated during construction would consist of the construction workforce, as well as the transport of construction equipment and materials. Impacts on transportation on local roadways in the vicinity of the study area, such as CR 88, would be moderate in the short term while initial project activities and roadway improvements are underway. Once the bridge and other roadway improvements designed to facilitate site access are complete, local roadway impacts would be reduced. During operation, the bridge and roadway improvements would also facilitate access for the smaller operational workforce, as well as traffic generated by public access to the proposed recreational facilities, such that any traffic impacts to the roadway network would be minor. Additionally, the addition of the bridge linking CR 588 and CR 88 provides a long-term benefit to local transportation, significantly reducing the commute between communities on opposite sides of the reservoir.

Air Quality

Affected Environment

The EPA has designated Jackson County as a maintenance area for particulate matter equal to or less than 2.5 micrometers in size ($PM_{2.5}$) and in attainment for all other criteria pollutants.

Environmental Consequences

Air quality impacts associated with this alternative would occur from emissions during site preparation, construction and dredging equipment operations, and vehicle use by the construction workforce. The increases in emission levels are expected to have a minimal impact on air quality from criteria pollutants. The operation of PSH facilities would result in minimal air emissions. Generation and pumping equipment would be electrically powered, and there would be no emissions from the generators. Overall, the construction and operation of the new facility near Rorex Creek would result in minor, localized impacts on air quality and would not result in an exceedance of applicable air quality standards.

Climate Change and Greenhouse Gasses

Affected Environment

The Earth's natural warming process is known as the "greenhouse effect." The Earth's atmosphere consists of a variety of gases that regulate the Earth's temperature by trapping solar energy. These gases—including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride—are cumulatively referred to as greenhouse gases (GHGs) because they trap heat like the glass of a greenhouse. Anthropogenic activities, which include the burning of fossil fuels to produce energy and deforestation, have contributed to elevated concentrations of GHGs in the atmosphere since the Industrial Revolution. GHGs in the atmosphere have caused an increase in the average global temperature. While the increase in global temperature is known as global warming, the resulting change in a range of global weather patterns is known as "climate change."

Environmental Consequences

There is potential for impact on GHG emissions due to construction. However, hydroelectric facilities are one of the oldest renewable energy sources. Therefore, the GHG emissions associated with this alternative would have a minimal impact on global climate change.

Noise

Affected Environment

Sensitive noise receptors include residences or other developed sites where frequent human use occurs, such as churches, parks, and schools. Sensitive receptors in the Rorex Creek study area include scattered residences and two private youth camps. Existing noise sources include developed recreation sites, recreational watercraft use and barge traffic on Guntersville Reservoir, vehicle noise on nearby roads, and intermittent noise from the operation of agricultural equipment. Typical background day-night noise levels for rural areas are anticipated to range between a day-night average sound level of 35 and 50 dBA, 50 - 65 dBA in recreation and residential areas, and 48-57 dBA for suburban residential areas west of Guntersville Reservoir.

Environmental Consequences

Construction of the upper reservoir would require excavation of rock and earth to a depth of about 60 feet below the existing grade. This activity would require the use of large earth-moving equipment including backhoes, graders, loaders, and dump trucks. The use of explosives would also be required. During the two to four years of excavation, the project would be anticipated to result in significant increases in ambient noise. Receptors within 500 feet of the construction areas would have the potential to experience periods of very loud (65 to 85 dBA) noise during construction. There are no residences within 500 feet of the construction area. With the exception of one residence, located about 800 feet from the construction area, all residences are more than 0.25 mile away. Noise and vibration impacts on residents near the study area could be significant during the construction period, especially during the excavation of the upper reservoir depending on proximity to the construction area. However, once construction is complete, operational noise impacts would be minimal.

Socioeconomics

Affected Environment

The block groups that comprise the Rorex Creek area of interest are predominantly rural and have a combined resident population of 25,787, which accounts for approximately 0.5 percent of the total population of the state of Alabama. Since 2010, the study area has experienced a population increase of approximately 4.6 percent, in contrast to the population decrease in Jackson County (-1.1 percent), but consistent with the growth rate of the State of Alabama (5.2 percent). Approximately 89.5 percent of the population of the Rorex Creek area of interest is white, with Blacks or African Americans comprising the largest single minority population group (3.4 percent). Minority percentages in the area of interest are generally consistent with those of Jackson County and lower than those of the State of Alabama. There are 21 census block groups within the Rorex Creek area of interest, one of which has a minority population that either exceeds 50 percent of the total population, or meaningfully greater (greater than or equal to 10 percentage points), or both, than the minority population percentage of the general population (i.e., that of the county or state).

Approximately 40.7 percent of people living within the Rorex Creek area of interest are considered low-income, with percentages for individual block groups ranging from 22.3 to 63.5 percent of the population. Nine of the census block groups have low-income populations that either exceed 50 percent of the total population or significantly exceed the low-income percentage of the general population, including the block groups in which the primary project activities would occur.

Environmental Consequences

Construction of a PSH facility near Rorex Creek would require a workforce of up to approximately 1,000 people and would last for approximately 5 to 7 years. While it is anticipated that a portion of the workforce could be drawn from the labor force that currently resides within the surrounding counties, specialty workers and laborers not available within the region would be expected to temporarily relocate to the area to support construction activities. Construction activities would entail a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and the procurement of additional services. Capital costs associated with the proposed action would, therefore, have direct economic benefits to the local area and surrounding community during the construction period. Revenue generated by sales tax collected from purchases by construction workers would benefit the local economy.

In addition, the preferred alternative includes the construction of a new bridge that would extend from CR 558 across Guntersville Reservoir, providing more direct access between the Scottsboro and Pisgah communities. These infrastructure improvements would significantly decrease travel times between communities on opposite sides of the reservoir, providing for the movement of goods and services and expanding market access for local businesses. This, in combination with the proposed development of recreational amenities, may spur economic growth and development in the area of interest. Overall, economic impacts from the preferred alternative are anticipated to be moderate and beneficial.

Utilities

Affected Environment

The Rorex Creek study area includes the existing Guntersville Reservoir and an existing, 14.7-mile-long, unenergized, double circuit 500 kV transmission line that runs from the Bellefonte Property for approximately 14.7 miles northwest to an interconnection with the existing Madison-Widows Creek 500-kV line at CR 39. Utilities that provide service to the Rorex Creek study area include Farmers Telecommunications Cooperative (telephone), The Town of Pisgah (water), Sand Mountain Electric Cooperative, which purchases its power from TVA, and Marshall County Gas District (natural gas). The Widows Creek – Bellefonte 500-kV transmission line crosses the site from the northeastern corner to the center of the study area where it divides and travels south and west across the Guntersville Reservoir. The Bellefonte – Section 500-kV transmission line parallels the Widows Creek – Bellefonte line to the center of the study area, then turns south toward the town of Section, Alabama. Both of these lines are owned and operated by TVA.

Environmental Consequences

Overall, the added long-term storage capacity as a result of the Action Alternative would have potential long-term beneficial impacts by helping to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of intermittent energy resources onto the electric grid.

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Symbols, Acronyms, Abbreviations, and Glossary of Terms

°C	degrees Celsius
°F	degrees Fahrenheit
AADT	average annual daily traffic
AC	alternating current
ADCNR	Alabama Department of Conservation of Natural Resources
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
ALIPC	Alabama Invasive Plant Council
APE	Area of Potential Effect
ARAP	Aquatic Resource Alteration Permit
BCC	birds of conservation concern
BESS	Battery Energy Storage System
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
CAA	Clean Air Act
CBMPP	Construction Best Management Practices Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
COVID-19	Coronavirus identified in 2019
CR	County Road
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DC	direct current
DOE	U.S. Department of Energy
ECHO	Enforcement and Compliance History Online
EIS	Environmental Impact Statement
EO	executive order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
FR	Federal Register
FWLT	Forever Wild Land Trust
GHG	greenhouse gas
GIS	geographic information system
GPM	gallons per minute
GRLMP	Guntersville Reservoir Land Management Plan
GSA	Geological Survey of Alabama
HPA	Habitat Protection Area
HUC	hydrologic unit code
I-24	Interstate 24
I-59	Interstate 59
IPaC	Information for Planning and Consultation
IRP	Integrated Resource Plan
kV	kilovolt
L_{dn}	day-night average sound level

MBTA	Migratory Bird Treaty Act
MW	megawatt
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NARR	Native American Removal Routes
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NOI	notice of intent
NO_x	nitrogen oxides
N_2O	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRLMP	Nickajack Reservoir Land Management Plan
NVC	National Vegetation Classification System
NWI	National Wetland Inventory
OPCC	opinions of construction cost
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
$PM_{2.5}$	particulate matter equal to or less than 2.5 micrometers in size
PM_{10}	particulate matter equal to or less than 10 micrometers in size
PSH	pumped storage hydropower
RCRA	Resource Conservation and Recovery Act
RHND	Regional Natural Heritage Database
ROW	right-of-way
RPS	Raccoon Mountain Pumped Storage Facility
SHPO	State Historic Preservation Office
SMZ	stream management zone
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasure
SR	State Route
SWA	Small Wild Area
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
TVAR	Tennessee Valley Archaeological Research
US	U.S. Route
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Valley	Tennessee River Valley
VdB	vibration decibels
VOCs	Volatile Organic Compounds
WMA	Wildlife Management Area
WWC	wet weather conveyance

1 PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Tennessee Valley Authority (TVA) is proposing to add more pumped storage hydropower (PSH) within its service area as the need for long-duration energy storage increases. PSH is a type of hydroelectric energy storage that serves the same power supply function as peaking units, but it uses low-cost, off-peak electricity to store energy for generation at peak times. PSH plants pump water to an upper reservoir during periods of low demand and release it to a lower reservoir to generate electricity during periods of high demand. Consequently, a PSH plant is both a power supply source and an electricity user (TVA 2019a). In a sense, a PSH facility functions like a giant battery, storing energy when there is a surplus of generation in the grid and then releasing the energy later when there is demand. PSH is also used to balance the variability of the output of intermittent energy resources.

Pumped storage is a versatile asset that provides power generation, long-duration energy storage, and grid balancing, as well as emergency black-start capabilities. Adding a pumped storage facility to the system could enable TVA to increase baseload generation sources, such as nuclear, and work in coordination with intermittent resources.

TVA has prepared this Draft Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts associated with proposed construction and operation of a new PSH facility at two potential locations in Jackson County, Alabama, or expansion of the existing Raccoon Mountain Pumped Storage Plant facility (RPS) in Marion County, Tennessee (Figure 1-1).

This Draft EIS identifies and evaluates potential environmental, social, and economic impacts from the construction and operation of pumped storage facilities for each alternative.

The four alternatives assessed in this EIS are as follows:

- Alternative A: No Action
- Alternative B: Construct a New Facility Near Rorex Creek in Jackson County, Alabama
- Alternative C: Construct a New Facility Near Widows Creek in Jackson County, Alabama
- Alternative D: Expansion of RPS in Marion County, Tennessee

This Draft EIS presents existing conditions for relevant resources and an assessment of potential project-related impacts per currently proposed scenarios. The resource evaluations will also allow TVA to consider alternative designs and configurations for the PSH facility within the study areas, with an understanding of relevant constraints from a resource and regulatory perspective. Combined, this information will allow TVA to make decisions regarding potential development at each of the three study areas. The studies associated with the EIS will enable TVA to avoid or minimize potential effects through project siting and design.

This EIS is drafted in accordance with TVA's procedures (18 Code of Federal Regulations [CFR] 1318) for implementing NEPA.

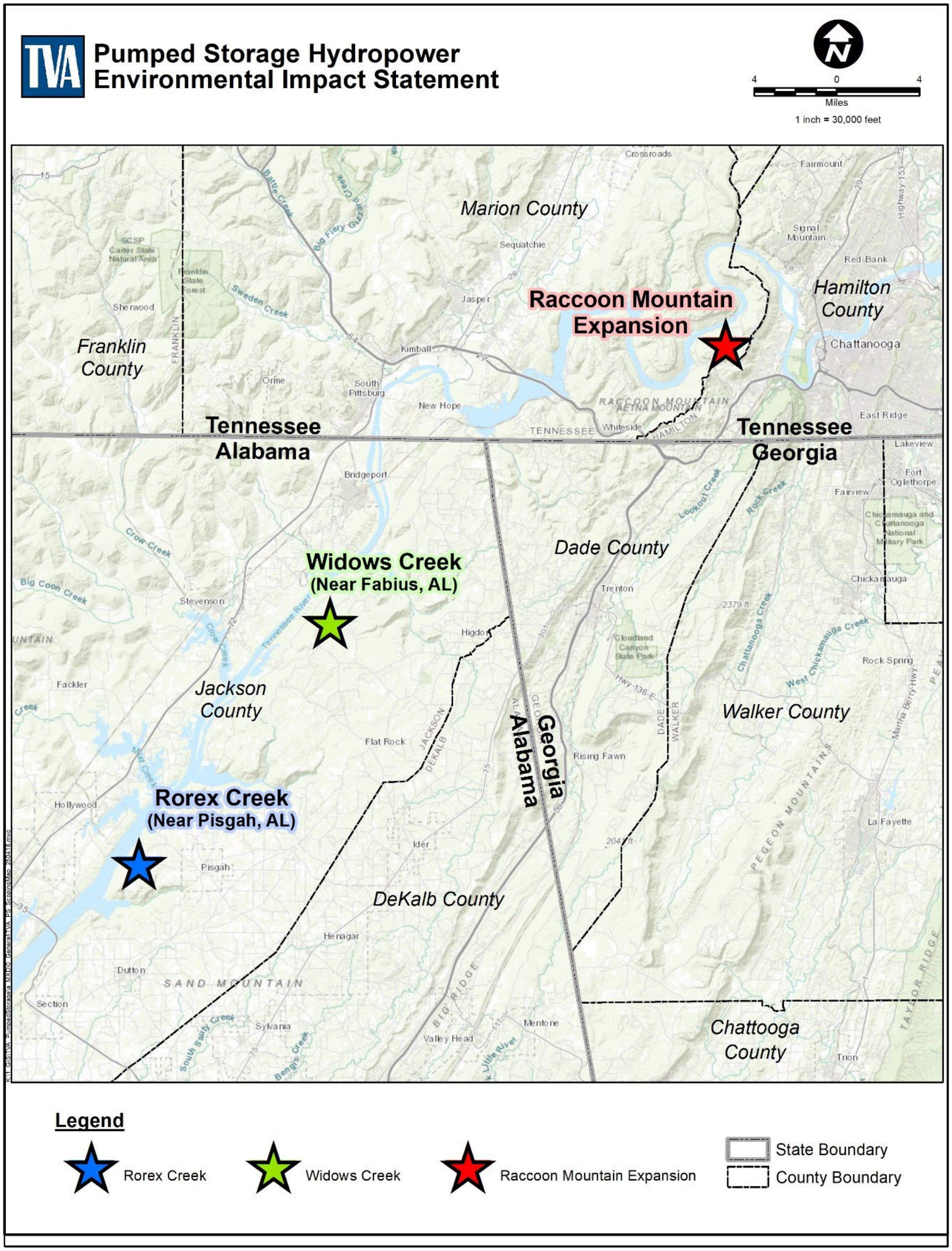

Figure 1-1. Location of the Pumped Storage Hydropower Study Areas

1.2 Energy Storage

Energy storage systems are often divided into short- and long-duration systems. Short-duration storage, typically with a capacity ranging from 2 to 8 hours of storage, is used for smoothing and stabilizing the inconsistent energy produced by renewable energy resources and localized voltage support. Lithium-ion batteries are the most common form of short-term energy storage, with additional research and pilot projects aimed at testing other types of battery chemistries, like flow and iron saltwater batteries.

In addition to providing grid stabilization services, long-duration storage, with typically more than 8 hours of stored energy, is used to provide generation when weather is not conducive to generation from renewables. Long-duration storage also provides reserve capacity for baseload generation, peaking generation, and arbitrage during periods of low demand. The most common form of long-duration energy storage is PSH, both in the United States and worldwide. TVA relies on this resource to routinely balance its system during fluctuations on the grid. Other types of long-duration energy storage include compressed air and gravity storage.

While short- and long-duration storage technologies operate differently, both benefit the energy system by supporting the reliability of existing plants, providing additional load capacity, and contributing to grid stability. As supply and demand change in the energy system, maintaining an energy portfolio that uses both short- and long-duration energy storage technologies will be key to TVA meeting its goals for grid resiliency and ensuring reliable service for its customers.

1.3 Pumped Storage Hydropower

PSH is a type of hydroelectric energy storage. It consists of two water reservoirs at different elevations that can generate power as water moves down from the upper reservoir to the lower reservoir, passing through a pump-turbine, during periods when energy is needed on the electrical grid (Figure 1-2). When generation potential is greater than demand, the pump-turbines are reversed, and water is pumped up to the upper reservoir to store energy for generation at peak times or when additional energy is needed for grid reliability. PSH is a versatile asset that provides power generation, long-duration energy storage, and grid balancing, as well as emergency black-start capabilities. Adding a PSH facility to the system could enable TVA to increase baseload generation sources, such as nuclear, and work in coordination with intermittent resources.

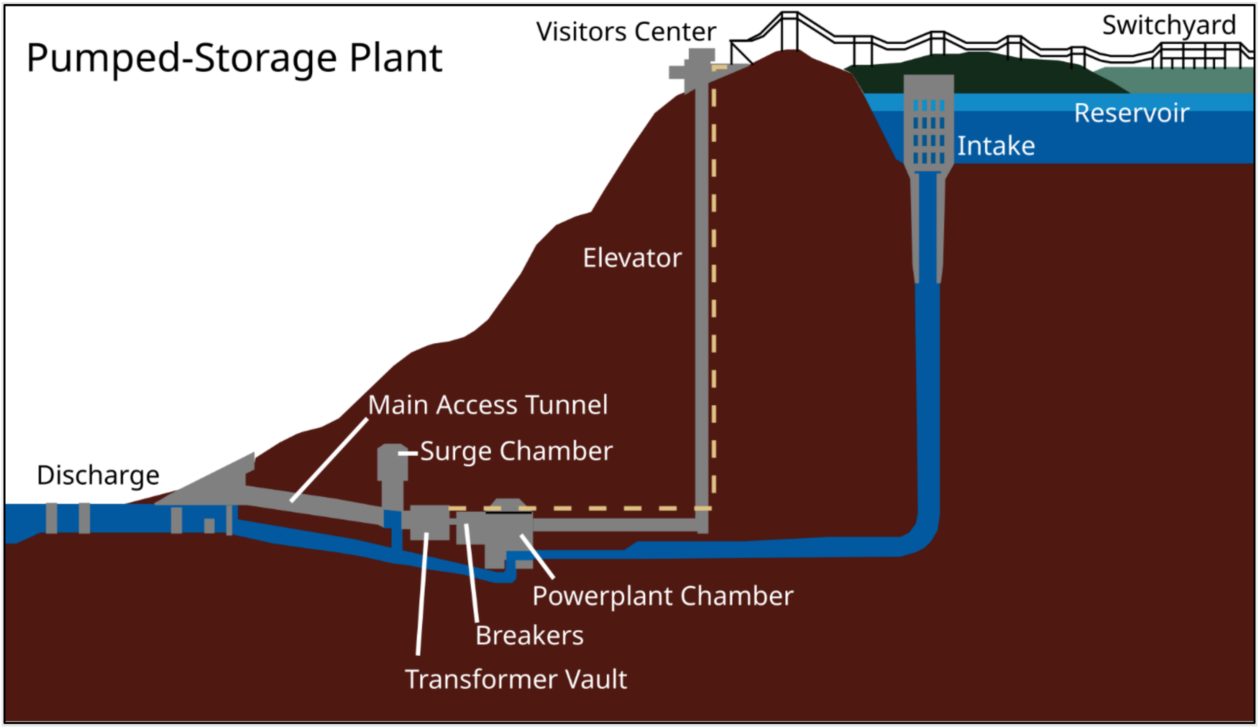

Figure 1-2. Pumped Storage Hydropower

The proposed new PSH facilities in Jackson County, Alabama, would be similar in design to the existing RPS near Chattanooga, Tennessee. A new upper reservoir would be constructed on a mountaintop adjacent to Guntersville Reservoir, which is an existing multi-purpose reservoir on the Tennessee River. The proposed pump-turbines would consist of water conveyance tunnels and an underground powerhouse constructed by tunneling within the mountain. The pump-turbines would be sized for up to 1,600 megawatts (MWs) of generation for approximately 12 to 20 hours.

Expanding the existing RPS would include construction of another underground powerhouse and another series of water conveyance tunnels to connect the existing upper reservoir with the Nickajack Reservoir (the lower reservoir) along the Tennessee River. The new powerhouse would generate up to 800 MW in addition to the plant's current 1,700 MW generation capacity. Excavation of the upper reservoir to create additional storage capacity could be considered.

1.4 TVA Act and Integrated Resource Planning

TVA's core statutory objectives under the TVA Act are to provide the people of the Tennessee Valley with low-cost and reliable electricity, environmental stewardship, and a prosperous economy (16 United States Code [U.S.C.] §§ 831 et seq.). Consistent with, and as mandated by the Energy Policy Act of 1992, TVA engages in a long-range, "least-cost planning" process that "evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service to electric customers of [TVA] at the lowest system cost" (16 U.S.C. § 831m-1(b)(1)). In June 2019, TVA published the 2019 Integrated Resource Plan (IRP) and an associated EIS, which were developed with input from stakeholder groups and the public and provide direction on how best to meet future electricity demand over the next 20 years (TVA 2019a, 2019b). The IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area. TVA's asset strategy incorporated the strategic direction from the 2019 IRP[2] and supports affordable, reliable, and resilient energy for the customers TVA serves. TVA engages in the "least cost planning" process through development of the IRP. The 2019 IRP recommended that TVA continue to evaluate emerging energy storage technologies, including pumped storage, as part of technology innovation efforts aimed at developing future electricity generation capabilities. The 2019 IRP identified energy storage goals to add up to 2,400 MW of storage by 2028 and up to 5,300 MW by 2038.[3]

1.5 Purpose and Need

The purpose of the Proposed Action is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the 2019 IRP (TVA 2019a) and to meet the demand for electricity by facilitating the integration of additional baseload generation and intermittent resources onto the electric grid. PSH is needed to provide long-duration energy storage to assist with load balancing by allowing baseload technologies, such as nuclear generation, to run nearly full time. This is necessary because these technologies are generally not conducive to following the demand curve and work best when running at a consistent output with limited output variability. PSH is a reliable and proven technology to aid in balancing energy output to meet fluctuating demands. Additionally, the proposed PSH would be equipped with variable speed turbine technologies to allow greater flexibility in managing grid stability and reliability with less dispatchable generation and greater minute-by-minute variability due to fluctuations in output from intermittent resources.

This Draft EIS evaluates the potential for pumped storage facilities in two areas within Jackson County, Alabama, and an expansion of the existing facility at Raccoon Mountain (RPS). Potential environmental and economic impacts from the construction and operation of pumped storage facilities at each site are also considered.

1.6 Decisions to be Made

This Draft EIS will inform TVA decision-makers and the public about the potential environmental impacts of the proposed action. TVA determined alternative locations for potentially developing one or more PSH facilities in the TVA service area and assessed the environmental effects of the construction and operation of these facilities.

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[2] TVA is in the process of developing a new IRP. In May 2023, TVA published a Notice of Intent in the Federal Register announcing its plans to prepare an EIS associated with the implementation of the 2025 IRP. The draft 2025 IRP and EIS was published by TVA in September 2024, and development of a final 2025 IRP and EIS is in progress. TVA has reviewed the 2019 IRP and associated EIS and determined that it remains valid and guides future generation planning consistent with least-cost planning principles.

[3] Since the completion of the 2019 IRP, TVA has seen a marked increase in electricity demand and the need for long-duration energy storage. PSH is a versatile asset that provides power generation, long-duration energy storage, and grid balancing, as well as emergency black-start capabilities. Adding a PSH facility to the system could enable TVA to increase baseload generation sources, such as nuclear, and work in coordination with intermittent resources.

1.7 Related Environmental Reviews

In addition to the IRP Final EIS, other related environmental documents and materials were reviewed while preparing this EIS and are listed below. These documents helped describe the affected resources assessed in this document or provided environmental evaluations of energy storage technologies in the Valley. Specific information was incorporated by reference, as appropriate:

- TVA Bellefonte Site Utility Improvements Final Environmental Assessment (TVA 2014a)
- TVA Bellefonte Property Disposal Final Environmental Assessment (TVA 2017a)
- TVA Bellefonte Solar Energy Center Final Environmental Assessment (TVA 2020a)
- TVA Solar and Battery Programmatic Environmental Impact Statement (TVA 2024a)
- TVA Widows Creek Fossil Plant Deconstruction Final Environmental Assessment (TVA 2016)
- TVA Widows Creek Fossil Plant Soil Excavation and Gypsum Stack Closure Environmental Assessment (TVA 2014b)
- TVA Widows Creek Property Disposal Environmental Assessment (TVA 2015a)
- TVA Widows Creek Fossil Plant Property Disposal and Transmission Connections Final Supplemental Environmental Assessment (TVA 2015b)
- North Alabama Utility-Scale Solar Facility Final Environmental Impact Statement (TVA 2022a)
- Vonore Battery Energy Storage System and Associated Substation Final Environmental Assessment (TVA 2022b)

1.8 Public Agency Involvement

1.9 Scoping

1.9.1 Scoping Period Public Outreach

Public participation is an integral part of NEPA's procedural requirements. Before the initiation of the NEPA scoping process, a public open house was held at Pisgah High School in Pisgah, Alabama, on February 23, 2023, to engage local community residents, agencies, and organizations. At the open house, TVA presented information that explained that TVA is conducting geological, biological, and cultural resource studies of potential alternative sites that may be suitable for the construction and operation of a PSH facility in Jackson County, Alabama, or the expansion of the Raccoon Mountain RPS in Marion County, Tennessee, or both.

Public scoping for the PSH project was initiated with the publication of a notice of intent (NOI) to prepare a Programmatic EIS in the Federal Register (FR) on May 19, 2023. The NOI initiated a 45-day public scoping period, which concluded on July 5, 2023. In addition to the NOI, TVA published notices regarding this effort in the *Chattanooga Times Free Press* newspaper that serves the Marion County, Tennessee, area and in the *Jackson County Sentinel* newspaper that serves the Jackson County, Alabama, area. TVA also issued a news release to the media and posted the news release on the TVA website to solicit public input. Additionally, notifications were issued to state and federal agencies and interested stakeholders.

TVA held a virtual public scoping meeting on June 22, 2023. Fifty-one individuals, both members of the public and representatives of organizations, registered for the meeting. Among those registered, 34 attended the scoping meeting, 10 of which were not affiliated with TVA. Attendees included members of the public, Southern Environmental Law Center, U.S. Environmental Protection Agency (EPA), and other agencies and non-governmental organizations. Questions raised at the public scoping meeting included concerns regarding land ownership, the economic impact of the project, potential impacts on the mountain bike trails located on Raccoon Mountain, availability of information, and the project timeline. Several questions were asked regarding how and when landowners will be notified if their land is under consideration for the project.

After publishing the NOI, TVA began the process of conducting environmental field studies and geological field studies, along with continuing engineering feasibility studies. During the progress of the studies, it was determined that Widows Creek had significant engineering and environmental challenges associated with the required construction of a water conveyance system (or tailrace) across the floodplain. Additionally, the expansion of the RPS would not add significant storage capacity but only a higher capacity output with a reduction in runtime. With the field studies and engineering challenges with Widows Creek and the Raccoon Mountain expansion, TVA decided to prepare a site-specific EIS, rather than a programmatic EIS, to evaluate the impacts of construction and operation of PSH facilities at the Rorex Creek, Widows Creek, and Raccoon Mountain study areas.

1.9.2 Summary of Scoping Feedback

TVA received 62 comments during the scoping process. These comments were received via 35 email submissions from members of the public, one submission from the EPA, one submission from the Alabama Department of Natural Resources (ADCNR) Division of Wildlife and Freshwater Fisheries, and one submission submitted on behalf of multiple organizations including Southern Environmental Law Center, Center for Biological Diversity, Sierra Club, Appalachian Voices, and Energy Alabama. Comment submissions were reviewed to identify specific issues of concern.

The Scoping Report provides additional detail regarding comments received during the scoping process and is available in Appendix A and on TVA's website. TVA considered these comments during the preparation of the Draft EIS.

1.10 Public and Agency Review of the Draft EIS

TVA’s public and agency involvement includes the publication of a notice of availability in the federal register announcing the 45-day public review of the Draft EIS. TVA will also hold an open house for the Draft EIS in Pisgah, Alabama, on June 12, 2025 at Pisgah High School. To solicit public input, the availability of the Draft EIS was announced in the *Chattanooga Times Free Press* newspaper that serves the Marion County, Tennessee area and in the *Jackson County Sentinel* newspaper that serves the Jackson County, Alabama, area. TVA also issued a news release to media and posted the news release on the TVA website to solicit public input (www.tva.com/NEPA). TVA’s agency involvement included the circulation of the draft EIS to local, state, and federal agencies and to federally recognized tribes as part of the review. Cooperating agencies are listed in Section 1.12, Cooperating Agencies.

1.11 Scope of Environmental Impact Statement

This Draft EIS analyzes the potential environmental impacts of the proposed site preparation, construction or expansion, and operation of PSH facilities within one of three study areas in Marion County, Tennessee, and Jackson County, Alabama (Figure 1-1). A detailed description of the proposed action and alternatives considered are provided in Chapter 2. The scope of this EIS includes the evaluation of impacts associated with the proposed activities. Because the design, location, and requirements for some potential future actions, including off-site transmission line upgrades at the Widows Creek and Raccoon Mountain study areas, are too speculative at this time, the potential environmental impacts from these actions are not evaluated in this Draft EIS. Should TVA elect to build a PSH facility at any of the alternative locations at a later time, further analysis would be required. Chapter 3 presents existing conditions within each study area for relevant resources and general environmental impact analysis for those resources that could be affected per currently proposed scenarios at each site. The resource evaluations will also allow TVA to consider alternative designs and layouts with an understanding of relevant constraints from a resource and regulatory perspective. The studies associated with the EIS will enable TVA to avoid or minimize potential effects through project siting and design.

TVA prepared this Draft EIS to comply with NEPA and TVA's procedures for implementing NEPA (18 CFR Part 1318). TVA considered the possible environmental effects of the proposed action and determined that potential effects on the following environmental resources are relevant to the decision to be made and assessed the potential impacts on these resources in detail in this Draft EIS:

- Vegetation
- Wildlife
- Threatened and Endangered Species
- Surface Water Resources
- Aquatic Ecology
- Wetlands
- Floodplains
- Geology and Soils
- Groundwater
- Land Use and Prime Farmland
- Navigation
- Natural and Managed Areas, Parks, and Recreation
- Cultural and Historical Resources
- Visual Resources
- Public Health and Safety
- Solid and Hazardous Waste
- Transportation
- Air Quality
- Climate Change and Greenhouse Gases (GHG)
- Noise and Vibration
- Socioeconomics
- Utilities

1.12 Necessary Permits and Licenses

A summary of the laws and executive orders (EOs) relevant to the Proposed Action is provided in Table 1-1. TVA holds the permits necessary for the current operation of RPS.

Table 1-1. Laws and Executive Orders Relevant to the Proposed Action

Environmental Resource Area	Law/EO
Geology, Soils, and Prime Farmland	Farmland Protection Policy Act
Water Resources	Alabama Administrative Code 335-6 Administrative Code of Tennessee TDEC, Chapter 0400-04 Clean Water Act Sections 401, 402, and 404 EO 11988 – Floodplain Management EO 11990 – Protection of Wetlands Safe Drinking Water Act TDEC Aquatic Herbicides General Permit Section 7 of the WSRA Section 10 of the WSRA
Biological Resources	Alabama Administrative Code 220-2-.92, Protected Nongame Species Administrative Code of TDEC, Chapter 0400 Bald and Golden Eagle Protection Act Endangered Species Act Section 7 (Consultation with U.S. Fish and Wildlife Service) EO 13112 – Invasive Species EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds Migratory Bird Treaty Act
Air Quality and GHG Emissions	Clean Air Act Alabama Administrative Code, 335-3 Administrative Code of TDEC – Chapter 1200-3 and Chapter 0400-30
Navigation	General Bridge Act of 1946 USACE Section 408 Permit
Cultural Resources	Alabama Administrative Code 460-X Administrative Code of TDEC – Chapter 0400.02 Archaeological Resources Protection Act National Historic Preservation Act Section 106 Native American Graves Protection and Repatriation Act
Waste Management	Alabama Administrative Code 335-13 and 335-14 Administrative Code of Tennessee, Chapter 0400.10-12 Comprehensive Environmental Response, Compensation, and Liability Act Emergency Planning and Community Right-to-Know Act Resource Conservation and Recovery Act Solid Waste Disposal Act Toxic Substances Control Act
Public and Occupational Health and Safety	Occupational Safety and Health Act
Intergovernmental Review	EO 12372 – Intergovernmental Review of Federal Programs

Key: EO = Executive Order; TDEC = Tennessee Department of Environment and Conservation; WSRA = Wild and Scenic Rivers Act

TVA would seek and obtain all necessary permits, licenses, and approvals required for the alternative selected. Representative permits or approvals include the following:

- Tennessee Department of Environment and Conservation (TDEC) and Alabama Department of Environmental Management (ADEM) Construction General Permit (National Pollutant Discharge Elimination System [NPDES]) applications, modifications for all stormwater discharges associated with construction activity that disturb more than 1 acre of land, or both. Stormwater Pollution Prevention Plans (SWPPPs) may be required to detail sediment and erosion control best management practices (BMP).
- In conjunction with erosion and sediment control plans that are required for the Construction General Permit, ADEM requires a Construction Best Management Practices Plan (CBMPP).
- Clean Water Act (CWA) Section 404 permit from the U.S. Army Corps of Engineers (USACE) and Section 401 Water Quality Certification/Aquatic Resource Alteration Permit (ARAP) may be required from the appropriate state permitting agencies (TDEC or ADEM) for actions that involve or affect wetlands and jurisdictional waters, including disturbance, crossing, dredging and fill.
- U.S. Coast Guard Private Aids to Navigation Permit for the construction of intake and discharge pipeline in navigable waters.
- U.S. Coast Guard Bridge Permit for proposed bridge associated with the Rorex Creek Alternative.
- Consultation with the U.S. Fish and Wildlife Service (USFWS) regarding effects on species listed under the Endangered Species Act (ESA).
- Compliance with National Historic Preservation Act (NHPA) Section 106 for protection of archaeological and historical resources.
- Certain permits may be required from the TDEC Division of Air Pollution Control or ADEM, which administers the Clean Air Act (CAA) related programs in Tennessee and Alabama.

Actual permit requirements for any specific construction project would be evaluated based on site-specific conditions and site selection, and details of the permitting requirements would be determined based on final project designs.

1.13 Cooperating Agencies

Federal and state agencies with jurisdiction and special expertise in the EIS study areas were invited to participate as cooperating agencies in the environmental analysis of the proposed action. Cooperating agencies at the federal level include the USACE and U.S. Coast Guard.

2 ALTERNATIVES

This chapter explains the rationale for identifying the alternatives to be evaluated, describes each alternative, provides a comparison of alternatives with respect to their potential environmental impacts, and identifies the Preferred Alternative.

2.1 Alternative Screening Process

In September 2021, TVA conducted preliminary pumped storage siting and configuration assessments, and prepared Class 5 opinions of construction cost (OPCC) based on Association for the Advancement of Cost Engineering International guidance. During initial project planning, TVA considered alternatives and specific screening criteria to evaluate the potential for pumped storage facilities.

TVA's PSH study began by using previous studies and geographic information systems (GISs) to identify locations that may be suitable for development within the TVA power service area (Figure 2-1).

Many potential sites were identified and evaluated based on requirements for topography, geology, and tunneling length. Sixty-one locations, ranging from mining sites to greenfield sites, were identified for evaluation. TVA performed a desktop screening study on these potential sites based on some basic parameters:

- Penstock length
- Flooded infrastructure
- Impacts to natural areas
- Unsuitable geology or mining impacts
- Displacement of residents
- Park areas

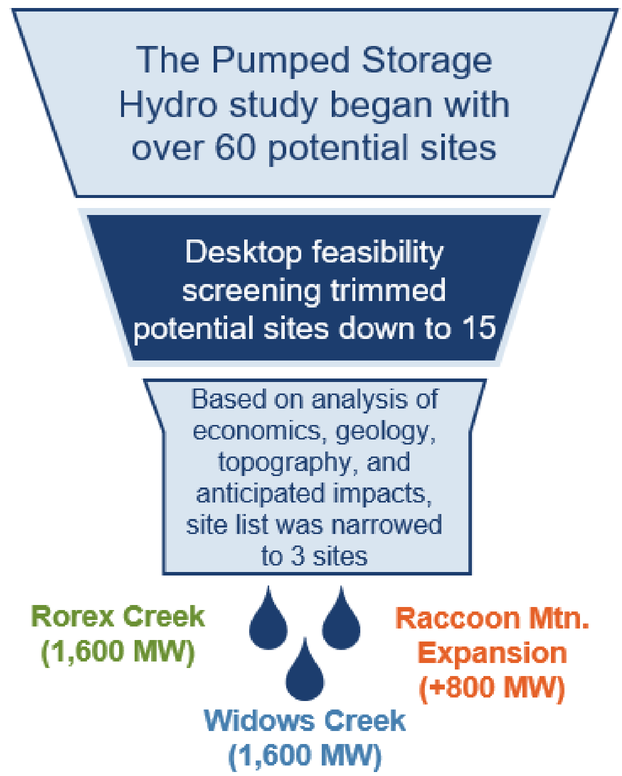

Figure 2-1. PSH Site Screening Process

Utilizing these parameters, the sites were reduced to 15 locations for additional analysis, including sizing for reservoirs and tunnels. This phase included a more detailed technical screening and site adjustments to screen for factors such as the following:

- Development cost per MW of output and megawatt-hours (MWh) of storage
- Tunnel lengths
- Fill water
- Site access
- Transmission interconnection lengths

The properties that remained viable, a total of nine sites, were then subjected to formal desktop analyses. Data from the National Wetland Inventory (NWI), National Hydrography Dataset, National Land Cover Database (NLCD), U.S. Geological Survey (USGS) topographic quadrangles, U.S. Department of Agriculture (USDA) Digital Elevation Models, USDA Natural Resources Conservation Service, Federal Emergency Management Agency (FEMA), and aerial photography were used to determine general site characteristics and evaluate topography, land cover, soils, water resources, threatened and endangered species, and cultural resources on each site and in the vicinity, as relevant to the resource area. Federal, state, and local permitting needs for each site were considered in the analyses. TVA also performed site reconnaissance on the nine remaining sites to evaluate them for any potential fatal flaws and to provide additional information for engineering analysis. Subject matter experts screened the remaining nine sites based on the following:

- Engineering and cost
- Transmission modeling
- Biological and aquatic impacts
- Cultural impacts
- Community impacts

Results of this screening study provided TVA with sufficient information to select three potential alternative sites for further evaluation in the NEPA process, as described in Section 2.2, Description of Alternatives.

2.2 Description of Alternatives

Through the preliminary alternative screening process and scoping, TVA has determined there are four reasonable and feasible alternatives. The alternatives include the following:

- **Alternative A – No Action Alternative.** TVA would not develop or expand PSH facilities at any of the project sites.
- **Alternative B – Construct New Facility Near Rorex Creek.** Construction and operation of a new upper reservoir, power tunnel, and powerhouse with four or six turbine generators with a range of 260 MW up to 400 MW with a combined generating capacity between 1,200 MW up to 1,600 MW located at the Rorex Creek site using the existing Guntersville Reservoir as the lower reservoir.
- **Alternative C – Construct New Facility Near Widows Creek.** Construction and operation of a new upper reservoir, power tunnel, and powerhouse with four 400-MW turbine generators (1,600 MW total) located at the Widows Creek site using the existing Guntersville Reservoir as the lower reservoir.
- **Alternative D – Expansion of Raccoon Mountain.** Construction and operation of a new 2 x 400-MW power complex located at TVA's existing RPS, referred to as Raccoon Mountain II. This alternative would potentially expand the existing upper reservoir at Raccoon Mountain and use the existing Nickajack Reservoir as the lower reservoir.

Detailed descriptions of the action alternatives are provided in Section 2.4, Action Alternatives. Anticipated facilities and size of construction footprints for each alternative site are shown in Table 2-1. Table 2-2 includes a summary of approximate principal characteristics for each proposed action alternative.

The alternative sites were selected following multiphase screening and concept studies and are currently undergoing feasibility-level evaluations. The study area boundary for each proposed site was first determined by selecting sufficient area in the region of the site that would potentially encompass multiple alignments for the proposed PSH facility. Then, the study areas were delineated along property boundaries.

Other alternatives to the Proposed Action, such as other project sites that were considered but eliminated from further analysis, are discussed in Section 2.5, Alternatives Considered but Eliminated from Further Consideration.

2.3 Alternative A – No Action Alternative

The No Action Alternative would not meet the purpose and need, but it provides a baseline of conditions against which the impacts of the proposed action alternatives are measured. Under the No Action Alternative, TVA would not develop or expand PSH facilities at any of the project sites. TVA would continue to rely on existing sources of generation to meet generation needs and reserve margin requirements. Existing TVA sources of dispatchable generation include natural gas combined cycle and combustion turbine plants, natural gas aeroderivative plants, pumped storage and other sources if necessary.

2.4 Action Alternatives

For each action alternative, anticipated preconstruction activities would include clearing and grading of lands for the development of project facilities and establishment of spoil areas to accommodate disposal of materials excavated from the construction of underground tunnels, caverns, and shafts. Land within the footprint of the upper reservoirs would be cleared of vegetation and excavated to bedrock. Construction of dams, embankments, and upper reservoirs (Rorex Creek and Widows Creek sites only); tunnels, tunnel portal, caverns, and shafts; miscellaneous yards and facilities, upper and lower reservoir inlet/outlet structures, roads and access ways, transformer and switchyards, and transmission facilities to complete the connection between the proposed PSH facility and existing power transmission systems would also be required.

Underground excavation for the tunnels and powerhouse would be accomplished via traditional drill and blast methods. Borrow materials would be obtained on site except for some crushed rock, concrete, and asphalt. These materials would be obtained from commercially available, previously permitted quarries. The proposed workforce is anticipated to peak at 1,000 workers for each alternative, and the total construction duration is expected to be five to eight years for each alternative site. The operations workforce would include approximately 60 full-time workers.

During construction of the underground powerhouse, access would be provided by tunnels. Much of the workforce and materials to construct the powerhouse would be staged near the entrance of the tunnels. Sufficient space would be required at the tunnel entrance to house temporary construction facilities and support areas, such as office trailers, warehousing, labor resources, shop space, concrete plants, wastewater treatment areas, etc. TVA would repurpose tunnel spoils as fill material to construct these construction support areas adjacent to the tunnel entrances and existing lower reservoir. After construction of the powerhouse, the construction support areas would be developed into permanent plant support areas, recreational areas, and green spaces.

Dredging, underwater excavation, or both would be required within the existing lower reservoir for each option to create the inlet and outlet structures and associated infrastructure for the plant. Alternative dam types and configurations would be evaluated pending refined engineering studies, including rockfill embankments with vertical and inclined core options, roller compacted concrete, and various seepage barrier options. Early studies indicate the following dam embankment quantities, depending on type, crest elevation, and geometry:

- Rorex Creek – Approximately 10 million to 17 million cubic yards
- Widows Creek – Approximately 5.3 million cubic yards
- Raccoon Mountain II – Not applicable, as this concept would use the existing RPS dam structures and reservoirs. While the reservoir capacity may be expanded through excavation, there would be no change to the existing dam.

For each alternative site, TVA would work with the community to develop recreation amenities. It is anticipated that these amenities would be similar to existing facilities at the RPS, and would likely include hiking and biking trails, boat ramps, and overlooks. Generation decisions for the proposed PSH facilities would be made by the TVA Balancing Authority based on the generation needs, system loads, and excess power on the grid.

Table 2-1. Anticipated Facilities and Maximum Size of Construction Footprints for Each Alternative Site

	Alternative Site		
Anticipated Facility	**Alternative B: Rorex Creek (new construction)**	**Alternative C: Widows Creek (new construction)**	**Alternative D: Raccoon Mountain Expansion**
Upper Reservoir (including laydown and construction support)	1,000 ac	1,000 ac	N/A[2]
Upper Reservoir General Facilities	100 ac	100 ac	100 ac
Dam Embankment	10-17 million yd^3	5.3 million yd^3	N/A
Upper Reservoir to Lower Reservoir Access Road	150 ac	N/A	N/A
Tunnel Portal Area and Facilities	100 ac	200 ac	100 ac
Transformer and Switchyard	50 ac	50 ac	50 ac
Miscellaneous	100 ac	100 ac	100 ac
Total Acres[1]	1,500 ac	1,450 ac	350 ac
Inlet/Outlet Structure	Y	Y	Y
Inlet/Outlet Yard Area	Y	Y	Y
Spoil Area (Adjacent Bank)	Y	Y	Y
Temporary Cofferdam	Y	Y	Y

Anticipated Facility	Alternative Site		
	Alternative B: Rorex Creek (new construction)	**Alternative C: Widows Creek (new construction)**	**Alternative D: Raccoon Mountain Expansion**
Bridge	Y	N	N
Barge Facility	Y	Y	N

[1] Quantities are approximate and dependent upon the final design.

[2] Alternative D (Raccoon Mountain expansion) could include increasing the storage capacity of the upper reservoir through excavation within the existing reservoir footprint.

Key: N/A = not applicable; ac = acre; yd^3 = cubic yards; Y = yes; N = no

Table 2-2. Summary of Approximate Principal Characteristics for Each Alternative Site

Project Feature	Description		
	Rorex Creek	**Widows Creek**	**Raccoon Mountain Expansion**
A – Upper Reservoir			
Usable Storage Volume	34,200 up to 47,752 acre-feet (proposed)	25,600 acre-feet (proposed)	32,132 acre-feet (existing)[1]
Maximum Normal Water Level	EL 1,435 up to 1,460 feet MSL (proposed)	EL 1,521 feet MSL (proposed)	EL 1,672 feet MSL (existing)
Minimum Normal Water Level	EL 1,335 up to 1,355 feet MSL (proposed)	EL 1,455 feet MSL (proposed)	EL 1,540 feet MSL (existing)
Existing Intake	N/A	N/A	Vertical, un-gated
Proposed New Intake	Vertical, gated	Vertical, gated	Horizontal, gated
B – Lower Reservoir (Existing)			
Lower Reservoir Name	Guntersville Reservoir	Guntersville Reservoir	Nickajack Reservoir
Water Surface Elevation – Maximum Operating Pool	595 feet MSL	595 feet MSL	634 feet MSL
Water Surface Elevation – Minimum Operating Pool	593 feet MSL	593 feet MSL	632 feet MSL
C – Water Conduits (Proposed)			
Arrangement	One water conveyance system supplying two units	Two separate water conveyance systems, each supplying two units; four units total	One water conveyance system supplying two units
Low Pressure Tunnel	One 27.5-foot-diameter, concrete-lined, 600-foot-long tunnel, from upper reservoir inlet/outlet to vertical shaft	N/A	One 27.5-foot-diameter, concrete-lined, 600-foot-long tunnel, from upper reservoir inlet/outlet to vertical shaft
Vertical Shafts	One 27.5-foot-diameter, concrete-lined shaft, 843 feet deep, from low pressure tunnel to high pressure tunnel	Two 30-foot-diameter, concrete-lined shafts, 733 feet deep, from low pressure tunnel to high pressure tunnel	One 27.5-foot-diameter, concrete-lined shaft, 843 feet deep, from low pressure tunnel to high pressure tunnel
High Power Tunnels	Two separate water conveyance systems, each supplying two units; four units total	Two 30-foot diameter, concrete-lined tunnels, 2,185 feet long, from vertical shaft to penstock bifurcation	One 27.5-foot diameter, concrete-lined tunnel, 1,380 feet long, from vertical shaft to penstock bifurcation

Project Feature	Description		
	Rorex Creek	**Widows Creek**	**Raccoon Mountain Expansion**
Penstocks	N/A	Four 17-foot diameter, 350-foot-long to powerhouse, each with a 90-foot-long concrete-lined section and 260-foot-long steel-lined section	Two 18-foot-diameter, 350-foot-long to powerhouse, each with a 90-foot-long concrete-lined section and 260-foot-long steel-lined section
Draft Tubes	Two 33-foot diameter tubes, concrete-lined, 675 feet deep, to high-pressure tunnel	Conventional, as required for velocity head recovery	Conventional, as required for velocity head recovery
Draft Tube Tunnels	Two 33-foot diameter, concrete-lined tunnels, 1,786 feet long, from vertical shaft to penstock bifurcation	Four 25-foot-diameter, 267-foot-long tunnels extending to tailrace tunnel	Two 24-foot-diameter, 150-foot-long tunnels extending to tailrace tunnel
Tailrace Tunnels	Four 19-foot-diameter, 350-foot-long tunnels to powerhouse, each with a 90-foot-long concrete-lined section and 260-foot-long steel-lined section	Two 33-foot-diameter, 1,159-foot-long draft tube tunnels, to lower reservoir inlet/outlet	One 32-foot-diameter, 1,310-foot-long tunnel, to lower reservoir inlet/outlet
Head Loss Assumption – Overall per Conduit, Two Units per Conduit in Operation	Conventional, as required for velocity head recovery	Generating Mode: $h_{loss} = C_G*Q_{total}^2$; C_G=9.8987E-08 Pump Mode: $h_{loss} = C_P*Q_{total}^2$; C_P=1.1156E-07 Units: head loss ft, flow in cfs	Generating Mode: $h_{loss} = C_G*Q_{total}^2$;$C_G$=1.2923E-07 Pump Mode: $h_{loss} = C_P*Q_{total}^2$; C_P=1.2761E-07 Units: head loss ft, flow in cfs
Surge Tank/Chamber	None assumed; to be confirmed in later hydraulic transient studies	None assumed; to be confirmed in later hydraulic transient studies	None assumed; to be confirmed in later hydraulic transient studies
D – Powerhouse (Proposed)			
Generating/Pumping Equipment	Four or six pump-turbine/generator-motor units	Four pump-turbine/generator-motor units	Two pump-turbine/generator-motor units
Rated Generating Capacity	Range from 267 to 400 MW each, 1,200 MW to 1,600 MW total	Four units X 400 MW each, 1,600 MW total	Two units X 400 MW each, 800 MW total
Powerhouse Type	Underground cavern	Underground cavern	Underground cavern
E – Transmission (Proposed)			
Transformation	Recommended generator voltage stepped up to 500 kV via transformers located in aboveground transformer yard	Recommended generator voltage stepped up to 500 kV via transformers located in aboveground transformer yard	Recommended generator voltage stepped up to 161 kV via transformers located in aboveground transformer yard

Key: EL = elevation; kV = kilovolt; MSL = mean sea level; MW = megawatt; N/A = not applicable

[1] Alternative D could include increasing the storage capacity of the upper reservoir through excavation within the existing reservoir footprint.

2.4.1 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, TVA would construct and operate a new PSH facility with a generation capacity of up to 1,600 MW near Tennessee River Mile (TRM) 388 in Pisgah, Alabama, and Guntersville Reservoir would serve as the lower pool. Figures 2-2a, 2-2b, 2-2c, 2-2d, and 2-2e depict limits of disturbance where construction activities would occur and identify locations of project features, including the upper reservoir, power tunnel, underground powerhouse, switchyard, intake/outflow structure at Guntersville Reservoir (portal), 500-kV project transmission line, and relocations of existing transmission lines in the project area. The figure also identifies construction support areas that would be used for material storage and staging.

Preliminary renderings of the facility are shown on Figure 2-3, Figure 2-4, Figure 2-5, and Figure 2-6. The Rorex Creek study area is approximately 4,848 acres and is primarily owned by private landowners with some TVA property on the mountainside and near the river. The study includes greenfield areas and areas previously surface mined for coal.

Two transmission line corridors cross the Rorex Creek study area, as shown on Figure 2-2. The Widows Creek – Bellefonte 500-kV transmission line crosses the site from the northeastern corner to the center of the study area where it divides and travels south and west across the Guntersville Reservoir. The Bellefonte – Section 500-kV transmission line parallels the Widows Creek – Bellefonte line to the center of the study area, then turns south toward the town of Section, Alabama. Both of these lines are owned and operated by TVA.

In addition to the construction activities described in Section 2.4, Action Alternatives, for the action alternatives, preliminary designs include the following primary features for Alternative B:

- Construction of an upper reservoir on the Sand Mountain plateau that would have a usable volume of approximately 47,752 acre-feet and would be surrounded by an approximately 100-foot-tall dam.
- Construction of an underground powerhouse containing four or six 267- to 400-MW variable speed pump-turbine/generator-motor units with a combined rated generating capacity of 1,600 MW.
- Construction of two parallel water conveyance systems (each water conveyance system connected to two units each) consisting of a gated vertical upper reservoir inlet/outlet structure, vertical shaft, high pressure headrace tunnel, manifold, penstocks, draft tubes, tailrace tunnels, and a gated horizontal lower reservoir inlet/outlet structure.
- Various upgrades and improvements to the existing access roads leading to the project area and new roads within the project site.
- Construction of a permanent barge docking area to facilitate the transport of construction equipment and materials to the site via barge.
- Construction of a new bridge extending from County Road (CR) 558 and crossing Guntersville Reservoir, construction of a new road extending from the new bridge to the upper bluff near the sites, various improvements to existing roads in proximity to

and extending from the sites toward the town of Pisgah. Other required local infrastructure improvements are yet to be determined.

- Construction of new transformer yard and switchyard facilities that would connect to the existing, currently unused double circuit 500-kilovolt (kV) transmission line that extends from the Bellefonte Property for approximately 14.7 miles northwest to an interconnection with the existing Madison-Widows Creek 500-kV line at CR 39 (Figure 2-2). Vegetation within the transmission line corridor would be cleared to a width of 300 feet and upgrades would be completed, as necessary.
- Rerouting two existing 500-kV lines around the perimeter of the upper reservoir, resulting in a total of about 5.2 miles of new 500-kV transmission line and removal of about 4.0 miles of existing 500-kV transmission lines.

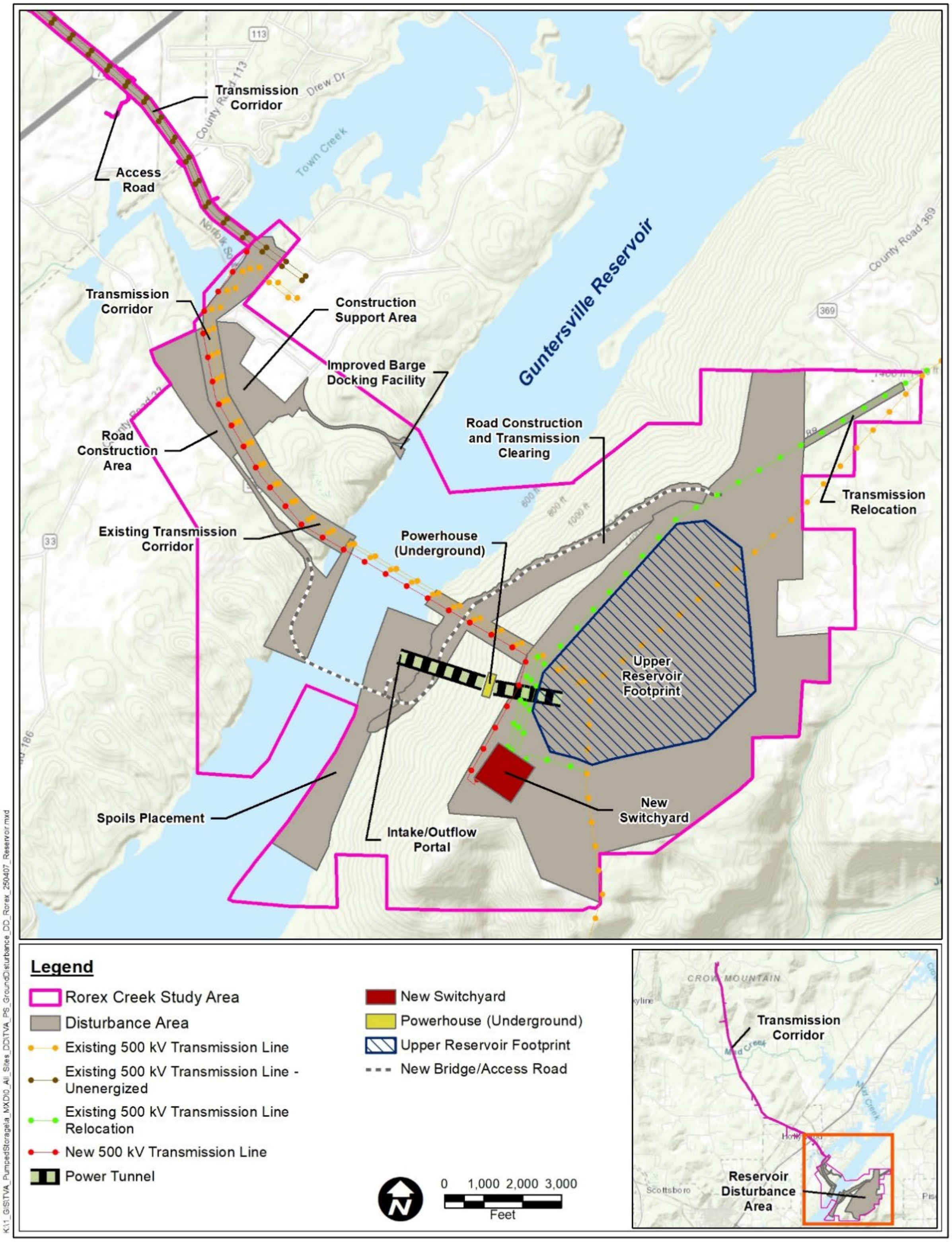

Figure 2-2a. Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

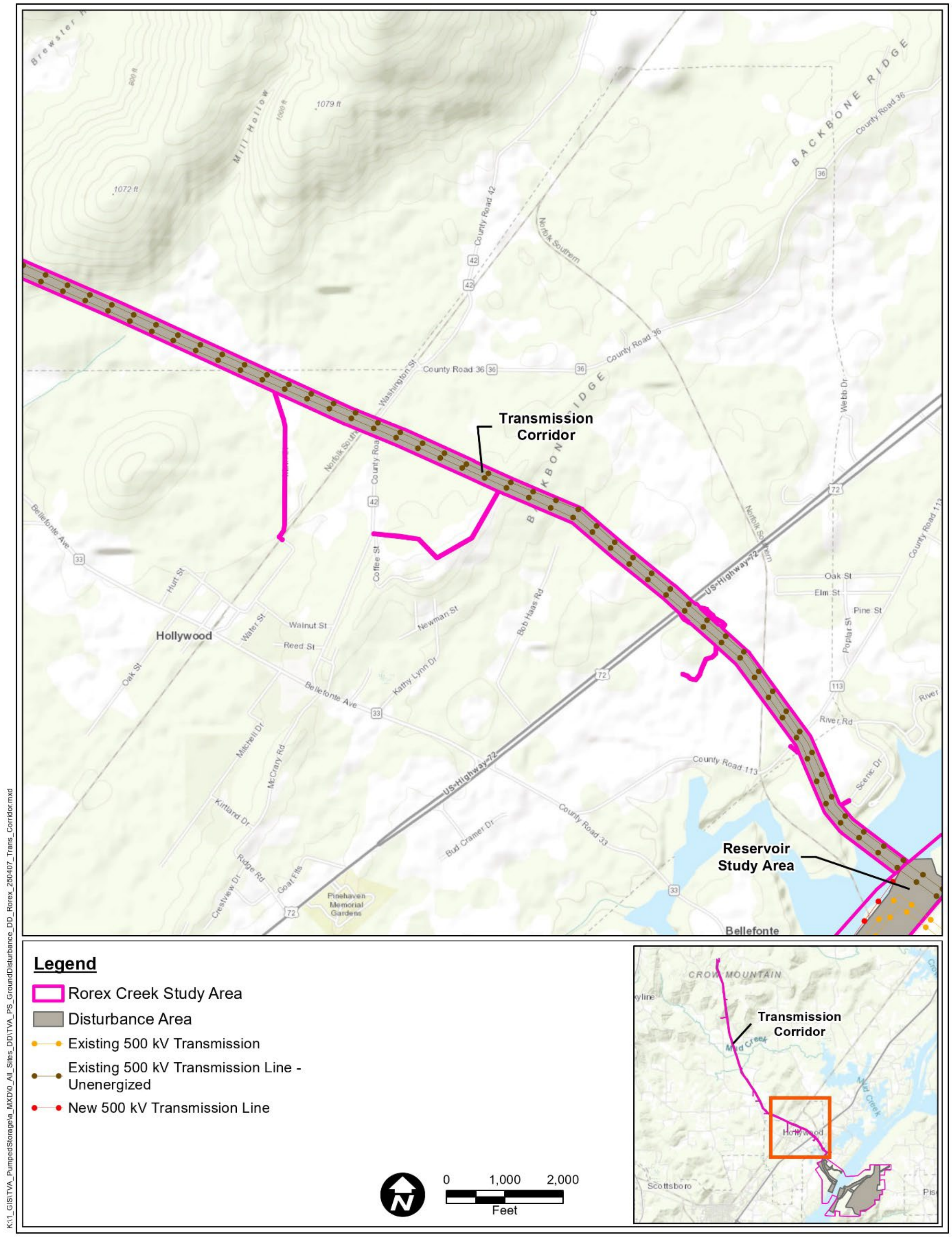

Figure 2-2b. Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

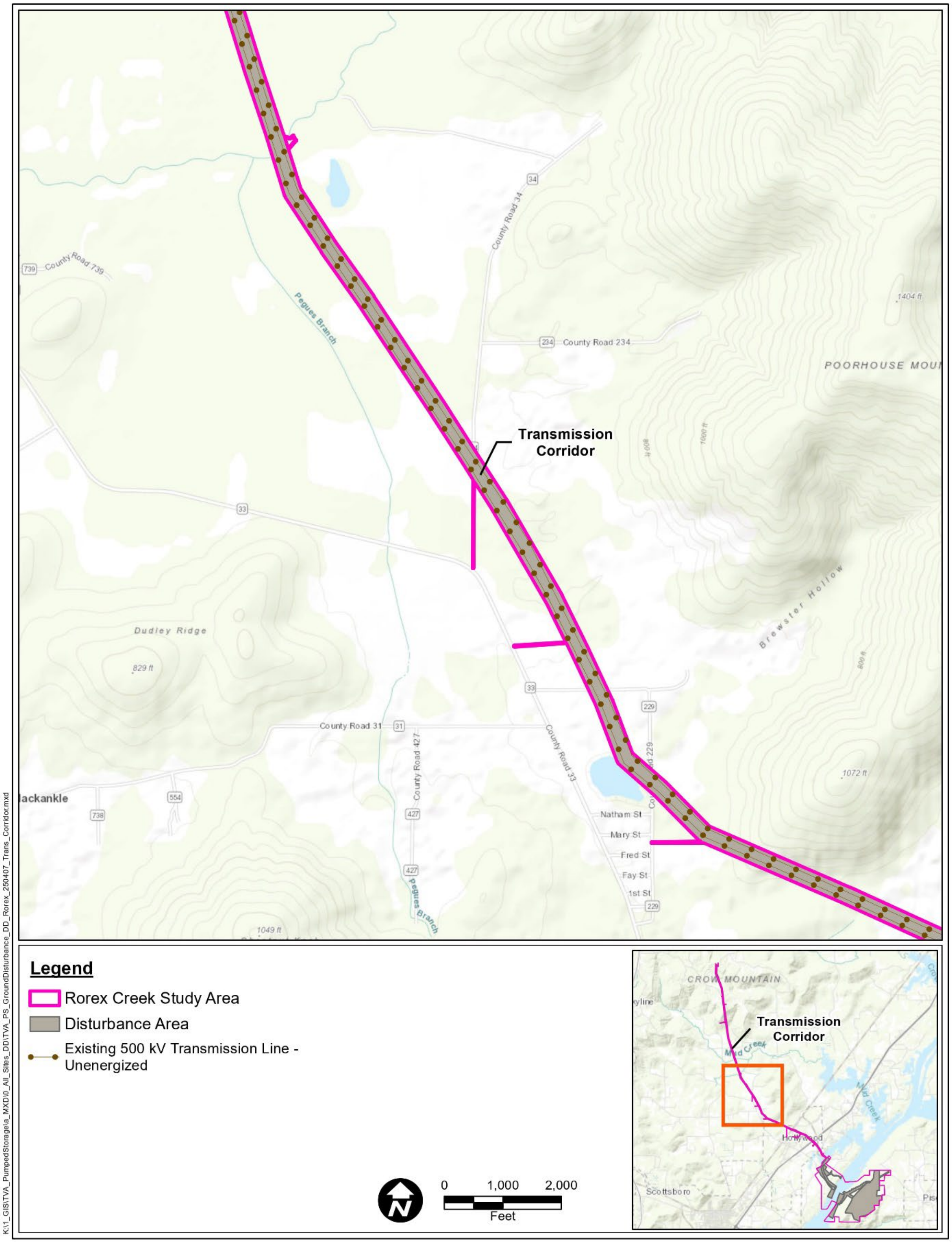

Figure 2-2c. Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

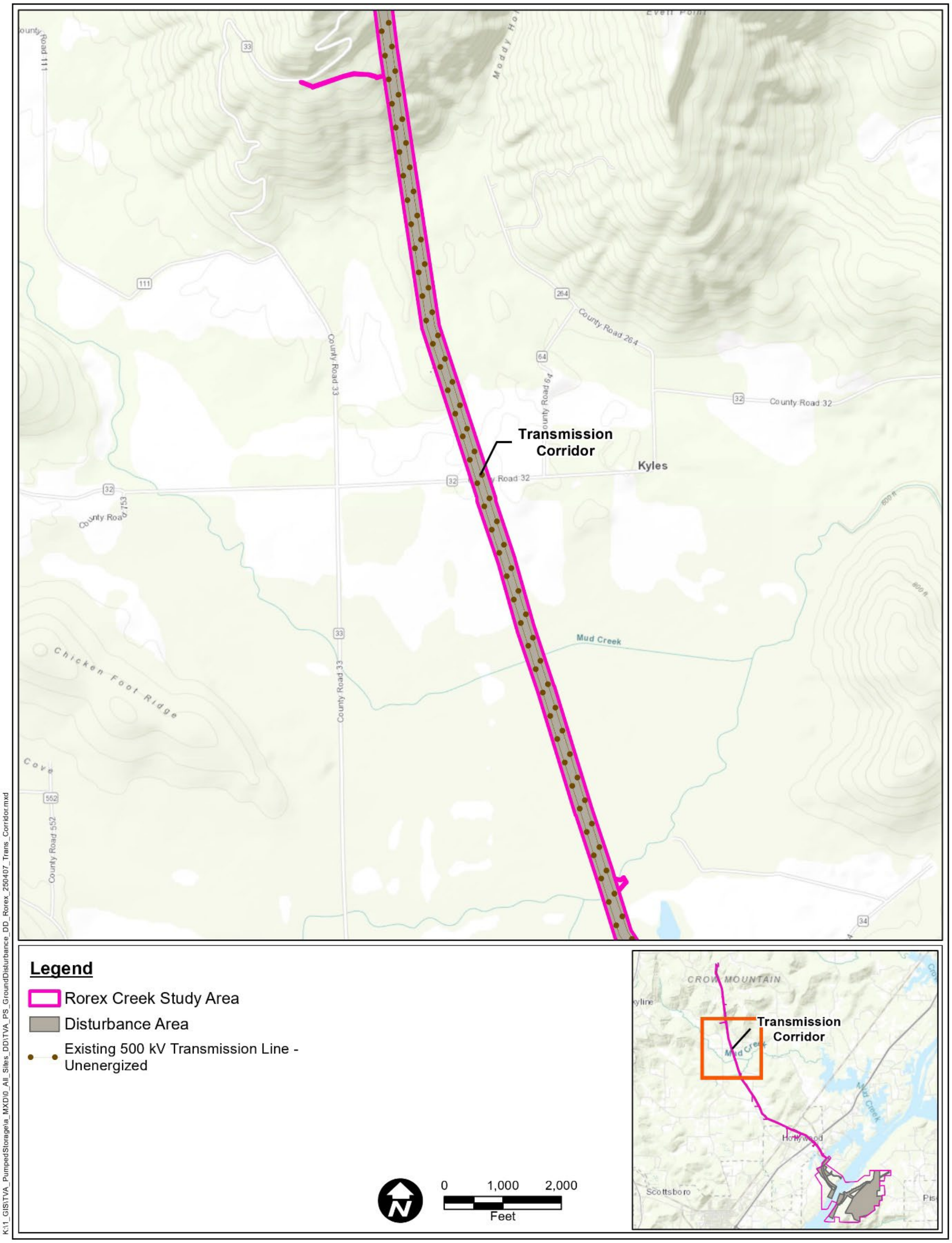

Figure 2-2d. Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

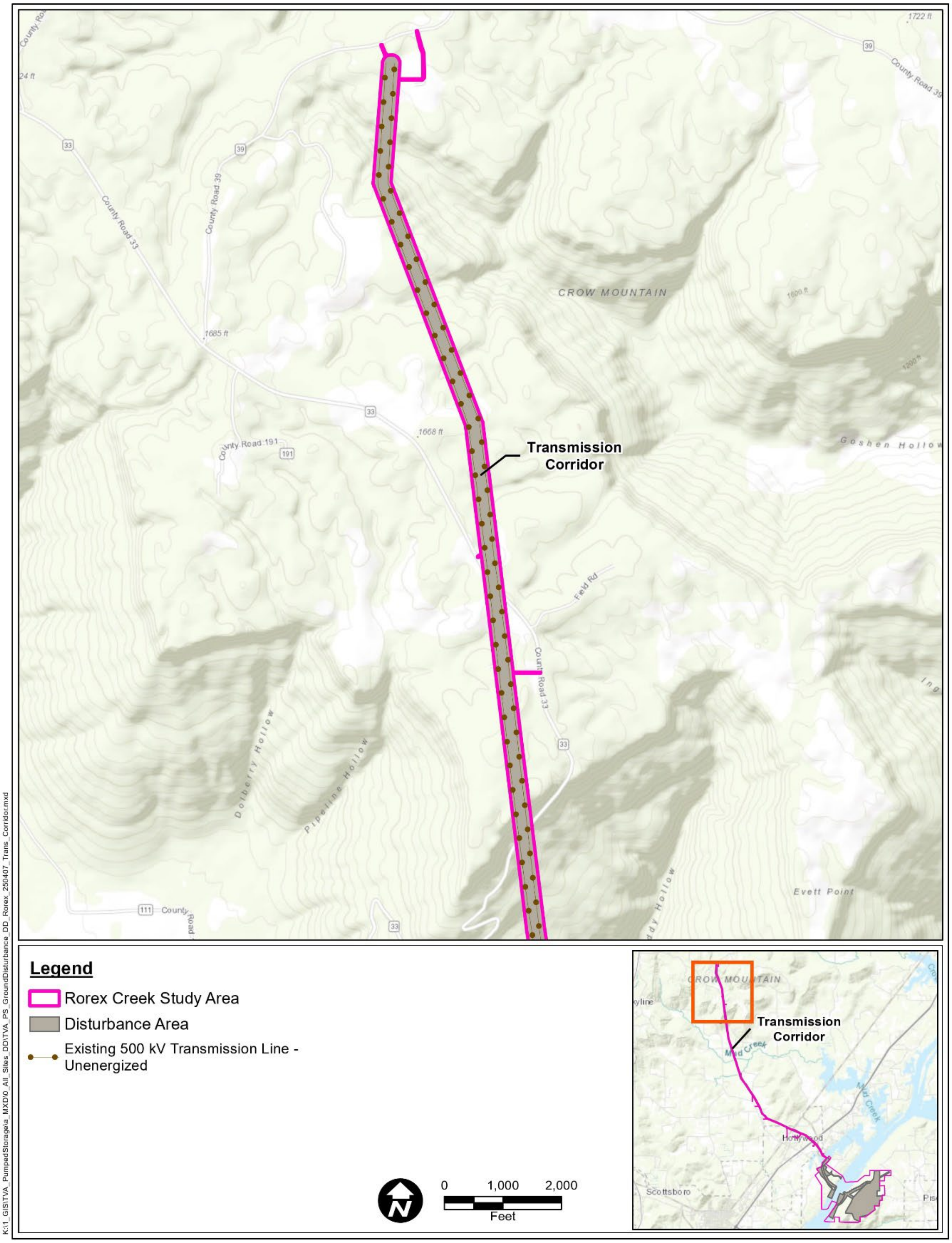

Figure 2-2e. Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Figure 2-3. Preliminary Overview Rendering of the Pumped Storage Hydropower Facility near Rorex Creek

Figure 2-4. Preliminary Rendering of the Upper Reservoir for the Pumped Storage Hydropower Facility near Rorex Creek

Figure 2-5. Preliminary Cutaway Rendering of the Pumped Storage Hydropower Facility near Rorex Creek

Figure 2-6. Preliminary Rendering of Potential Riverfront Recreational Facilities for the Pumped Storage Hydropower Facility near Rorex Creek

2.4.2 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, TVA would construct and operate a new PSH facility with a generation capacity of 1,600 MW near TRM 408 in the area near Stevenson and Fabius, Alabama, and Guntersville Reservoir would serve as the lower pool (Figure 2-7). The Widows Creek study area is on approximately 4,600 acres of greenfield property that is primarily owned by private landowners with some TVA property on the mountainside and near the river.

In addition to the construction activities described for all of the action alternatives in Section 2.4, Action Alternatives, preliminary designs include the following primary features for Alternative C:

- Construction of an upper reservoir on the Sand Mountain plateau that would have a usable volume of approximately 25,600 acre-feet.
- Construction of an underground powerhouse containing four 400-MW variable speed pump-turbine and generator-motor units with a combined rated generating capacity of 1,600 MW.
- Construction of two parallel water conveyance systems (each water conveyance system connected to two units each) consisting of a gated vertical upper reservoir inlet/outlet structure, vertical shaft, high-pressure headrace tunnel, manifold, penstocks, draft tubes, tailrace tunnels, and a gated horizontal lower reservoir inlet/outlet structure. This would require dredging a channel across the existing complex of superior quality wetlands adjacent to the Guntersville Reservoir.
- Various upgrades and improvements to the existing access roads leading to the project area, new roads within the project area, and construction of a permanent barge port facility for loading and unloading materials and equipment. Other required local infrastructure improvements are yet to be determined. If this alternative is selected, additional infrastructure improvements not assessed in this EIS would be evaluated in a separate NEPA review as designs are further developed.
- Construction of new transformer yard and switchyard facilities.
- Because the design, location, and requirements for potential future off site transmission line development, upgrades, or both are too speculative at this time, the potential environmental impacts from these actions are not evaluated in this Draft EIS. As applicable, additional transmission line(s) and upgrades would be evaluated in a separate NEPA review.
- Disturbance areas depicted on Figure 2-7 are based on current level of design and represent the project footprint only. Additional surface would occur as part of project construction for material storage and laydown areas, site grading, transmission and switchyard facilities, etc. Effects associated with these areas would need to be evaluated under further NEPA review.

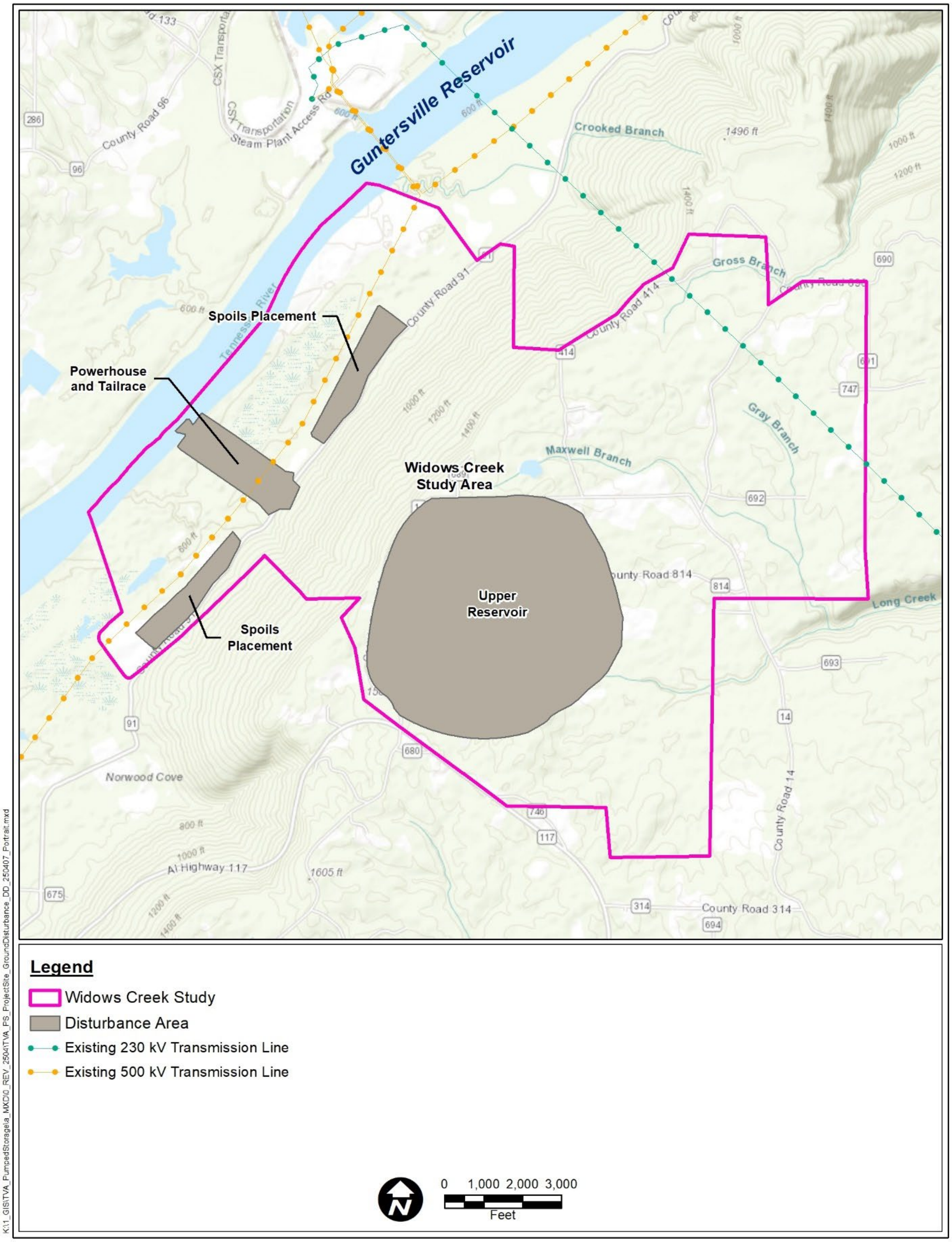

Figure 2-7. Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

2.4.3 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would install and operate a second underground powerhouse (800 MW) at TVA's existing RPS facility near Chattanooga, Tennessee. The second powerhouse would use water from the existing upper reservoir, drawing the pool down more deeply than the present operation for each cycle. This alternative could also include increasing the storage capacity of the upper reservoir through excavation within the existing reservoir footprint. The new plant facility would be sited on lands owned by TVA. The project study area for this alternative includes about 1,500 acres of TVA-owned land adjacent to the existing facility.

The proposed Raccoon Mountain II site would use the existing Raccoon Mountain PSH upper reservoir infrastructure along with the construction of new powerhouse and transmission facilities. In addition to the construction activities described for all of the action alternatives in Section 2.4, Action Alternatives, preliminary designs include the following primary features:

- Use of the existing Raccoon Mountain upper reservoir.
- Use of the existing Nickajack Reservoir as the lower reservoir.
- Use of existing yards, roads, and facilities to the extent possible. Existing roads in proximity to the site, other local infrastructure, or both would be improved as necessary.
- Construction of an underground powerhouse enclosing two variable speed pump-turbine/generator-motor units and associated equipment with a combined installed generating capacity of 800 MW.
- Construction of upper and lower upper reservoir inlet/outlet structures.
- Construction of a water conveyance system consisting of a headrace tunnel and shaft, two penstocks, two draft tubes, and a tailrace tunnel.
- Construction of a new transformer yard located above the proposed underground powerhouse.
- Construction of a new switchyard located in proximity to the existing switchyard. Disturbance areas depicted on Figure 2-8 are based on current level of design and represent the project footprint only. Additional surface disturbance would occur as part of project construction for material storage and laydown areas, site grading, transmission and switchyard facilities, etc. Effects associated with these areas would need to be evaluated under further NEPA review.

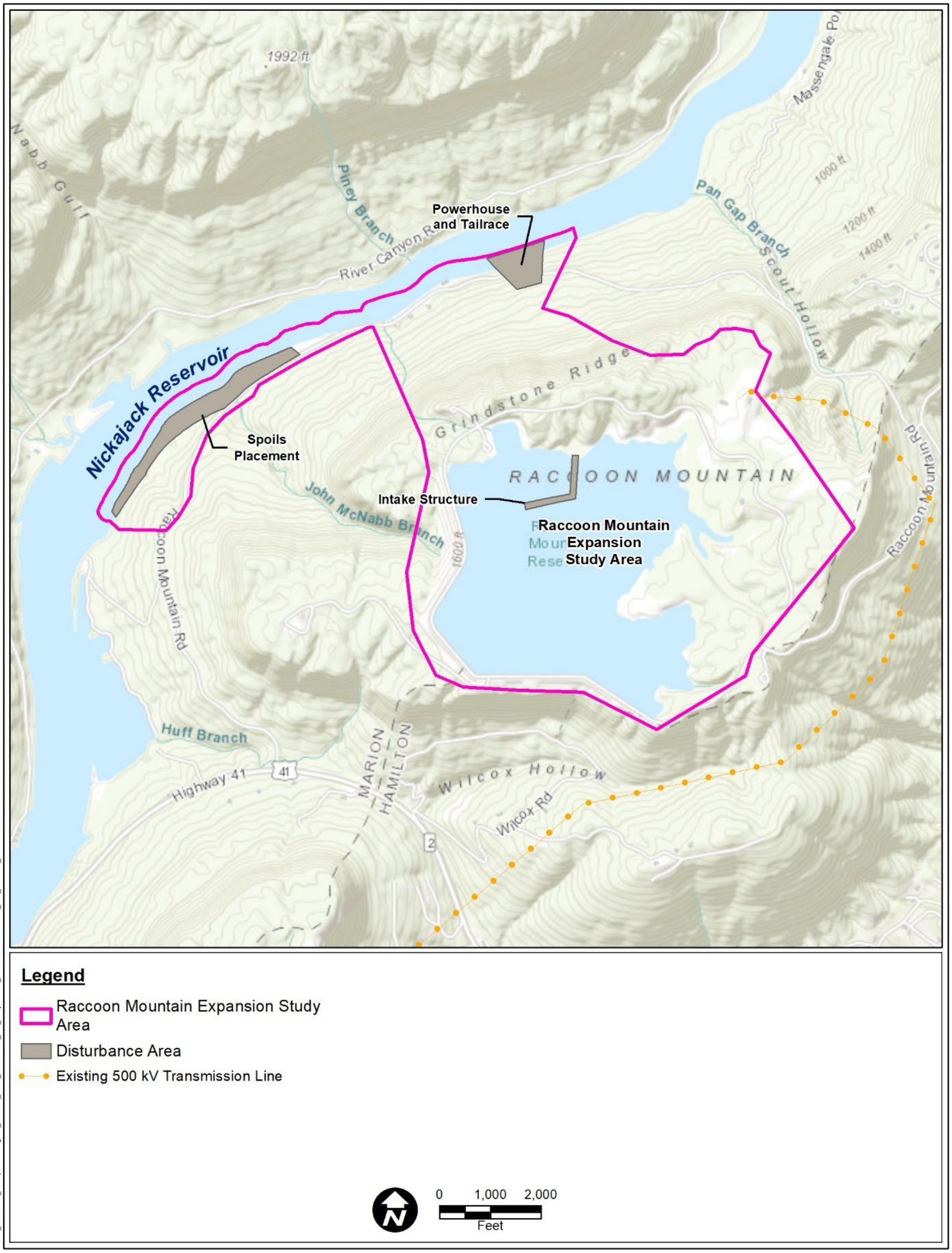

Figure 2-8. Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

2.5 Alternatives Considered but Eliminated from Further Consideration

In 2021, TVA initiated a study to evaluate suitable locations to construct PSH facilities. In the study, TVA employed a ranking system to determine the most suitable locations that would have the least effects on the natural and human environment at a feasible cost, as described in Section 2.1, Alternative Screening Process. The following sections describe the alternatives that were considered but were eliminated from further consideration.

2.5.1 Reliance, Tennessee Alternative Site

This proposed PSH facility site was dismissed from consideration because it would require the construction of both a new upper and lower reservoir that would provide only 800 MW of power. In addition, this alternative would have extensive visual impacts due to the requirement for a transmission line on Bean Mountain, which is a National Forest area protected for its scenic value.

2.5.2 Fabius Mine Site in Flat Rock, Alabama

TVA considered the Fabius Mine Site area for potential PSH development, but the site geology was not suitable for the construction of water conveyance tunnels and an underground powerhouse due to the extent of karst topography present at the site.

2.5.3 Battery Energy Storage Alternative

In addition to PSH energy storage, TVA considered battery storage to meet the need for large-scale energy storage to support grid operation and resiliency. A lithium-ion battery energy storage system (BESS) is a type of system that uses an arrangement of lithium-ion batteries and other electrical equipment to store electrical energy. BESSs have been increasingly used in residential, commercial, industrial, and utility applications for peak shaving or grid support. A lithium-ion BESS can consist of an array of individual containerized battery modules. Excess grid energy can be stored as chemical energy within the battery to be released as direct current (DC) electrical energy when called upon at a later time. This facility would require inverters to convert the DC energy of the batteries to alternating current (AC) energy that can be exported to the grid.

The storage need under consideration is expected to provide up to1,600 MW of output capacity over either 12 hours or 20 hours. The asset would be expected to be charged and discharged on a near-daily basis to support grid operation. It should be noted that while PSH has been deployed at this scale in the past, to date, lithium-ion BESS installations have been on a much smaller scale, often in the 100-200-MW range with a 4-hour duration. The deployment of 1,600 MW of lithium-ion battery storage at a single site would be a first of its kind for this technology. TVA would likely need to consider using multiple sites and engaging with battery vendors, as a BESS this size may be beyond the current market’s capability to install at a single site.

TVA performed a lifecycle cost comparison of PSH energy storage and lithium-ion BESS (single large site) to compare the financial feasibility of implementing these two energy storage technologies at the scale considered (HDR 2023). TVA performed a preliminary review of the technical operating characteristics for each technology to provide a basis for the operating assumptions used in developing the life cycle cost evaluation. PSH storage typically has a round-trip efficiency of 80 percent and a continuous auxiliary load of 3 MW.

A BESS of this size could be expected to have a roundtrip efficiency of 85 percent and a continuous auxiliary load of 70 to 100 MW. Table 2-3 summarizes the alternatives and compares the operating costs associated with each energy storage option.

Table 2-3. Comparison of Life Cycle Costs Between Pumped Storage Hydropower and Battery Energy Storage Options

Summary of Energy Storage Options	PSH Energy Storage	Lithium-ion BESS
Power Output	1,600 MW	1,600 MW
12-hour Energy Storage	19,200 MWh	19,200 MWh
20-hour Energy Storage	32,000 MWh	32,000 MWh
12-hour Charge Duration	12 hours	12 hours
20-hour Charge Duration	20 hours	20 hours
Round Trip Efficiency	80%	85%
Continuous Aux Load	3 MW	70-100 MW
12-Hour Life Cycle Cost (60-year)		
Capital Cost	$5,751 MM	$8,037 MM
NPV of Operating Cost ($2023)	$445 MM	$4,223 MM
Total Life Cycle Cost ($2023)	$6,196 MM	$12,260 MM
20-Hour Life Cycle Cost (60-year)		
Capital Cost	$6,316 MM	$12,536 MM
NPV of Operating Cost ($2023)	$445 MM	$7,038 MM
Total Life Cycle Cost ($2023)	$6,761 MM	$19,574 MM

Key: BESS = Battery Energy Storage System; MW = megawatt; MWh = megawatt hour; NPV = net present value; MM = million

At the 12-hour duration, installation costs of PSH energy storage and lithium-ion BESS appeared comparable. However, at the 20-hour duration, PSH storage benefits from increased economies of scale and presents a lower capital cost alternative than lithium-ion BESS. In all cases, the maintenance cost associated with the BESS installation is much higher than the PSH. This is largely due to the degradation of the BESS units. Typically, a lithium-ion installation is designed with a lifespan of 15- to 20 years and an augmentation plan is often required to combat the capacity degradation experienced by the battery cells. In contrast, PSH facilities have a typical lifespan of 80 to 100 years, including periodic equipment replacements and regular maintenance (National Hydropower Association 2024).

In summary, the current technology for lithium-ion batteries is not appropriate for long-term energy storage. Lithium-ion batteries are more appropriate for shorter duration 2-to-4-hour storage for energy peak shaving. The costs and environmental impacts associated with maintaining the 12-hour or 20-hour storage capacity over the 15-, 30-, 45- and 60-year durations result in high ongoing maintenance costs for the lithium-ion BESS options (HDR 2023). Therefore, the 1,600-MW lithium-ion BESS alternative was eliminated from further consideration in this Draft EIS.

2.5.4 Groundwater-Sourced (Closed-Loop Pumped Storage)

PSH facilities can be characterized as either open loop or closed loop, with respect to their connectivity to other waterbodies. The U.S. Department of Energy (DOE) defines an open-loop PSH as “continuously connected to a naturally flowing water feature,” and a closed-loop PSH as “not continuously connected to a naturally flowing water feature” (DOE 2024). Closed-loop PSH facilities commonly use a groundwater source to fill the upper reservoir rather than naturally flowing surface water reservoirs. Additional groundwater is used during the project to replenish water lost through evaporation. An alternative using groundwater to fill the upper reservoirs would require additional ground disturbance, would generate additional spoil materials, affect local aquifers, and would incur additional costs for no apparent benefit over using surface water from existing reservoirs.

The proposed action alternatives are all located adjacent to pre-existing multi-purpose reservoirs and would be designed to pump water from those reservoirs to the upper reservoir as part of normal project operations. Any secondary drilling and pumping needed to reach a groundwater source would be unnecessary.

According to DOE (2020), “the environmental effects of closed-loop PSH projects (i.e., groundwater sourced) are generally lower (i.e., more localized and of shorter duration) than those of open-loop projects because they: (1) are located “off-stream,” potentially minimizing aquatic and terrestrial impacts, and (2) often have greater siting flexibility than open-loop projects” (DOE 2020). However, the action alternatives assessed in this Draft EIS would use pre-existing lower reservoirs. The DOE found that for open-loop projects where the lower reservoir was already constructed for other purposes and an upper reservoir was added later for PSH operations (i.e., the action alternatives evaluated in this Draft EIS), impacts may be as low, if not lower, than closed-loop PSH projects (DOE 2020).

For such “add-on” PSH projects, it is likely that initial construction impacts will be lower than those of constructing a closed-loop project, as only one new reservoir needs to be built. Closed-loop systems can impact groundwater quality, groundwater circulation patterns, and chemistry. Impacts on groundwater quantity resulting from the large quantities of water necessary for reservoir fill and refill could reduce groundwater availability for other uses. Conversely, the impacts of project operations may be higher than closed-loop systems because the add-on project’s lower reservoir is still continuously connected to and affects a naturally flowing water feature. All of the 43 PSH projects operating in the United States are open-loop, so the environmental effects of closed-loop are not well-documented (DOE 2020).

Closed-loop PSH projects were considered but eliminated from further consideration because the impacts of drilling and pumping needed to reach a groundwater source for the upper reservoir would likely be greater than using a pre-existing lower reservoir to fill the upper reservoir. In addition, closed-loop facilities can have adverse impacts on groundwater quality and quantity.

2.5.5 Floating Solar Arrays

Floating solar photovoltaic arrays are an emerging application of photovoltaics in which systems are sited directly on waterbodies. TVA considered the potential for the installation of floating solar arrays within the upper reservoir of a PSH facility. However, the upper reservoir would be subject to large daily changes in water elevations, which could result in significant stresses on a floating array, potential for possible grounding on the system, and inordinate challenges associated with conducting maintenance on the array within the upper reservoir. This would not be a good application for floating solar arrays.

2.6 Comparison of Alternatives

The impacts evaluated may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, cultural, and socioeconomic resources within the project areas of each alternative and within the surrounding areas. Impact severity is dependent upon their relative magnitude and intensity and resource sensitivity. Four descriptors are used to characterize the level of impacts and is consistent with TVA's current practice. In order of degree of impact, the descriptors are as follows:

- No Impact (or "absent") – Resource not present or, if present, not affected by project alternatives under consideration.
- Minor – Environmental effects are not detectable or are so minor that they would not noticeably alter any important attribute of the resource.
- Moderate – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- Significant – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The environmental impacts of each alternative under consideration are summarized in Table 2-4. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3. As described in Section 2.7, TVA's Preferred Alternative, Alternative B was identified as the preferred alternative; therefore, additional design and engineering were conducted to develop project plans at the Rorex Creek Site. For these reasons, Chapter 3 provides more information for Rorex Creek, including potential transmission line corridors and access roads, compared to Raccoon Mountain and Widows Creek.

Table 2-4. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A: No Action	Alternative B: New Pumped Storage Hydropower Facility near Rorex Creek	Alternative C: New Pumped Storage Hydropower Facility near Widows Creek	Alternative D: Expansion of Raccoon Mountain Pumped Storage Hydropower Facility
Vegetation	No effect	Significant adverse effects to sensitive vegetation communities. Minor effects to previously disturbed or locally common communities.	Significant adverse effects to sensitive vegetation communities. Minor effects to previously disturbed or locally common communities.	Minor effects to previously disturbed or locally common communities.
Wildlife	No effect	Minor adverse effects are associated with construction noise and habitat loss.	Minor adverse effects are associated with construction noise and habitat loss.	Minor adverse effects are associated with construction noise and habitat loss.
Threatened and Endangered Species	No effect	May effect, but not likely to adversely affect ESA-listed plants, bats, and mussels. Significant adverse effects to several globally rare and/or state-listed plant species. Minor adverse effects to other rare or sensitive species.	May effect, but not likely to adversely affect ESA-listed bats and mussels. Minor adverse effects to other rare or sensitive species.	May effect, but not likely to adversely affect ESA-listed bats and mussels. Minor adverse effects to other rare or sensitive species.
Surface Water	No effect	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.
Aquatic Ecology	No effect	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.
Wetlands	No effect	Moderate effects are associated with construction disturbance and fill with offset from compensatory mitigation.	Moderate effects are associated with construction disturbance and fill with offset from compensatory mitigation.	Minor effects associated with construction disturbance and fill.

Resource	Alternative A: No Action	Alternative B: New Pumped Storage Hydropower Facility near Rorex Creek	Alternative C: New Pumped Storage Hydropower Facility near Widows Creek	Alternative D: Expansion of Raccoon Mountain Pumped Storage Hydropower Facility
Floodplains	No effect	Minor to moderate effects associated with the placement of tunnel and upper reservoir spoils and bridge abutments within the 100-year floodplain. Minor effects associated with operation.	Minor effects associated with the placement of tunnel and upper reservoir spoils and construction of the tailrace channel within the 100-year floodplain. Minor effects associated with operation.	Moderate to significant effects associated with the placement of tunnel spoils within the 100-year floodplain. Minor effects associated with operation.
Geology and Soils	No effect	Minor effects associated with potential for erosion during construction and operation.	Moderate effects are associated with a potential for erosion or sinkholes associated with karst features below the floodplain.	Minor effects are associated with a potential for erosion during construction and operation.
Groundwater	No effect	Minor temporary effects associated with excavation, tunneling, and blasting during construction. Minor effects during operation.	Minor temporary effects associated with excavation, tunneling, and blasting during construction. No effects during operation.	Minor temporary effects associated with excavation, tunneling, and blasting during construction. No effects during operation.
Land Use and Prime Farmland	No effect	Minor adverse effects are associated with conversion of prime farmland to industrial use.	Minor to moderate adverse effects associated with conversion of prime farmland to industrial use.	Insignificant effects associated with conversion of prime farmland to industrial use.
Navigation	No effect	Minor, temporary effects during construction are associated with increased barge traffic and minor constriction during bridge construction and cofferdam operations. Minor long-term effects are associated with the bridge piers and localized effects of operation near the intake/outflow structure.	Minor, temporary effects during construction are associated with increased barge traffic and minor constriction associated with cofferdam operations. Minor localized effects of operation near the intake/outflow structure.	Negligible effects associated with construction and operation.

Resource	Alternative A: No Action	Alternative B: New Pumped Storage Hydropower Facility near Rorex Creek	Alternative C: New Pumped Storage Hydropower Facility near Widows Creek	Alternative D: Expansion of Raccoon Mountain Pumped Storage Hydropower Facility
Natural Areas, Parks, and Recreation	No addition of parks, trails, and picnic facilities	Minor temporary effects associated with construction noise. Significant, long-term beneficial effects associated with TVA-developed recreational amenities in the project area.	Moderate temporary effects of construction noise on the state wildlife management area near the project. Minor long-term adverse effects of operation within the state wildlife management area.	Minor temporary effects associated with construction noise, no effects of operation.
Cultural and Historic Resources	No effect	No effect.	Potentially significant effect on archaeological and architectural resources requiring additional consultation and mitigation.	No effect.
Visual Resources	No effect	Moderate effects are associated with construction and views of the new dam.	Significant effects associated with construction, views of the new dam, and views on new transmission lines.	Minor effects associated with construction and views of new transmission line.
Public Health and Safety	No effect	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.	Minor effects associated with construction and operation.
Solid and Hazardous Waste	No effect	Minor adverse effects associated with construction and operation.	Minor adverse effects associated with construction and operation.	Minor adverse effects associated with construction and operation.

Resource	Alternative A: No Action	Alternative B: New Pumped Storage Hydropower Facility near Rorex Creek	Alternative C: New Pumped Storage Hydropower Facility near Widows Creek	Alternative D: Expansion of Raccoon Mountain Pumped Storage Hydropower Facility
Transportation	No addition of bridge across the reservoir shortening travel time between Pisgah and Scottsboro	Moderate adverse effect to local roads during early construction phases. Reduced adverse effects once roadway improvements and bridge are complete. Minor adverse effects are associated with operation. Long-term beneficial effect associated with bridge across reservoir.	Moderate adverse effect to roads in close proximity to the study area during early construction phases. Minor adverse effects once roadway improvements are complete.	Minor adverse effects associated with construction. No effect associated with operation.
Air Quality	No additional use of hydropower to offset emissions from combustion-driven generation	Minor effect of increased emissions associated with construction vehicles during the 5 to 7-year construction period.	Minor effect of increased emissions associated with construction vehicles during the 5 to 7-year construction period.	Minor effect of increased emissions associated with construction vehicles during the 5 to 7-year construction period.
Climate Change and Greenhouse Gases	No additional use of hydropower to offset emissions from combustion-driven generation.	Minor effect of increased emissions associated with construction vehicles during the 5 to 7-year construction period.	Minor effect of increased emissions associated with construction vehicles during the 5 to 7 -year construction period.	Minor effect of increased emissions associated with construction vehicles during the 5 to 7-year construction period.
Noise	No effect	Major effect associated with excavation of the upper reservoir during the first 2 to 5 years of construction. No effect associated with operation.	Major effect associated with excavation of the upper reservoir during the first 2 to 5 years of construction. No effect associated with operation.	Minor effects associated with construction. No effect associated with operation.

Resource	Alternative A: No Action	Alternative B: New Pumped Storage Hydropower Facility near Rorex Creek	Alternative C: New Pumped Storage Hydropower Facility near Widows Creek	Alternative D: Expansion of Raccoon Mountain Pumped Storage Hydropower Facility
Socioeconomics	No addition of bridge across the river or economic benefits from construction and operation jobs.	Moderate long-term beneficial effects associated with bridge construction. Moderate temporary beneficial economic effects associated with the construction workforce. Temporary moderate adverse effects on housing and services associated with construction work force.	Significant, temporary beneficial economic effects associated with the construction workforce. Temporary moderate adverse effects on housing and services associated with construction work force. Moderate adverse effects associated with the purchase of residential properties.	Minor temporary beneficial economic effects associated with the construction force.
Utilities	Potential adverse impacts in the form of service disruptions due to inability to meet the increasing energy demands in the Tennessee Valley	Overall long-term beneficial impacts would occur due to improved system reliability and flexibility to integrate intermittent energy resources.	Overall long-term beneficial impacts would occur due to improved system reliability and flexibility to integrate intermittent energy resources.	Overall long-term beneficial impacts would occur due to improved system reliability and flexibility to integrate intermittent energy resources.

2.7 TVA's Preferred Alternative

TVA's preferred alternative is Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek. Alternative B meets the purpose and need of the project and supports the recommendations outlined in TVA's 2019 IRP (TVA 2019b). Alternative B was identified as the preferred alternative due to the following:

- More new power generation and storage (1,200 MW to 1,600 MW) than under Alternative D (800 MW)
- Fewer wetlands impacts than Alternative C
- Fewer impacts than Alternative C on privately owned land parcels and residences in the proposed upper reservoir footprint
- No impact to National Register of Historic Places (NRHP)-listed or -eligible archaeological sites within the project disturbance area.
- Substantial socioeconomic and transportation benefits to the local communities associated with this alternative, including construction of a new bridge that would extend from CR 558 across Guntersville Reservoir, providing more direct access between the Scottsboro and Pisgah communities; various improvements to existing roads in proximity to and extending from the proposed project area toward the town of Pisgah; and construction of barge port facilities for loading and unloading materials and equipment
- An existing 500-kV transmission powerline at the Bellefonte Property across the Guntersville Reservoir that can distribute power from the PSH facility to the TVA transmission system grid

Alternative C – New Pumped Storage Hydropower Facility near Widows Creek was not identified as the preferred alternative due to the following:

- Substantial wetlands impacts, especially those associated with the proposed tailrace through a large superior-quality wetland complex adjacent to Guntersville Reservoir.
- More impacts than Alternatives B and D to privately owned land parcels/residences in the proposed upper reservoir footprint.
- Potential to impact NRHP-listed or -eligible archaeological sites within the project disturbance area.
- Limited benefits to the local community as compared to Alternative B.
- Development of a new transmission powerline corridor, whereas there is an existing transmission corridor at the Rorex Creek study area.

Alternative D – Expansion of RPS was not identified as the preferred alternative due to the following:

- The expansion would not substantially increase the energy storage capacity of RPS. It would increase the available MWs of input and output but would not increase the storage volume in terms of MWh.
- The expansion would result in outages of the existing RPS that would prevent the operation of the plant during portions of the construction period.

Once Rorex Creek was identified as the preferred alternative, additional design and engineering analyses were conducted to develop project plans and complete additional surveys at the Rorex Creek Site. For these reasons, Chapter 3 provides additional information for Rorex Creek, including impacts resulting from a potential transmission line corridor and access roads, compared to Raccoon Mountain and Widows Creek. In addition, because design has been further developed for Rorex Creek, the disturbance area shown on Figures 2-2a through 2-2e includes permanent infrastructure and temporary use and laydown areas, whereas the disturbance areas for Widows Creek and Raccoon Mountain (Figure 2-7 and Figure 2-8) include only approximate permanent infrastructure impact areas.

2.8 Summary of BMPs, Mitigation Measures, and Commitments

BMPs, mitigation measures, and commitments identified in Chapter 3 to avoid, minimize, or reduce adverse impacts on the environment are summarized in the following subsections. Additional project-specific BMPs may be applied as appropriate on a site-specific basis to enable efficient maintenance of construction projects and further reduce potential impacts on environmental resources.

2.8.1 Best Management Practices

- Standard BMPs would be implemented including those described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities (TVA 2022c); the Tennessee Erosion and Sediment Control Handbook (TDEC 2012); the Alabama Handbook for Erosion Control; Sediment Control and Stormwater Management on Construction Sites and Urban Areas (Alabama Soil and Water Conservation Committee 2022); as well as the project-specific SWPPP, the site-specific CBMPP, or both. BMPs would be used for the following:
- To minimize the introduction and spread of invasive species, TVA would follow standard operating procedures consistent with EO 13112 as amended by EO 13751 (Invasive Species) for revegetating with noninvasive plant species as defined in the BMP manual (TVA 2022c).
- Land clearing operations would be conducted in accordance with TVA BMPs to prevent any unnecessary damage to the remaining natural vegetation, protect wetlands and streams to the extent practicable, and prevent soil erosion (TVA 2022c). During vegetation clearing activities, marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site.
- During access road construction, culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any perennial streams would be removed following construction. However, in ephemeral streams, the culverts would be left or removed, depending on the landowner’s wishes or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions.
- Pesticide and herbicide use as part of construction or maintenance activities would comply with the TDEC or ADEM General Permit for Application of Pesticides, which also requires a pesticide discharge management plan. In areas requiring chemical treatment, only EPA-registered and TVA-approved herbicides would be used in

accordance with label directions to restrict applications near receiving waters and to prevent unacceptable aquatic impacts.

- Spill prevention and controls shall be in place to minimize risk of pollutant laden discharge to surface waters during construction and operation. Special handling for oil, grease, and regulated chemicals shall be accommodated to protect against discharge to surface waters.
- Stormwater detention would be incorporated into detailed site design to ensure that runoff rates and discharge requirements comply with all appropriate state and local requirements, including NPDES permit limits.
- The transformer yards, 500-kV substation, PSH powerhouse, and construction laydown areas would either be constructed underground and isolated from floodwaters, or on ground outside 100- or 500-year floodplains and above 100- or 500-year flood elevations.
- Intake and outflow structures would be constructed using the least amount of fill practicable.
- Flood-damageable material and equipment would be stored outside the floodplain and above the 100-year flood elevation, as a standard practice.
- Nonhazardous and hazardous solid waste would be managed by TVA-approved solid waste disposal vendors and disposed of at state-approved, licensed facilities according to solid waste regulations from Tennessee, Alabama, or both. The disposal vendor applicant would be required to confirm that they would comply with all applicable federal, state, and local requirements and standards for handling, transporting, and disposing of nonhazardous or hazardous solid waste, as applicable.
- Any maintenance activities conducted in transmission line corridors and stream management zones (SMZs) would follow TVA's BMPs for construction and maintenance of transmission lines, *A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities* (TVA 2022c).
- Field studies and additional NEPA reviews would be conducted as necessary and appropriate, based on future planning needs.

2.8.2 Mitigation Measures

- TVA would work to minimize permanent and temporary impacts on wetlands, streams, and other sensitive resources during the design phase. If impacts to wetlands are not avoidable, CWA permitting with the USACE, the TDEC, the ADEM (or all) would be required, as appropriate. TVA would ensure that applicable permitting and required mitigation are obtained such that wetland or stream impacts would be compensated through the mitigation process. Mitigation measures would be used for the following:
- Additional site-specific investigations to evaluate the presence of karst features in areas proposed for structure development. Detailed designs for safety-related features and other structures would include all appropriate karst-related mitigative measures, and a grouting plan would be implemented as applicable.

- Minimization of the noise effects of blasting, TVA would require the construction contractor to develop a blasting plan to include notifications to local officials, emergency departments, and neighboring businesses and residents.
- Minimization of the effect of construction dewatering on groundwater levels in the areas surrounding any potential excavation, and to reduce the need for dewatering, fractures and cavities transmitting large amounts of water would be appropriately blocked or grouted. As appropriate, TVA would assess the effects of dewatering by monitoring groundwater levels surrounding the excavation and water levels in potentially affected surface waterbodies.
- New road construction or modifications to existing roads within 100-year floodplains would be designed and constructed such that upstream flood elevations would not increase more than 1.0 foot, and fill within the reservoir (or reservoirs) would be minimized.
- If the timing of proposed actions within 660 feet of active osprey nests cannot be modified to avoid nesting seasons, then coordination with the USDA Wildlife Services would be required for guidance to ensure compliance under the EO 13186.
- When feasible, tree removal across the study area (or areas) would occur in winter (October 15 to March 14) when most species of migratory birds would not be nesting, would be away from the region, or both.[4]
- TVA would avoid removal of documented summer roost trees for federally listed bats. In addition, TVA would ensure any potential bat summer roosting trees removed within conservation buffers around known roost trees would be done in winter (October 15 to March 14) when federally listed bats are in winter hibernacula. Where feasible, TVA would minimize impacts elsewhere across the study area by removing trees in winter (October 15 to March 14) as well. Consultation under Section 7 of the ESA is underway regarding potential impacts to federally listed bats.
- Mitigation measures that may be considered for localized traffic congestion include staggering work shifts to avoid localized delays at key intersections, installing traffic lights and stop signs, and adding turning lanes.
- When designs for specific PSH facilities are developed, TVA would conduct further analysis, modeling, or both to determine off-site noise impacts, if necessary.

[4] While the timing of tree clearing will be taken into consideration to the extent practical, the there are areas within the disturbances area, including the upper reservoir, where this will not be possible.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Scope of Analysis

This chapter describes the baseline environmental conditions (affected environment) of environmental resources in the study areas and the anticipated environmental consequences (or impacts) that would occur from the implementation of the alternatives described in Chapter 2.

3.1.1 Impact Assessment

Within the environmental consequences sections, impacts may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, cultural, and socioeconomic resources within the study area and the surrounding area. Impact severity is dependent upon their relative magnitude and intensity and resource sensitivity. Intensity descriptors were defined in Subsection 2.6, Comparison of Alternatives.

3.1.2 Reasonably Foreseeable Future Actions

Table 3-1 identifies reasonably foreseeable future trends and planned actions that were identified during internal and external scoping to be in proximity to the proposed actions. The projects listed are clearly presented in approved planning documents, have been funded to adequately support full construction and operation, or have applied for appropriate permits for construction or operation. Past and present actions inherently have environmental impacts that are integrated into the base condition for each resource analyzed in this chapter. These actions are not related to the proposed project but could also affect environmental resources in the project area.

Accordingly, the affected environment described in this Draft EIS considers changes to the human environment from reasonably foreseeable future actions with a close causal relationship to the alternatives. Potential effects are generally considered in this Draft EIS if they are projected to occur at the same time and place as the proposed action and may include those that overlap in time and geography.

Table 3-1. Summary of Reasonably Foreseeable Future Actions in Proximity to the Study Areas

Project Name	Description	Approximate Distance from Study Area	Status
Rorex Creek			
SR 35 Lane Additions	Construct additional lanes on SR 35 in Section, Alabama, from (1) Williams Street to Scenic Drive, and (2) Scenic Drive to the Tennessee River for approximately 4.3 miles.	3.3 miles southwest	Construction will be authorized in two phases: Approximately 1 mile will be constructed in 2025; and approximately 3.3 miles are expected to be constructed in 2031 (ALDOT 2025).
US 72 Preventative Maintenance	Resurface approximately 7.5 miles of US 72, starting west of SR 35.	2.6 miles south	Construction is expected to be authorized in 2025 (ALDOT 2025).
Raccoon Mountain			
I-24 Corridor Improvements	Widen I-24 to six lanes from the interchange with I-59 in Georgia to the interchange with I-124 in Chattanooga to increase capacity, relieve congestion, and improve operations.	1.4 miles south	Preliminary engineering and environmental review are underway. Construction is estimated to begin in 2027 (TDOT 2024a).
Signal Mountain Boulevard (SR 8, US 127)	Conduct repairs and upgrades to drainage systems, slope stabilization at various locations, and rock fall mitigation to make Signal Mountain Boulevard a safer and more reliable route.	3.8 miles northeast	Construction is estimated to begin in 2026 (TDOT 2024b).
Moccasin Bend Environmental Campus Upgrades	Construct a waste-to-energy system at the existing Moccasin Bend Environmental Campus water treatment plant.	2.4 miles east	Construction is expected to be completed by the end of 2028 (City of Chattanooga 2023).

Key: I-24 = Interstate 24; I-59 = Interstate 59; I-124 = Interstate 124; SR = State Route; US 127 = U.S. Route 127

3.2 Vegetation

3.2.1 Affected Environment

3.2.1.1 Rorex Creek Study Area

The Rorex Creek study area is west of Pisgah in Jackson County, Alabama, and encompasses approximately 4,848 acres. It spans both sides of Guntersville Reservoir along the Tennessee River. The study area is located within the Southwestern Appalachians Ecoregion (Level III) and the following Level IV Ecoregions: Sequatchie Valley (68b), which encompasses Guntersville Reservoir, and the portion of the study area on the west side of the reservoir; Plateau Escarpment (68c); and Southern Table Plateaus (68d) (Griffith et al. 2001a).

Most of the study area is located on Sand Mountain and its western escarpment, which are part of the latter two ecoregions. The Southern Table Plateau is underlain by Pennsylvanian-age sandstone, which is erosion-resistant and contributes to the mostly flat plateau surface. The Plateau Escarpment is part of the Sequatchie Valley and Tennessee River Valley, and its steep, eroded slopes are underlain by Mississippian-age bedrock of mostly shale and limestone, although the upper escarpment slope is littered with massive sandstone boulders left from the mass wasting of the plateau rim.

Land cover designations within the study area were developed based on field observations and land use/land cover information obtained from the National Land Cover Dataset (NLCD) (Dewitz 2023). Field reconnaissance level surveys of plant communities in the study area were conducted by WSP in June, July, and September 2023 and August 2024 (WSP 2024a). Land cover within the study area and a 5-mile radius is shown in Table 3-2 and on Figures 3-1a through 3-1e. Deciduous Forest is the dominant cover class in the study area (approximately 1,975 acres).

Land cover on the plateau of Sand Mountain within the study area is primarily composed of rural residential properties in pasture, hay, loblolly pine (*Pinus taeda*) plantations, naturally regenerated loblolly monocultures, recently high-graded (selectively logged) timber stands, shallow abandoned mine pit ponds and wetlands, and disturbed early-successional deciduous and mixed forest. Powerlines cross the study area on the plateau, and the associated corridors are partially maintained and cleared of woody vegetation, with pasture and old field vegetation dominant.

The Sand Mountain escarpment (steep slope or bluff) along the east side of Guntersville Reservoir consists of very steep, rocky, and forested terrain with an elevation change of approximately 800 feet from the reservoir to the top of the escarpment. Significant portions of the upper half of the escarpment slope have been logged as recently as 2011 and 2015, which provide early-successional, undeveloped habitats, including young successional forest and scrub thickets. Mature deciduous forest occurs on the low slopes of the escarpment and in rocky, steep, or otherwise inaccessible areas on the slopes of the upper escarpment. It is unlikely that old growth forests are present within the study area; however, mature, presumably secondary growth stands on the escarpment were not evaluated for age. A swath of partially cleared vegetation runs up the escarpment in the transmission line corridor and can be generally characterized as scrub forest.

Within the Sequatchie Valley, adjacent to Guntersville Reservoir, a chain of long, thin islands and peninsulas partially attached to the shoreline are on either side of the reservoir within the study area. These islands are positioned in the bottomlands and floodplain of the reservoir and support forested wetlands and uplands. Herbaceous marshes and swamp forests surround the islands and peninsulas and are especially prevalent and extensive in their protected backwaters. Floating aquatic vegetation is widespread throughout the deeper backwaters.

On the west side of Guntersville Reservoir, the study area includes a portion of the Bellefonte Nuclear Power Plant property. Hills fronting the reservoir on the western edge of the river consist of mature to young-successional forest. Overgrown cedar glades and barrens are along the western edge of these hills. Within low valleys on the western mainland, lands have been cleared and are cropped or used for pasture.

The west side of the study area also includes an existing 300-foot-wide transmission line corridor and associated access roads. The corridor begins at the power plant property and extends approximately 14.7 miles northwest. The transmission line corridor crosses forested areas, pastures, agricultural fields, residential properties, and roadways, as well as several blue-line streams, including Town Creek at the southernmost end and Robinson and Mud Creeks about midway. This transmission line corridor has not been cleared for about 15 years, and where adjacent landowners do not maintain fields, it supports dense stands of young mixed-deciduous forest.

Crow Mountain is at the northernmost end of the transmission line corridor. Along the slopes of Crow Mountain within the previously cleared transmission line corridor, acidic soils dominate the upper slopes and support a mixed pine-hardwood community. Calcareous forest and woodland dominate the descending slopes of Crow Mountain and the base of Poorhouse Mountain.

Table 3-2. Land Cover Within the Rorex Creek Study Area and Vicinity

Land Cover Description	Study Area (acres)	5-mile Radius (acres)
Barren Land	6.8	242
Cultivated Crops	144.6	14,797
Deciduous Forest	1,950.5	69,493
Developed, High Intensity	9.0	309
Developed, Low Intensity	66.1	2,538
Developed, Medium Intensity	37.3	956
Developed, Open Space	146.3	6,391
Emergent Herbaceous Wetlands	92.4	1,622
Evergreen Forest	407.9	6,159
Hay/Pasture	690.3	35,353
Herbaceous	109.2	2,208
Mixed Forest	448.3	12,588
Open Water	467.9	9,053
Shrub/Scrub	183.8	2,294
Woody Wetlands	87.8	6,830

Land Cover Description	Study Area (acres)	5-mile Radius (acres)
Total	**4,848.1**	**170,833**

Source: NLCD data (Dewitz 2023)

3.2.1.1.1 Sensitive Plant Communities

The U.S. National Vegetation Classification System (NVC) has hierarchically catalogued plant communities of the United States (Grossman et al. 1998). At the lowest level of NVC classification, plant communities are described by association, which represents a recognized type supported by plot data and field observations based on floristic composition, physiognomy, and habitat. NatureServe has adopted this system of plant community classification and applied a ranking system to assess associations by state and global rarity (NatureServe 2025). This NVC classification system and NatureServe rarity valuation is applied to the extent possible to catalog the plant communities observed and documented in the study area and assess their sensitivity. In some instances, observed plant communities in the study area were not easily classified according to an accepted NVC association and, therefore, could not be evaluated by the NatureServe rarity ranking system. In these cases, or in cases where an association could be applied but lacks a global or Alabama state “rare” rank according to NatureServe, discrete plant communities were nevertheless evaluated as sensitive if they possess sensitive species (species that have a NatureServe ranking of vulnerable [S3] or greater) or are uniquely uncommon habitat types for the region.

Several rare plant communities, shown in Table 3-3 and described further in Appendix C, were identified during field surveys of the Rorex Creek study area (WSP 2024a).

Table 3-3. Sensitive Plant Communities within the Rorex Creek Study Area

Sensitive Plant Community	Acres[1]
Shumard Oak – Chinquapin Oak Mesic Limestone Forest	73.8
Limestone Glade and Barren	1.5
Alabama Cumberland Sandstone Glade (and Barren)	1.0
Cumberland Plateau Willow Oak Pond	0.2
Spring Stream Head	1.1
Appalachian Forested Acidic Seep	0.8
Total	**78.4**

[1] Acreage rounded to the nearest tenth of an acre.

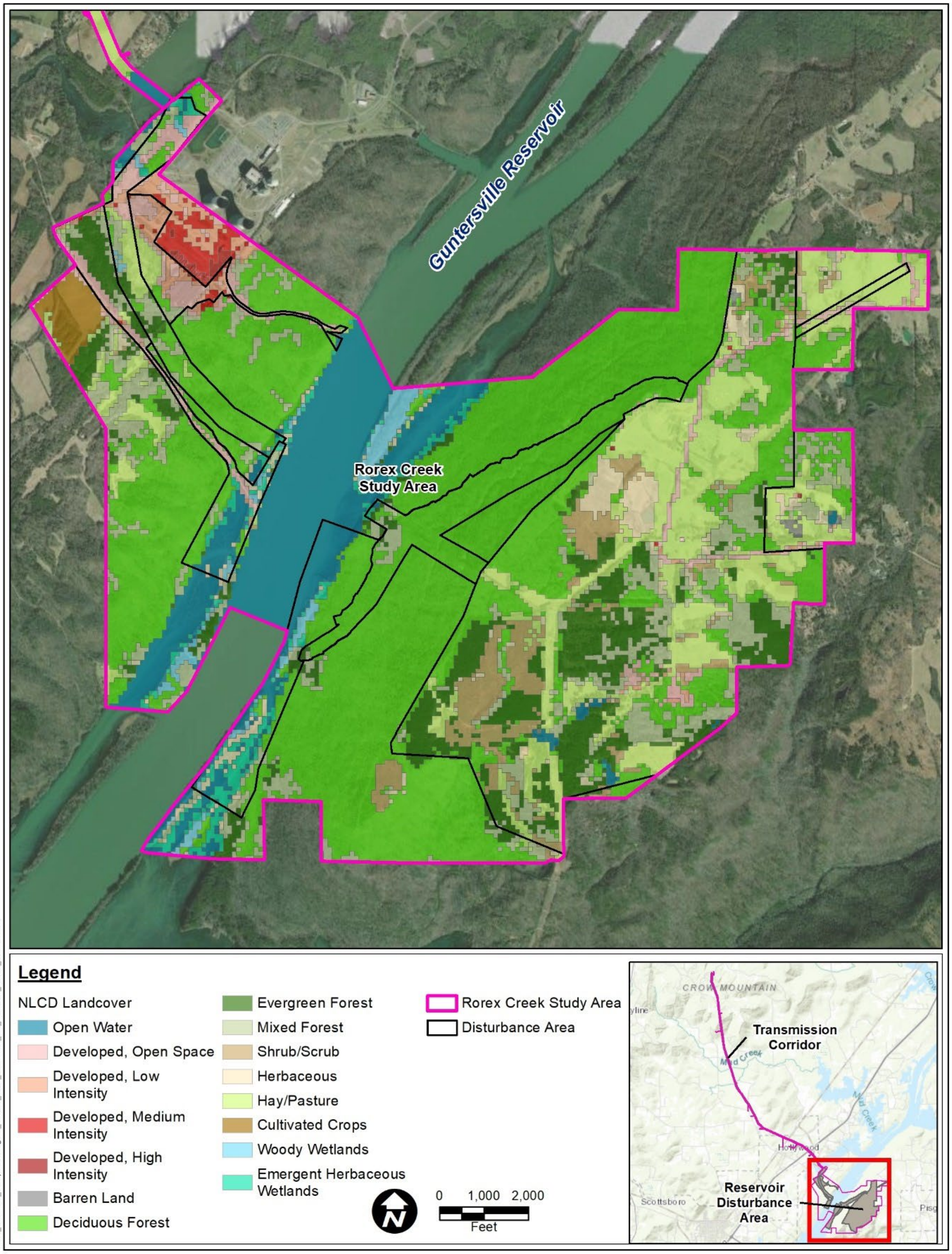

Figure 3-1 a. Land Cover Within the Rorex Creek Study Area

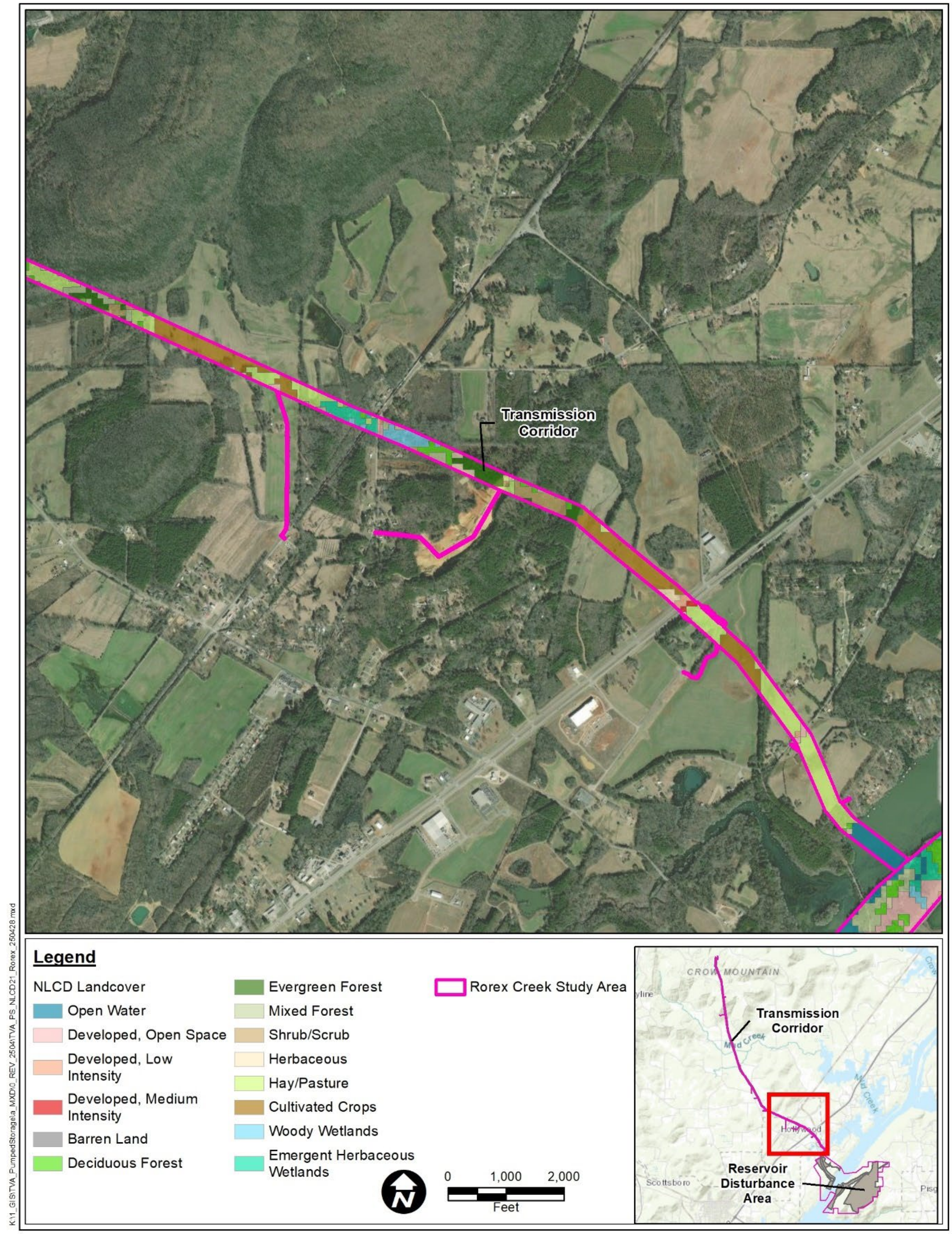

Figure 3-1b. Land Cover Within the Rorex Creek Study Area

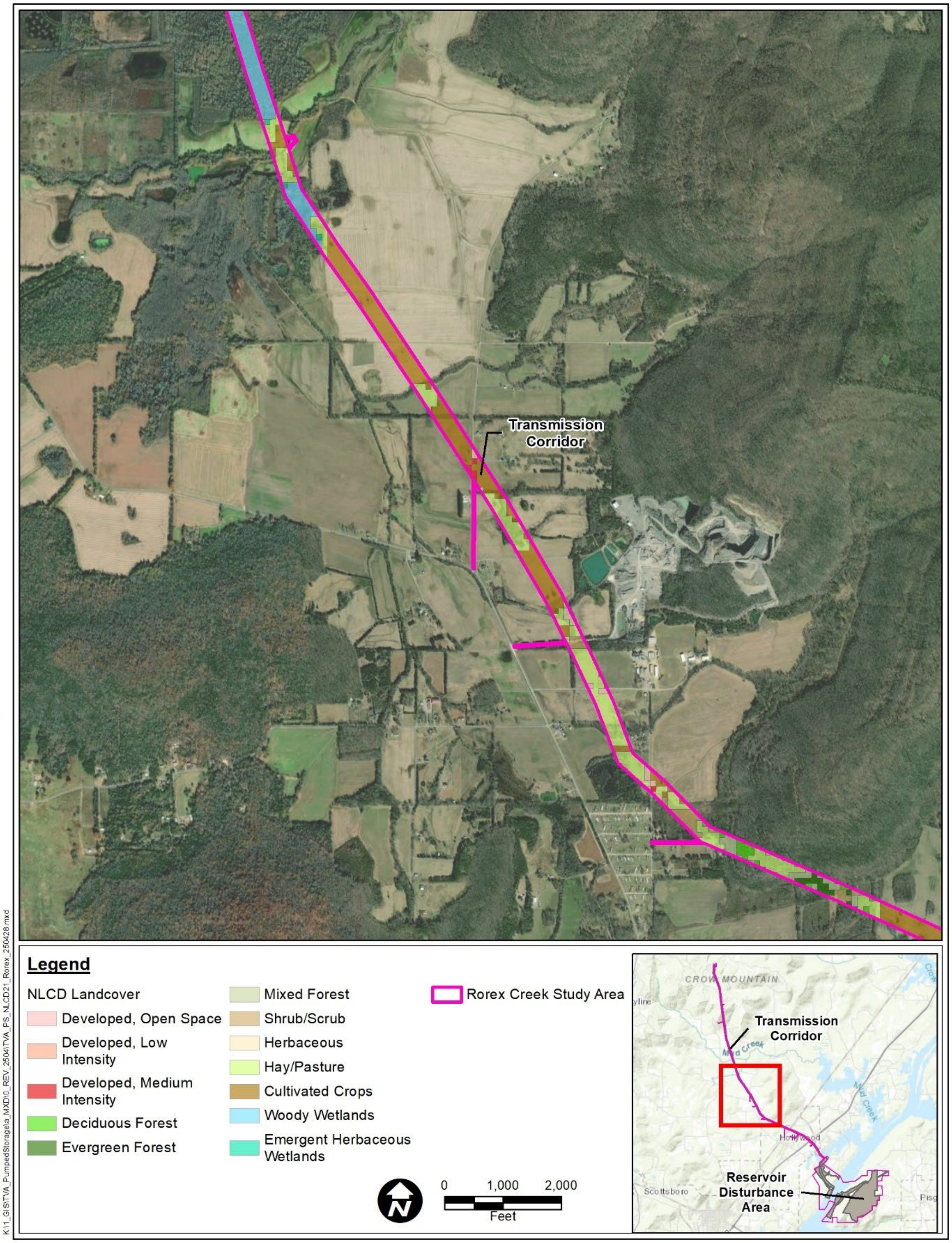

Figure 3-1c. Land Cover Within the Rorex Creek Study Area

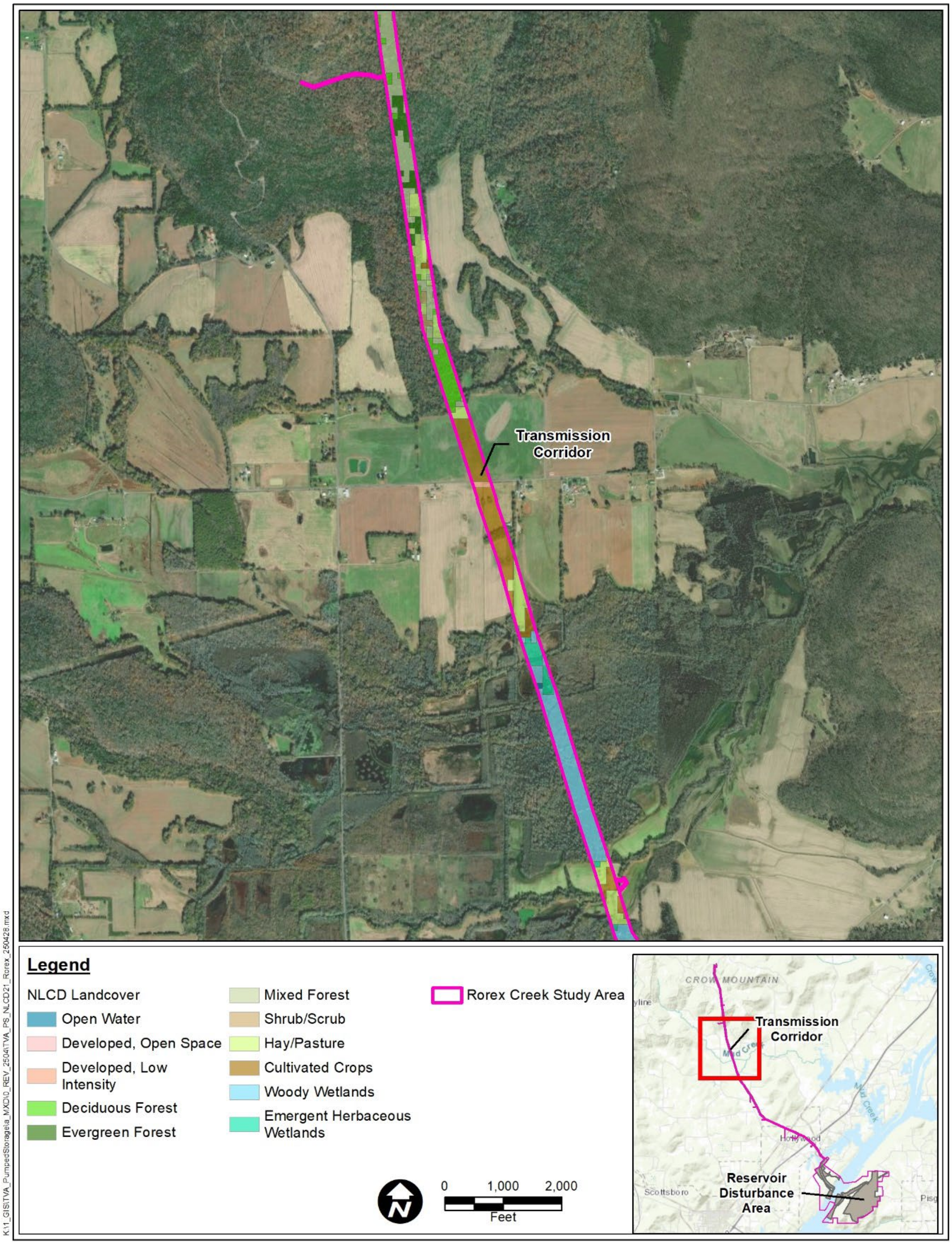

Figure 3-1d. Land Cover Within the Rorex Creek Study Area

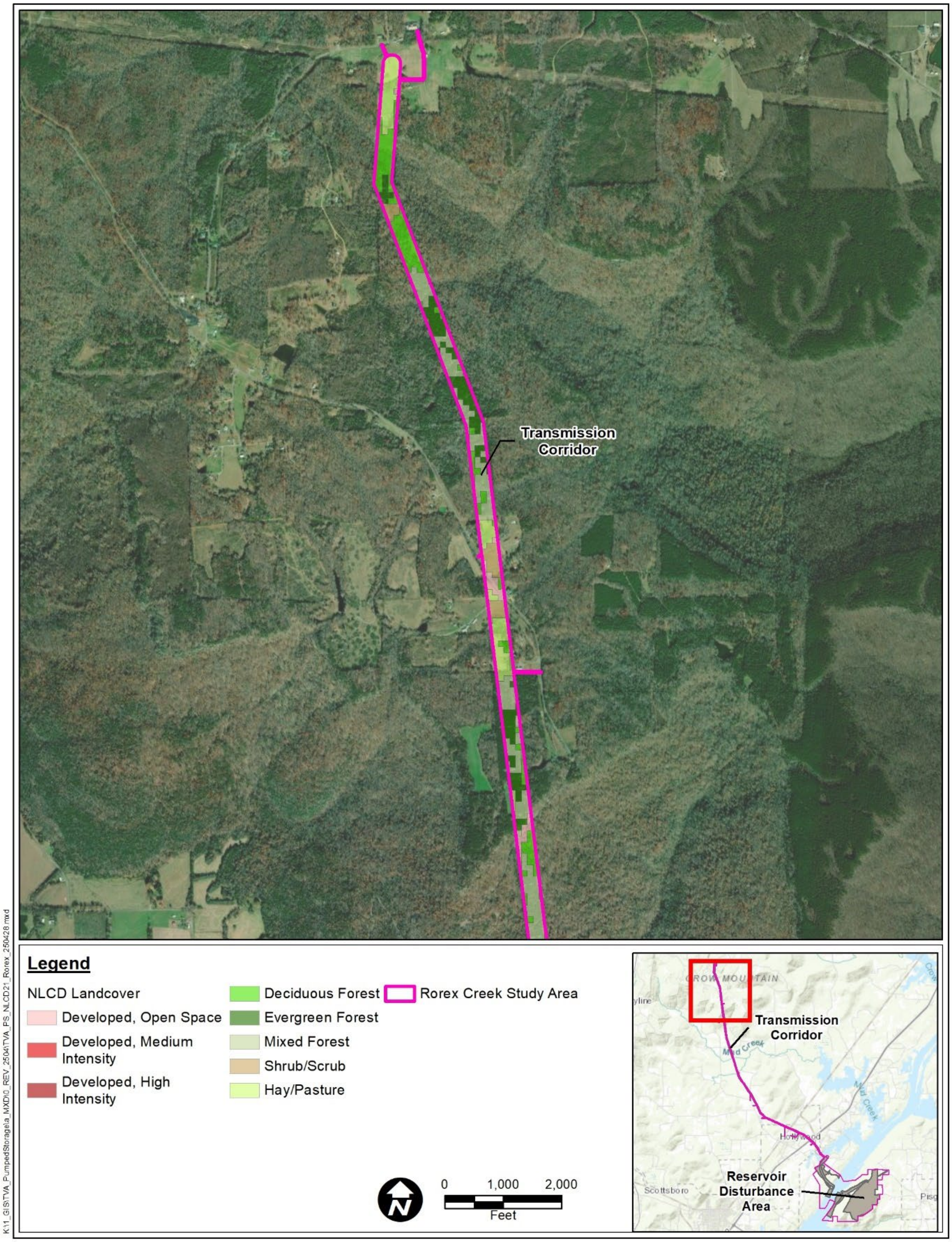

Figure 3-1e. Land Cover Within the Rorex Creek Study Area

3.2.1.1.2 Forested Land Cover

Forest accounts for approximately 2,864 acres of land within the study area (Table 3-2), and includes evergreen, mixed evergreen-deciduous, and deciduous forest (Dewitz 2023). Nearly all forests found on the plateau, upper escarpment, and within the transmission line corridor on the west side of the reservoir have been recently disturbed either through logging, periodic clearing, development, or conversion to pine plantation. Mature, presumably secondary forests occur in the bottom half of the eastern escarpment and in areas on its upper slope that are not easily accessed by loggers. Detailed forested land cover descriptions, including sensitive plant communities, are included in Appendix C.

3.2.1.1.3 Scrub-Shrub Land Cover

Scrub-shrub occupies approximately 183 acres of the study area (Table 3-2), represented in large part by early-successional ruderal communities. This includes a 50-acre recently high graded timber stand on the Sand Mountain plateau near the cellular tower and disturbed portions of the Bellefonte Nuclear Plant property. A very small high-quality shrub swamp was located in a depressional feature (potential sinkhole) on the plateau and has been highlighted as a habitat of special significance. Scrub-shrub land cover descriptions, including sensitive plant communities, are described further in Appendix C.

3.2.1.1.4 Herbaceous Land Cover

Herbaceous land cover (approximately 109 acres) (Table 3-2) is found almost exclusively on the farmed plateau of Sand Mountain and in the Sequatchie Valley where it is encountered on pasture lands, in powerline clearings in old field condition, and on sandstone glade and barren complexes (a community of special conservation concern). Some herbaceous wetland is also found fringing the backwater marshes of the islands, peninsulas, and bays of Guntersville Reservoir in the study area. Herbaceous land cover, including sensitive plant communities, is described further in Appendix C.

3.2.1.1.5 Noxious and Invasive Plants

Certain non-native species are considered invasive and pose a threat to the natural environment. Some invasive plants have been introduced accidentally, but most were brought to the region as ornamentals or for livestock forage and have subsequently escaped from cultivation. Because these robust plants arrived without their natural predators (insects and diseases), their populations spread quickly across the landscape displacing native species and degrading ecological communities or ecosystem processes (Miller et al. 2010). EO 13112, Invasive Species, issued on February 3, 1999, directs TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems, and take other related actions. Subsequently, EO 13751, Safeguarding the Nation from the Impacts of Invasive Species, issued on December 8, 2016, amended EO 13112 and directs actions to continue coordinated federal prevention and control efforts related to invasive species based on considerations of human and environmental health, climate change, technological innovation, and other emerging priorities.

While no federal noxious weeds were recorded during surveys of the study area, several species have been flagged by the Alabama Invasive Plant Council (ALIPC) as invasive species of special concern (WSP 2024a, USDA 2010, ALIPC 2012). Some of these species identified during surveys included wintercreeper (*Euonymus fortunei*), sawtooth oak (*Quercus acutissima*), tree of heaven, princess tree, Japanese stiltgrass, mimosa (*Albizia julibrissin*), trifoliate orange (*Poncirus trifoliata*), Bradford pear, autumn olive (*Elaeagnus umbellata*), Chinese privet, sacred bamboo (*Nandina dome*stica), Chinaberry (*Melia azedarach*), multiflora rose, Chinese wisteria (*Wisteria sinense*), Oriental bittersweet (*Celastrus orbiculatus*), hydrilla (*Hydrilla verticillata*), sweet autumn virginsbower (*Clematis terniflora*), Amur honeysuckle *(Lonicera maackii*), Japanese honeysuckle, kudzu (*Pueraria montana*), Johnsongrass, sericea lespedeza, and alligatorweed.

3.2.1.2 Widows Creek Study Area

The Widows Creek study area is located within the same Ecoregions as Rorex Creek described in Section 3.2.1.1, Rorex Creek study area. These include the Southwestern Appalachians Ecoregion (Level III) and the following Level IV Ecoregions: Sequatchie Valley (68b), which encompasses Guntersville Reservoir; Plateau Escarpment (68c); and Southern Table Plateaus (68d) (Griffith et al. 2001a).

Land cover designations within the study area were developed based upon field observations and land use/land cover information obtained from the NLCD (Dewitz 2023). Plant community surveys were conducted in June and September of 2023. Land cover within the Widows Creek study area and a 5-mile radius is shown in Table 3-4 and Figure 3-2. Deciduous forest is the dominant cover class in the study area (approximately 2,006 acres).

The vegetation within the Widows Creek study area varies from agricultural fields within the floodplain along the bank of Guntersville Reservoir to partially cleared rural residential areas at the top of a steep forested escarpment. Most of the escarpment and approximately one-half of the plateau on top of the escarpment was excluded from field surveys due to lack of property access. Maintained powerline easements are scattered throughout the study area.

Lands located on the plateau of the study area are primarily composed of rural residential properties in disturbed silvopasture (deliberate integration of trees and grazing livestock operations on the same land), cleared pasture, naturally regenerated loblolly monoculture, mid-successional deciduous and mixed coniferous-deciduous forest and woodland, and mature deciduous forest. It is unlikely that old growth forests are present within the study area; however, landowner access was limited for much of the escarpment, and mature, presumably secondary growth stands that were observed were not evaluated for age. On the escarpment, rich, often rocky limestone deciduous forested slopes extend to the footslope where flat benches and valleys in or near cleared or disturbed forest is positioned at the transition zone of the Guntersville Reservoir floodplain and the escarpment.

Within the Guntersville Reservoir valley and floodplain, an expansive river terrace characterizes the study area. Actively cropped agricultural fields dominate in flat upland and are drained by a large, forested slough and swamp complex found in the interior of the terrace. Forested swamp is the dominant land cover in naturally vegetated areas, although low upland forest can be found in shallowly concave low fingers of the slough, which remain wet long enough to prohibit farming. Additional lands in the periphery of the slough and swamp bisected by a cleared transmission line corridor are characterized by naturally vegetated but managed (herbicide treated) emergent marsh.

Table 3-4. Land Cover within the Widows Creek Study Area and Vicinity

Land Cover Description	Study Area (acres)	5-mile Radius (acres)
Barren Land	1.1	440
Cultivated Crops	492.4	4,321
Deciduous Forest	2,006.2	32,922
Developed, Low Intensity	26.4	588
Developed, High Intensity	0.0	2,099
Developed, Medium Intensity	4.4	1,099
Developed, Open Space	166.6	3,756
Emergent Herbaceous Wetlands	34.7	976
Evergreen Forest	122.8	6,079
Hay/Pasture	932.1	19,647
Herbaceous	110.0	2,732
Mixed Forest	326.2	8,077
Open Water	105.5	4,381
Shrub/Scrub	70.8	2,606
Woody Wetlands	241.2	2,885
Total	**4,640.3**	**92,607**

Source: NLCD data (Dewitz 2023)

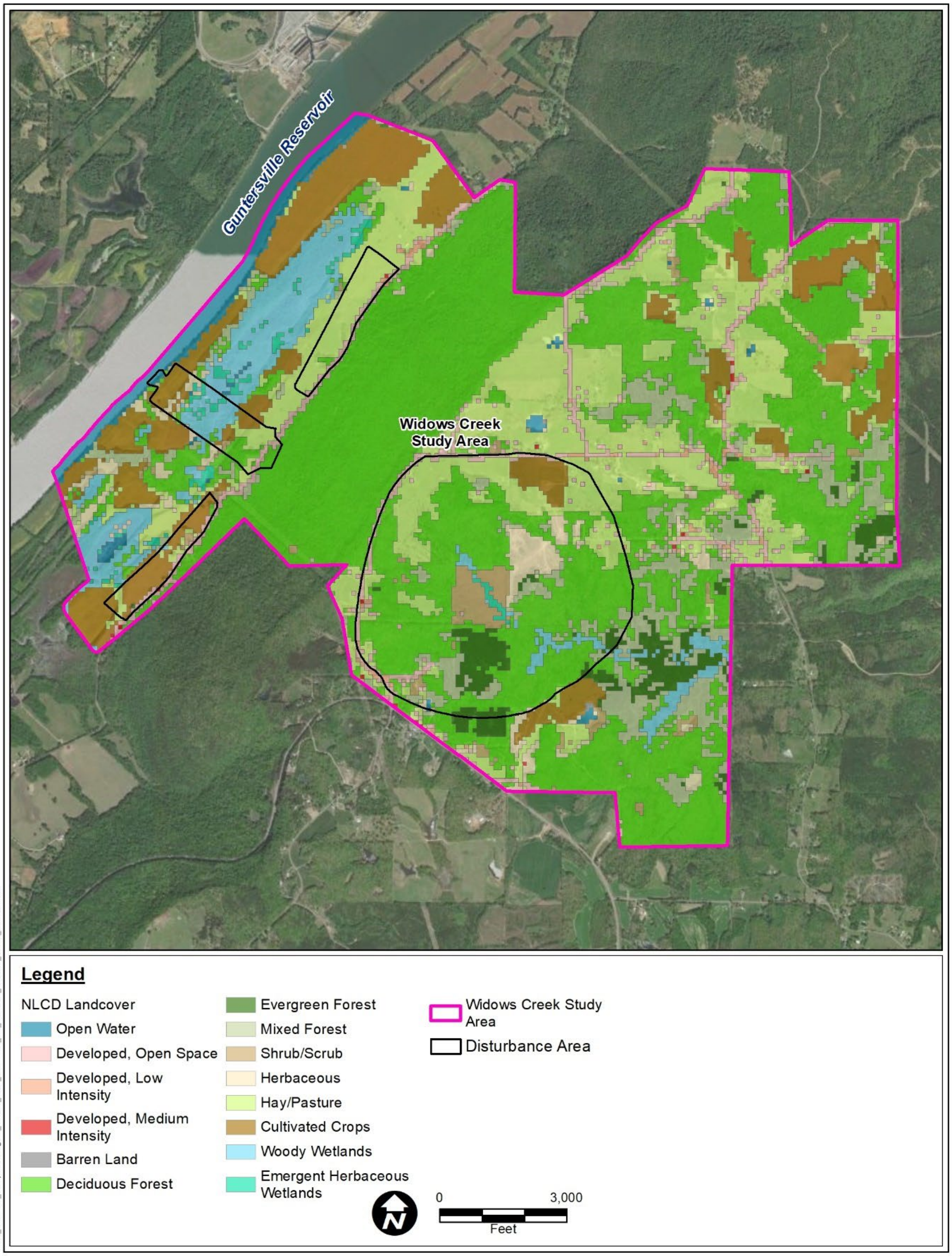

Figure 3-2. Land Cover Within the Widows Creek Study Area

3.2.1.2.1 Sensitive Plant Communities

Several rare plant communities were identified during field surveys of the Widows Creek study area (WSP 2024b). These communities and their associated acreage within the study area are included in Table 3-5 and described further in Appendix C.

Table 3-5. Sensitive Plant Communities within the Widows Creek Study Area

Sensitive Plant Community	Acres[1]
Alabama Cumberland Sandstone Glade (and Barren)	3.7
Appalachian Forested Acidic Seep	24.0
Interior Forested Acidic Seep	4.7
Shumard Oak – Chinquapin Oak Mesic Limestone Forest	3.0
Water Tupelo Swamp Forest and Beaver Impounded Buttonbush Swamp	66.8
Total	**102.2**

[1] Acreage rounded to the nearest tenth of an acre.

3.2.1.2.2 Forested Land Cover

Forest accounts for approximately 2,455 acres of land within the Widows Creek study area (Table 3-4) and includes evergreen, mixed evergreen-deciduous, and deciduous forest. Nearly all forests found on the plateau and upper escarpment have been recently disturbed either through logging, cattle grazing, or conversion to pine plantations. Some mature, presumably secondary forests can be also found on the plateau and low escarpment forests. Wetland deciduous forests can be found on the floodplain of the Guntersville Reservoir. Forested land cover within the study area, including sensitive plant communities, is described further in Appendix C.

3.2.1.2.3 Scrub-Shrub Land Cover

The small amount of scrub-shrub (approximately 69 acres) located within the Widows Creek study area (Table 3-4) is found within wetlands on both the plateau and reservoir floodplain terrace (WSP 2024b). Scrub-shrub on the plateau is exemplary of a pocosin community while shrub swamp is represented in the frequently inundated depressional portions of the floodplain terrace of Guntersville Reservoir. Both communities were identified by botanists as sensitive habitat types. Scrub-shrub land cover within the Widows Creek study area, including sensitive plant communities, is described further in Appendix C.

3.2.1.2.4 Herbaceous Land Cover

A diversity of mostly disturbed herbaceous vegetation types was encountered within the study area (approximately 110 acres) (Table 3-4) (WSP 2024b). On the plateau, disturbed herbaceous pastureland dominates; however, a sensitive glade and barren community is found scattered within the matrix of upland forest and woodland. On the floodplain terrace of Guntersville Reservoir, cropland is most prevalent but inundated marshland is also found within open areas in the interiors of forest and shrub swamps and along a cleared powerline ROW. Herbaceous land cover within Widows Creek study area, including sensitive plant communities, is described further in Appendix C.

3.2.1.2.5 Noxious and Invasive Plants

While no federal noxious weeds were recorded during surveys of the study area, several species observed have been flagged by the AIPC as invasive species of special concern (WSP 2024b, USDA 2010, ALIPC 2012). Some of those species included tree of heaven, princess tree, Japanese stiltgrass, autumn olive, Chinese privet, sacred bamboo, multiflora rose, Oriental bittersweet, Amur honeysuckle, Chinese wisteria, Japanese honeysuckle, Johnsongrass, musk thistle (*Carduus nutans*), sericea lespedeza, Asiatic dewflower (*Murdannia keisak*), and alligatorweed.

3.2.1.3 Raccoon Mountain Study Area

The Raccoon Mountain study area is located within the Southwestern Appalachians Ecoregion (Level III) and the Plateau Escarpment Ecoregion (Level IV), which is characterized by steep forested slopes and high velocity, high gradient streams (Griffith et al. 2001b). The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate.

Land cover designations within the study area were developed based upon field observations and land use/land cover information obtained from the NLCD. Field surveys of plant communities in the study area were conducted in June and September of 2023 (WSP 2024c). Land cover within the study area and within a 5-mile radius is shown in Table 3-6 and Figure 3-3. Deciduous forest is the dominant cover class (approximately 568 acres) in the study area, followed by open water (approximately 540 acres).

The RPS facility consists of a hydroelectric generating plant located in chambers and tunnels inside Raccoon Mountain and a previously constructed upper reservoir (Raccoon Mountain Reservoir) on the mountain top or plateau. Most of the study area surrounding the upper reservoir is forested. Existing infrastructure and maintained ROW occupy a relatively small portion of the study area. Transmission line corridors and other maintained areas throughout the site are managed as herbaceous, scrub-shrub habitats, or both. Forest communities on the plateau are composed of mid-successional deciduous and mixed coniferous-deciduous forested lands. Forest communities on the escarpment are composed of deciduous forest that transitions from the sub-xeric forested community found below the plateau rim to the low mesic forested footslopes near Nickajack Reservoir.

The plateau of the study area is primarily composed of mature second growth deciduous and mixed coniferous-deciduous forest and early to mid-successional evergreen forested lands. Herbaceous communities dominate the remaining portions of the plateau found along the RPS upper reservoir shoreline and in the transmission line corridors that crisscross the study area. Mature deciduous forest covers the entire study area escarpment and transitions from the sub-xeric forested community found below the plateau rim to the low mesic forested footslopes positioned just above the Nickajack Reservoir (Tennessee River) Valley. The remaining undeveloped lands of the valley are mostly herbaceous and are characterized by periodically maintained turf. Cores extracted by TVA from oak hickory forest on the plateau and mesic forest from the low slope of the escarpment indicate that some stands range in age from 75 to 140 years old. TVA has determined that some trees within forest stands on the steepest bluffs are over 230 years old, indicating old growth status (TVA 2010a).

Table 3-6. Land Cover within the Raccoon Mountain Study Area and Vicinity

Land Cover Description	Project Site (acres)	5-mile Radius (acres)
Barren Land	33.3	128
Deciduous Forest	568.1	45,351
Developed, High Intensity	33.4	2,472
Developed, Low Intensity	27.7	3,861
Developed, Medium Intensity	32.5	3,158
Developed, Open Space	61.1	6,279
Emergent Herbaceous Wetlands	17.0	184
Evergreen Forest	29.9	2,225
Hay/Pasture	35.3	1,929
Herbaceous	34.6	560
Mixed Forest	26.2	3,088
Open Water	539.7	4,960
Shrub/Scrub	42.0	523
Woody Wetlands	1.36	369
Total	**1,482.3**	**75,086**

Source: NLCD data (Dewitz 2023)

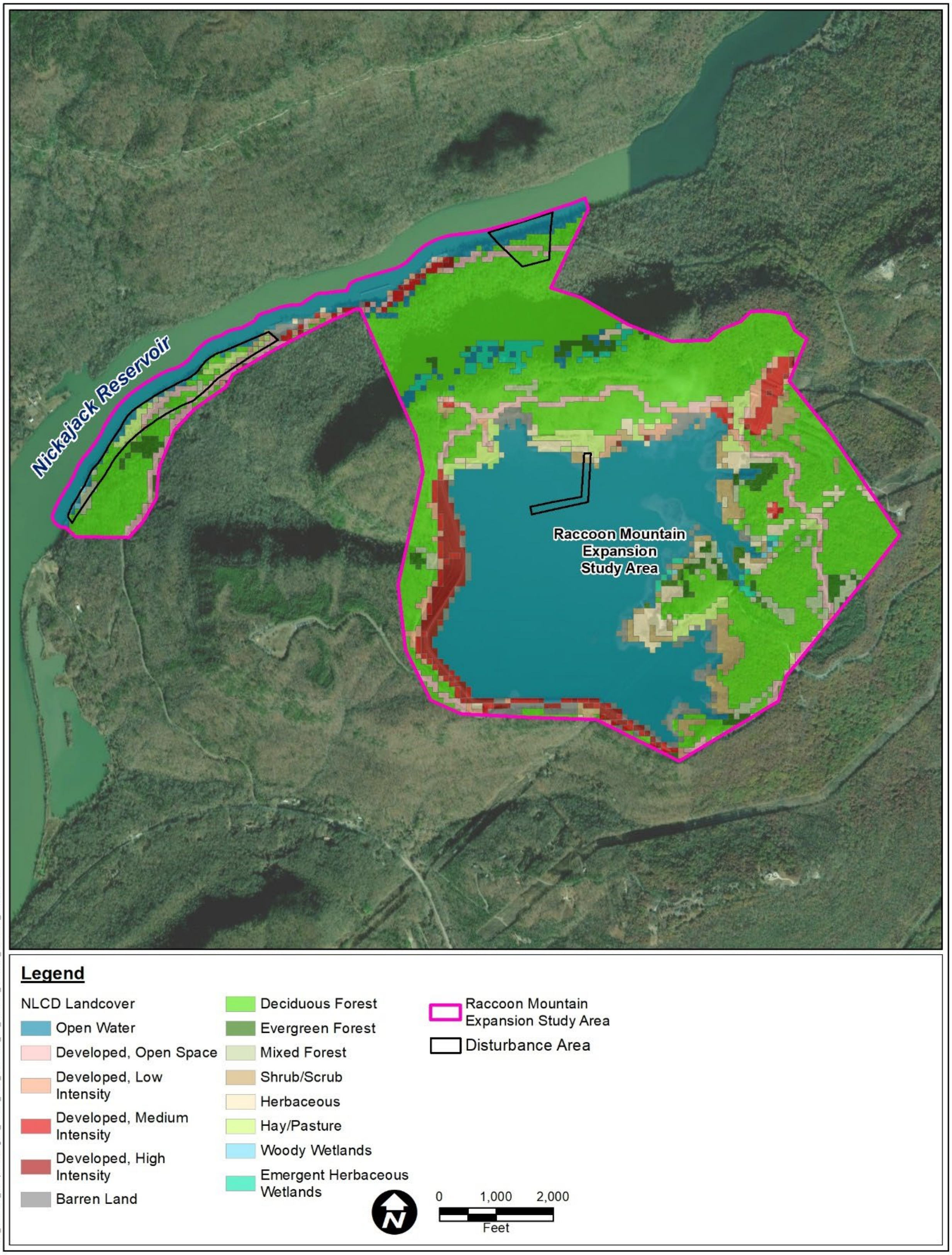

Figure 3-3. Land Cover Within the Raccoon Mountain Study Area

3.2.1.3.1 Sensitive Plant Communities

Several rare plant communities, shown in Table 3-7 and described further in Appendix C, were identified during field surveys of the Raccoon Mountain study area (WSP 2024c).

Table 3-7. Sensitive Plant Communities within the Raccoon Mountain Study Area

Sensitive Plant Community	Acres[1]
Cliff and Waterfall	0.9
Outcrop	2.1
Cumberland Plateau Clifftop Sandstone Barrens[2]	1.3
Appalachian Shorteaf Pine – Xeric Oak Forest[3]	1.8
Appalachian Montane Oak-Hickory Forest (Rich Type)[4]	0.7
Total	**6.8**

[1] Acreage amounts rounded to the nearest tenth of an acre.
[2] NatureServe 2005a
[3] NatureServe 2005b
[4] NatureServe 2010

3.2.1.3.2 Forested Lands

Forested lands account for approximately 624 acres (Table 3-6) within the study area, and include evergreen, mixed evergreen-deciduous, and deciduous forest. Evergreen forest (approximately 30 acres) is found almost entirely on the plateau surface and is represented by disturbed, regenerated loblolly pine stands and young Virginia pine slope forest which is prevalent along the reservoir shoreline (WSP 2024c). Mixed coniferous deciduous forest (approximately 26 acres) is also largely restricted to the plateau surface, but stand ages are more mature than representative evergreen forest observed within the study area. Deciduous forest (approximately 565 acres) is found throughout the escarpment slope and mature forested portions of the plateau. Acidic deciduous forest is the dominant community on the plateau and mid- and upper slope of the escarpment while stands of mixed mesophytic forest and mesic calcareous forest were found along the low footslope of the escarpment. Forested land cover, including descriptions of sensitive plant communities, are described further in Appendix C.

3.2.1.3.3 Herbaceous Land Cover

Herbaceous lands (approximately 85 acres) (Table 3-6) consist of the cleared powerline corridors and drawdown slopes of the RPS upper reservoir on the plateau and the weedy, periodically maintained lawns along gravel drives in the Nickajack Reservoir valley terrace. Old field conditions are found in the periodically cleared powerline except where sandstone outcrops create glade-like features (WSP 2024c). Herbaceous land cover, including sensitive communities, is described further in Appendix C.

3.2.1.3.4 Noxious and Invasive Plants

While no federal noxious weeds were recorded during surveys of the study area, several species have been flagged by the Tennessee Invasive Plant Council (TNIPC) as invasive species of special concern (WSP 2024c, USDA 2010, TNIPC 2024). Some of those identified during field surveys include burning bush (*Euonymus alatus*), tree of heaven, princess tree, Japanese stiltgrass, mimosa, Bradford pear, autumn olive, shrubby bushclover (*Lespedeza bicolor*), Chinese wisteria, Chinese privet, sacred bamboo, multiflora rose, Oriental bittersweet, Amur honeysuckle, Japanese honeysuckle, Johnsongrass, and sericea lespedeza.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under Alternative A, there would be no project-related impacts to vegetation, as TVA would not construct any of the proposed pumped storage facilities. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur, but they would not result from the proposed project.

3.2.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Land cover within the disturbance area for Rorex Creek (including permanent and temporary disturbance and off-site transmission line corridor) is shown in Table 3-8. The construction of Alternative B would include surface disturbance on up to 2,270 acres of vegetation (excluding barren land, open water and developed land uses), the majority of which has been previously disturbed through ROW maintenance, logging, mining, or agriculture. Within the off-site transmission line corridor portion of this disturbance area, approximately 169.8 acres of forested lands would be converted to shrub-scrub or herbaceous vegetation.

The upper reservoir footprint would be up to 1,000 acres (see Table 2-1 in Chapter 2) and would permanently convert natural vegetation types to open water. The upper reservoir general facilities footprint would be up to 100 acres and would disturb and convert natural vegetation to developed land. Access roads, portal areas and facilities, transformer and switchyard areas, and miscellaneous areas would convert an additional approximately 400 acres from natural vegetation to developed land. In total, the permanent construction footprint for the Rorex Creek PSH facilities would be up to 1,500 acres in total. However, following clearing, grading, and construction, some of the disturbed areas would be restored to approximate pre-construction conditions, to the extent practicable.

Table 3-8. Land Cover within the Action Alternative Disturbance Areas

Land Cover	Alternative B: Rorex Creek Temporary and Permanent Disturbance Area (acres)[1]	Alternative B: Rorex Creek Only Off-Site Transmission ROW (acres)	Alternative B: Rorex Creek Total Disturbance Area (acres)[2]	Alternative C: Widows Creek Permanent Disturbance Area[3] (acres)	Alternative D: Raccoon Mountain Permanent Disturbance Area[3] (acres)
Barren Land	1.6	0.6	2.2	0.0	<0.1
Cultivated Crops	0.5	103.7	104.2	74.8	0.0
Deciduous Forest	601.9	43.5	645.4	400.7	15.3
Developed, High Intensity	0.8	0.0	0.8	3.6	0.0
Developed, Low Intensity	30.2	2.5	32.7	0.0	0.2
Developed, Medium Intensity	5.3	2.0	7.2	0.6	0.0
Developed, Open Space	102.3	9.3	111.6	36.5	8.0
Emergent Herbaceous Wetlands	40.3	10.5	50.8	10.0	0.2
Evergreen Forest	313.3	35.0	348.3	41.7	0.2
Hay/Pasture	419.5	113.1	532.6	197.4	6.8
Herbaceous	78.7	4.2	82.9	43.1	0.2
Mixed Forest	234.8	57.4	292.2	48.2	3.1
Open Water	89.4	7.4	96.8	2.4	17.0
Shrub/Scrub	142.64	20.9	163.5	41.2	1.0
Woody Wetlands	15.7	33.9	49.6	37.0	0.4
Total	**2,077.0**	**443.9**	**2520.9**	**937.2**	**52.5**

Source: NLCD data (Dewitz 2023)

[1] Does not include off-site transmission line corridor

[2] Total Disturbance Area for Alternative B: Rorex Creek includes temporary and permanent disturbance area and off-site transmission line corridor

[3] Note: Because design and engineering are more developed for Rorex Creek (Preferred Alternative), the disturbance areas for the Widows Creek and Raccoon Mountain sites include only permanent impact areas, whereas the disturbance area for Rorex Creek includes temporary use, laydown, transmission, and permanent impact areas. Should development of the other sites be pursued in the future, additional design and NEPA review would be required.

Globally and regionally common natural plant communities located in proposed flooding areas and the footprint of PSH facility infrastructure would be permanently impacted by project activities, and a net local loss to their total acreage, species diversity, and ecological integrity would occur. In temporary workspaces, clearing and disturbance from project activities would likely result in the degradation, and in many cases permanent loss, of natural vegetation communities. However, except for several sensitive natural communities identified during botanical surveys, the permanent loss of globally and regionally common and previously disturbed plant communities within the study area is unlikely to have a significant effect on their viability locally or elsewhere.

Most lands within the project disturbance areas are currently occupied by highly disturbed plant communities that are likely to regenerate to a similar condition following temporary disturbance. Temporary disturbance would subject natural communities to invasive species encroachment. To minimize impacts from temporary disturbance, TVA is committed to avoiding sensitive communities when possible. Additionally, vegetation clearing and invasive species minimization would follow BMPs outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities* (TVA 2022c). Land clearing operations would be conducted in a manner that would prevent any unnecessary damage to the remaining natural vegetation, would protect wetlands and streams to the extent practicable, and would prevent soil erosion (TVA 2022c). During vegetation clearing activities, marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. Additionally, for vegetation cleared for transmission line corridor, clearing activities would follow the TVA *Transmission System Vegetation Management Program* that would include restoration activities with a goal of meadow-like end-states (TVA 2019c). Overall, impacts to previously disturbed and globally and regionally abundant natural vegetation communities resulting from project activities are anticipated to be minor.

However, globally and state rare plant communities are found within the Rorex Creek Disturbance Area. These sensitive plant communities are widely regarded as intolerant to disturbance and disruption of natural ecosystem processes; therefore, even temporary project impacts are anticipated to result in the complete loss of those affected occurrences. The areas of sensitive plant communities within the Rorex Creek Disturbance Area are included in Table 3-9.

Table 3-9. Sensitive Plant Communities within the Action Alternative Disturbance Areas

Sensitive Plant Community	Alternative B: Rorex Creek (acres)[1]	Alternative C: Widows Creek (acres)[1]	Alternative D: Raccoon Mountain (acres)[1]
Shumard Oak – Chinquapin Oak Mesic Limestone Forest	7.4	--	--
Limestone Glade and Barren	<0.1	--	--
Appalachian Forested Acidic Seep	--	14.9	--
Interior Forested Acidic Seep	--	4.7	--
Alabama Cumberland Sandstone Glade (and Barren)	0.9	1.9	--

Sensitive Plant Community	Alternative B: Rorex Creek (acres)[1]	Alternative C: Widows Creek (acres)[1]	Alternative D: Raccoon Mountain (acres)[1]
Cumberland Plateau Willow Oak Pond	0.2	--	--
Appalachian Forested Acidic Seep	0.8	--	--
Water Tupelo Swamp Forest and Beaver Impounded Buttonbush Swamp	--	25.1	--
Total	**9.4**	**46.5**	**0.0**

Notes: -- denotes no presence.

[1] Acreage amounts rounded to the nearest tenth of an acre.

Six discrete occurrences totaling approximately 2.5 acres of the sandstone glade (and barren) Alabama Cumberland Sandstone Glade association occur within or very near to the project disturbance areas (NatureServe 1998). Where possible, TVA would work to avoid impacting this community. To minimize anticipated impacts, TVA would commit to restoration of affected habitat associated with this community at a 1 to 3 (impacted to restored acreage) ratio and to offset impacts resulting from project activities by transplanting important sensitive species from this impacted community elsewhere, either within TVA property at the proposed Rorex Creek site or to a nearby location, to a site which is either currently suitable or can be made suitable through restoration. Potential on-site locations include existing intact glades, degraded existing glades, or former glade sites located during botanical surveys.

TVA's botanist identified potential off-site transplant locations. To ensure the survival of transplanted glade and barren species, and to minimize impacts associated with the loss of six occurrences of a globally and state imperiled community, restoration of degraded transplant recipient sites may be necessary. Restoration would be achieved through the use of BMPs such as clearing woody species, removal of invasive species, prescribed burning, and earthwork. Additional conservation measures would be implemented to protect and feature one or more occurrences of this globally imperiled community for public education through the installation of a guided boardwalk with educational signage. However, because of the state and global rarity of this community and the potential loss of a significant number of occurrences and total acreage within the disturbance area, impacts as a result of project activities would still likely be significant.

One occurrence (approximately 0.2 acre) of the sensitive Cumberland Plateau Willow Oak Pond association, one occurrence of limestone glade and barren (less than 0.1 acre), and one occurrence (approximately 0.8 acre) of the Appalachian Forested Acidic Seep association are present within the proposed disturbance areas and may be permanently impacted by project activities (NatureServe 1995, 2000). Where possible, TVA project leads would work with its TVA botanist to avoid impacting these areas. Due to the regional rarity of these two sensitive plant communities, potential impacts would likely be significant.

Two occurrences and 7.5 acres of Shumard Oak - Chinquapin Oak Mesic Limestone Forest association located on the escarpment fall within the proposed disturbance areas within the Rorex Creek study area (NatureServe 2008). However, TVA would commit to avoid 7.1 acres of this sensitive community located at the base of a transmission tower on the lower slope of the escarpment. As a result, minimal impacts from project activities to this community would be anticipated.

Occurrences of one remaining sensitive community identified within the study area (forested escarpment slope spring head) does not fall within the proposed disturbance areas and is not expected to be impacted by construction activities. Coordination with the TVA botanist would ensure that construction activities do not occur outside the established disturbance area boundaries and cause unforeseen impacts to this community.

3.2.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, impacts would be similar to those described under Alternative B. Impacts to vegetation types are shown in Table 3-8. Because design and engineering for Widows Creek are less developed than for Rorex Creek (Preferred Alternative), the disturbance area includes only permanent impact areas, whereas the disturbance area for Rorex Creek includes temporary use, laydown, transmission, and permanent impact areas. The construction footprint under this alternative could include flooding of up to 1,000 acres for the proposed upper reservoir and development of up to 200 acres for the portal area and facilities, 50 acres for transformer and switchyard areas, and 100 acres of miscellaneous infrastructure (see Table 2-1 in Chapter 2). The total permanent construction footprint could be up to 1,450 acres. Construction BMPs described for Alternative B would also be used under Alternative C.

As described for Alternative B, globally and regionally common natural plant communities located in proposed flooding areas and in the footprint of PSH infrastructure would be permanently impacted by project activities, and a net local loss to their total acreage, species diversity, and ecological integrity would occur. In temporary workspaces, clearing and disturbance from project activities would likely result in the degradation and, in many cases, permanent loss of natural vegetation communities. However, overall impacts to previously disturbed and globally and regionally abundant natural vegetation communities are anticipated to be minor.

Impacts to several sensitive vegetation communities that occur within the disturbance area are shown in Table 3-9, including approximately 25 acres of Water Tupelo Swamp Forest and beaver impounded buttonbush swamp, three occurrences and approximately 1.9 acres of Alabama Cumberland Sandstone Glade, 14.9 acres of Appalachian Forested Acidic Seep, and one occurrence and 4.7 acres of Interior Forested Acidic Seep. Due to the sensitivity of these rare natural communities, even temporary disturbance would be anticipated to result in the functional loss of impacted occurrences. Whenever possible, avoidance of these sensitive communities would be prioritized. Impact minimization may be possible through sensitive species relocation, either to appropriate locations on- or off-site, and restoration/augmentation of unimpacted occurrences of these communities at Widows Creek or elsewhere. Consultation with the TVA botanist to avoid, minimize, or offset impacts to these communities would be conducted; however, because of the state and global rarity of these sensitive communities and the potential loss of a significant number of their occurrences and total acreage within the disturbance areas, impacts from project activities would likely be significant.

3.2.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, a new upper reservoir would not be constructed and impacts on vegetation would be substantially reduced compared to Alternatives B and C. Permanent disturbance areas total approximately 53 acres and are shown in Table 3-8; however, no sensitive plant communities are likely to be affected. Because design and engineering are less developed for Raccoon Mountain than for Rorex Creek (Preferred Alternative), the disturbance areas do not include potential temporary use or laydown areas that could total up to 350 acres (see Table 2-1 in Chapter 2). In temporary disturbance areas where impacts would be short term and vegetation would be restored following construction, impacts to vegetation would be expected to be minor and would only affect regionally and globally common vegetation communities and species. To minimize both permanent and temporary minor impacts, TVA would use BMPs described under Alternative B and would consult with the TVA botanist.

3.2.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, ground disturbance associated with these actions may result in the direct alteration of natural vegetation communities. None of the identified actions geographically intersect with the same rare plant community resources potentially affected by the proposed project and they are largely improvements or expansions of existing facilities that were previously disturbed. As such, these actions would likely have minimal aggregate impacts on vegetation resources in the area.

3.3 Wildlife

3.3.1 Affected Environment

3.3.1.1 Rorex Creek Study Area

As described in Section 3.2, Vegetation, the Rorex Creek study area offers a wide array of wildlife habitats that support species common to the region. For more detailed vegetation descriptions see Appendix C.

WSP biologists conducted site reconnaissance level visual encounter surveys in June, July, September and October 2023 and in March, May, July, and August 2024, to record vegetation and observed wildlife and to document potential habitat for rare, threatened, or endangered species on the study areas (Appendix B) (WSP 2024a, 2025a). TVA and EnviroScience biologists provided additional observations for the Rorex Creek study area during opportunistic site visits and cave/karst surveys in August 2023, January 2024 and January 2025 (EnviroScience 2023a, 2024a, TVA 2025a). Biologists observed over 100 terrestrial species including nine mammal species, 14 reptile species, nine amphibian species, 86 bird species, and various invertebrates. Wildlife species observed through visual confirmation, sign (e.g., scat), or call during field surveys are listed in the field survey report in Appendix B. Observations of Birds of Conservation Concern (BCCs) and bat species are discussed in Section 3.4, Threatened and Endangered Species.

Common wildlife species observed included bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), eastern chipmunk (*Tamias striatus*), Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), nine-banded armadillo (*Dasypus novemcinctus*), Eastern gray squirrel (*Sciurus carolinensis*), and white-tailed deer (*Odocoileus virginianus*). Additional common wildlife species that were not recorded but that are likely to occur in all of the study areas include the red fox (*Vulpes vulpes*), southern flying squirrel (*Glaucomys volans*), groundhog (*Marmota monax*), long-tailed weasel (*Neogale frenata*), American mink (*Neogale vison*), several species of bat, and small mammals including mice, moles, voles and shrews. A variety of species of bumblebee, beetle, dragonfly, butterfly, and other insect species also have the potential to occur in these areas. The Guntersville Reservoir and other aquatic habitats (floodplain wetlands, streams, and ponds) provide habitat for shorebirds, wading birds, waterfowl, reptiles including turtles and snakes, and amphibians.

Lighting and transmission towers are commonly used by osprey to nest. Sixteen osprey nests were recorded within the study area during the 2023-2024 field surveys. No bald eagle nests were reported within the Rorex Creek study area. However, the nearby Guntersville Reservoir provides foraging habitat for bald eagles and osprey. Review of the TVA Regional Natural Heritage Database (RNHD) in September of 2024 identified the confirmed presence of a colonial wading bird colony within three miles of the Rorex Creek study area (TVA 2024b). Based on the RNHD, approximately 20 osprey nests had been recorded within three miles of the study area. Threatened and endangered species and migratory BCC with the potential to occur in the study area are discussed in Section 3.4, Threatened and Endangered Species.

Woodrat middens were observed within the Rorex Creek study area on the plateau and in crevices of rocky bluffs near the top of the escarpment on the east side of Guntersville Reservoir (WSP 2025a). It was not determined whether the middens were from Eastern woodrat (*Neotoma floridana*) or Allegheny woodrat (*Neotoma magister*) (a state-listed species)[5]. TVA biologists have also reported observing woodrats and woodrat scat inside caves and near cave openings within the Rorex Creek study area and along the transmission line corridor on the west side of the reservoir (TVA 2025a).

An ardeid (heron) rookery was observed within the study area on Bellefonte Nuclear Power Plant property near the transmission lines on the south side of Town Creek, adjacent to a wetland. The location of the rookery is consistent with typical nesting locations of species within the heron family, which includes wetland areas or lowland habitats with dense vegetation (Hoy 2017). No birds were observed in the rookery, but an abundance of fresh feces and feathers were seen. These indicators suggest the rookery is currently in use. It is likely this is a great blue heron rookery due to the abundance of this species in the study area.

3.3.1.2 Widows Creek Study Area

Vegetation of the Widows Creek study area is described in Section 3.2, Vegetation, and detailed plant community descriptions are included in Appendix C.

During reconnaissance level visual encounter surveys of the study area in June, July and September of 2023, WSP biologists noted numerous terrestrial and bird species listed in the technical report in Appendix B. Common wildlife species present at Widows Creek study area are the same or similar as those described for the Rorex Creek study area.

Six osprey nests were located within the study area during the June 2023 field surveys. No bald eagle nests were identified in the study area (WSP 2024d). However, the nearby

[5] Distinguishing between these two species requires capture and genetic analysis, so for the purposes of this analysis, any woodrat middens are considered potentially Allegheny woodrat.

Guntersville Reservoir provides foraging habitat for osprey and bald eagles. Review of the TVA RNHD identified the confirmed presence of a heron rookery within three miles of the Widows Creek study area (TVA 2023a).

3.3.1.3 Raccoon Mountain Study Area

Vegetation of the Raccoon Mountain study area is described in Section 3.2, Vegetation. Detailed plant community descriptions are included in Appendix C.

Common wildlife species present at Raccoon Mountain study area are the same or similar as those described for the Rorex Creek study area. During reconnaissance level visual encounter surveys of the Raccoon Mountain study area in June 2023, WSP biologists noted numerous terrestrial and bird species listed Appendix B.

Two raptor nests were located within the study area on two separate transmission towers. An osprey occupied one nest, and the other nest was empty at the time of survey and was later confirmed as a bald eagle nest by TVA biologists (WSP 2024e). The Nickajack Reservoir and the RPS upper reservoir both provide foraging habitat for bald eagles and osprey.

Review of the TVA RNHD identified the confirmed presence of a colonial wading bird colony within three miles of the Raccoon Mountain study area (TVA 2023b). Threatened and endangered species and migratory BCCs with the potential to occur in the study area are discussed in Section 3.4, Threatened and Endangered Species.

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under Alternative A, TVA would not construct a PSH facility at any of the proposed sites. All forested habitats would remain in place and soil and vegetation would remain as-is. Therefore, wildlife and their habitats would not be affected under the No Action Alternative.

3.3.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, the PSH facility would be constructed and operated within an ecologically diverse landscape that offers multiple habitat types for wildlife. Actions that would potentially affect wildlife habitats include site preparation within permanent and temporary use areas (disturbance areas), including development of barge access infrastructure and roadways, construction of a bridge, and clearing of vegetation within an existing transmission line corridor. Forested and herbaceous vegetation that may provide habitat for wildlife species would be removed in association with the proposed actions. The loss of approximately 1,166 acres of forest and approximately 682 acres of herbaceous and scrub-shrub vegetation would not noticeably reduce the local abundance and diversity of wildlife in the surrounding vicinity, and some of this area would be only temporarily affected and would be restored following construction. Removal of forest from the disturbance area surrounding the upper reservoir and generation facilities would not affect forest fragmentation any further than it already has been affected by previous mining activities and residential development within the disturbance area footprint. Along the existing off-site transmission line corridor, forest clearing (approximately 170 acres) would increase fragmentation in some areas where forest has re-established following the original clearing of the ROW.

Wildlife may be displaced by increased levels of noise and other disturbance during construction activities. These disturbances and habitat removal are expected to disperse wildlife into surrounding areas in an attempt to find new food and shelter sources and to reestablish territories. Forested areas that are cleared within new and existing transmission line corridor would likely be maintained as early-successional or developed habitat for the foreseeable future. It is expected that over time displaced species that utilize early successional habitat, edge habitats, fragmented forest, and otherwise developed habitats would return to the project disturbance area upon completion of project actions. Direct effects to some individuals that are immobile during the time of construction may occur, particularly if construction activities transpire during breeding/nesting seasons. However, the actions would not be expected to affect populations of species common to the area, as similarly suitable forested habitat is abundant throughout the adjacent landscape.

Suitable nesting and foraging habitats are present within the disturbance area for some migratory BCCs. See Section 3.4, Threatened and Endangered Species, for a discussion of impacts on BCCs, including the bald eagle.

While the proposed actions would result in alteration of habitats and displacement of resident wildlife species, impacts to wildlife are not expected to result in notable large-scale habitat alteration or destabilization of any wildlife species. Therefore, impacts to wildlife resulting from the implementation of Alternative B would be minor.

3.3.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, impacts would be similar to those discussed in Alternative B due to the construction and flooding of a new PSH facility and upper reservoir. Because design and engineering for Widows Creek are less developed than for Rorex Creek (Preferred Alternative), the disturbance area includes only permanent impact areas, whereas the disturbance area for Rorex Creek includes temporary use, laydown, transmission, and permanent impact areas. Further NEPA analysis would be required for any additional areas of disturbance required under Alternative C. Therefore, due to the disturbance area footprint being smaller than that of Alternative B and because this alternative does not include construction of a bridge, impacts to terrestrial wildlife would be reduced, though would be considered higher than those associated with Alternative D. The loss of approximately 528 acres of forest and approximately 282 acres of herbaceous and scrub-shrub vegetation would not noticeably reduce the local abundance and diversity of wildlife in the surrounding vicinity. Removal of forest from the disturbance area would not affect forest fragmentation any further than it already has been affected by agriculture and rural residential development within the disturbance area footprint. Additionally, conservation measures described in Alternative B would also be followed under this alternative. Therefore, impacts to wildlife resulting from the implementation of Alternative C would be minor.

3.3.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, impacts to terrestrial wildlife would be similar to impacts discussed under Alternatives B and C, but potential impacts would be at a much smaller scale due to the limited disturbance footprint under Alternative D. Because this alternative is an expansion of an existing PSH facility and upper reservoir, there would be less impacts to wildlife habitat than Alternatives B and C. The loss of approximately 19 acres of forest and approximately 7.8 acres of herbaceous and scrub-shrub vegetation would not noticeably reduce the local abundance and diversity of wildlife in the surrounding vicinity. Additionally, conservation measures described in Alternative B would also be followed under this alternative. Therefore, impacts to wildlife resulting from the implementation of Alternative D would be minor.

3.3.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, direct alteration of wildlife habitat may occur. None of the identified actions by others geographically intersect with the same terrestrial resources affected by the proposed project, and future actions such as roadway maintenance and improvements would be located near existing transportation corridors, within disturbed, developed, or artificially vegetated herbaceous habitats. As such, these actions would likely have minimal aggregate impacts on wildlife resources in the area.

3.4 Threatened and Endangered Species

3.4.1 Affected Environment

The ESA (16 USC §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover those species. The ESA defines an endangered species as any species in danger of extinction throughout all or a significant portion of its range, whereas a threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, can also be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Section 7 of the ESA requires federal agencies to consult with USFWS when their proposed actions may affect endangered or threatened species or their critical habitats.

The states of Tennessee and Alabama each protect species considered threatened, endangered, or deemed in need of management within the state other than those federally listed under the ESA. The species listings in Alabama are managed by the ADCNR; however, the Alabama Natural Heritage Program also maintains a database of plant and animal species that are considered threatened, endangered, special concern, or tracked within the state. The species listings in Tennessee are managed by the TDEC (TDEC 2024a), which considers listing recommendations from the Tennessee Wildlife Resources Agency. Additionally, TVA maintains the RNHD, which is a database of threatened and endangered plant and animal species that are known to occur in the TVA Region (TVA Power Service Area and Tennessee River Watershed). TVA considers state threatened and endangered species, as well as state vulnerable, imperiled, and critically imperiled species when evaluating impacts of proposed projects.

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to conserve migratory birds and implement the Migratory Bird Treaty Act (MBTA). The MBTA prohibits the “take” of migratory birds.

The regulatory definition of "take" as defined by 50 CFR § 10.12, "means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue hunt, shoot, wound, kill, trap, capture, or collect." The following prohibitions apply to migratory bird nests: "possession, sale, purchase, barter, transport, import and export, take, and collect." The MBTA is executed and enforced by USFWS. In addition to protection under the MBTA, bald and golden eagles are also protected under Bald and Golden Eagle Protection Act (BGEPA), which states that to kill, harass, and possess (without a permit), or sell bald and golden eagles and their parts is illegal.

3.4.1.1 Terrestrial Species

3.4.1.1.1 Rorex Creek Study Area

According to the USFWS Information for Planning and Consultation (IPaC) consultation letter, six federally listed terrestrial animal species, including the federally endangered gray bat (*Myotis grisescens);* Indiana bat (*Myotis sodalis);* northern long-eared bat (*Myotis septentrionalis*); and the whooping crane (*Grus americana*), designated as a nonessential experimental population; the proposed endangered tricolored bat (*Perimyotis subflavus*); and the proposed threatened monarch butterfly (*Danaus plexippus*), have the potential to occur within the Rorex Creek study area (USFWS 2025a). A review of the TVA RNHD resulted in records of eight federally or state-listed or protected terrestrial animal species recorded within three miles of the study area (Table 3-10). In addition, a colonial wading bird colony has also been recorded within three miles of the study area.

Review of the IPaC website also resulted in the identification of twelve BCCs that could occur within the study area, including the bald eagle, Canada warbler, cerulean warbler, chimney swift, eastern whip-poor-will, golden-winged warbler, Kentucky warbler, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, and wood thrush (USFWS 2025a). Of these, six were observed within the study area during 2023-2024 WSP Terrestrial Zoology field surveys, including the chimney swift, eastern whip-poor-will, Kentucky warbler, prairie warbler, prothonotary warbler, and wood thrush (WSP 2025a).

According to the USFWS IPaC, four federally listed plant species have the potential to occur within the Rorex Creek study area (USFWS 2025a; Table 3-10). Review of the TVA RNHD resulted in records of 42 state-listed or protected terrestrial plant species that have been recorded within five miles of the study area. No designated critical habitat for terrestrial animal or plant species occurs within the proposed study area.

Detailed species descriptions for threatened and endangered species in the study area are included in Appendix C, and terrestrial habitats within the study areas are described in Section 3.2, Vegetation.

Table 3-10. Terrestrial Plant and Animal Species of Conservation Concern Known from Within Three Miles (Animals) and Five Miles (Plants) of the Rorex Creek Study Area and Federally Listed Terrestrial Species Reported from Jackson County, Alabama

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
Amphibians					
Eastern hellbender	*Cryptobranchus alleganiensis*	PE	--	--	
Green salamander	*Anedides aeneus*	--	SP	S3	Y
Ocoee salamander	*Desmongnathus ocoee*	--	--	S2	Y
Birds					
Bald eagle	*Haliaeetus leucocephalus*	DM	D	S3	Y
Canada warbler	*Cardellina canadensis*	BCC	--	--	Y
Cerulean warbler	*Setophaga cerulea*	BCC	SP	S1B	Y
Chimney swift	*Chaetura pelagica*	BCC	--	--	Y[5]
Eastern whip-poor-will	*Antrostomus vociferus*	BCC	--	--	Y[5]
Golden-winged warbler	*Vermivora chrysoptera*	BCC	--	--	Y
Kentucky warbler	*Geothlypis formosa*	BCC	--	--	Y[5]
Osprey	*Pandion haliaetus*	--	--	S4	Y[5]
Prairie warbler	*Setophaga discolor*	BCC	--	--	Y[5]
Prothonotary warbler	*Protonotaria citrea*	BCC	--	--	Y[5]
Red-headed woodpecker	*Melanerpes erythrocephalus*	BCC	--	--	Y
Rusty blackbird	*Euphagus carolinus*	BCC	--	--	Y
Whooping crane	*Grus americana*	EXPN	T, XN	SP	Y
Wood thrush	*Hylocichla mustelina*	BCC	--	--	Y[5]
Arthropods					
Monarch butterfly	*Dananus plexippus*	PT	--	--	Y
A cave obligate spider	*Nesticus barri*	--	--	S3	Y
Mammals					
Gray bat	*Myotis grisescens*	E	E	S2	Y[5]
Indiana bat	*Myotis sodalis*	E	E	S1	Y[5]

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
Northern long-eared bat	*Myotis septentrionalis*	T	T	S1S2	Y
Tricolored bat	*Permimyotis subflavus*	PE	--	S3	Y[5]
Plants					
Alabama snowwreath	*Neviusia alabamensis*	--	--	S2	Y[5]
American ginseng	*Panax quinquefolius*	--	--	S4	Y[5]
American Hart's-tonguefern	*Asplenium scolopendrium* var. *americanum*	T	T	S1	Y
American smoke tree	*Cotinus obovata*	--	--	S2	Y[5]
American spikenard	*Aralia racemosa*	--	--	S1	Y[5]
Bastard Toad-flax	*Comandra umbellata*	--	--	S1	Y
Butler's quillwort	*Isoetes butleri*	--	--	S2	Y
Bronze willowherb	*Epilobium coloratum*	--	--	S1	Y[5]
Canada violet	*Viola canadensis*	--	--	S2	Y
Canadian milkvetch	*Astragalus canadensis*	--	--	S1	Y[5]
Carolina rhododendron	*Rhododendron minus*	--	--	S2	N
Cream avens	*Geum virginianum*	--	--	S2	Y[5]
Creeping aster	*Eurybia surculosa*	--	--	S1	Y[5]
Cumberland rosinweed	*Silphium brachiatum*	--	--	S2	Y[5]
Dutchman's breeches	*Dicentra cucullaria*	--	--	S2	Y[5]
Elf orpine	*Sedum smallii*	--	--	S3	Y[5]
Fame flower	*Phemeranthus* sp.	--	--	S1 or S3	Y[5]
Field horsetail	*Equisetum arvense*	--	--	S2	Y
Flatrock pimpernel	*Lindernia monticola*	--	--	S3	Y[5]
Gattinger’s prairie clover	*Dalea gattingeri*	--	--	S3	Y[5]
Goldenseal	*Hydrastis canadensis*	--	--	S2	Y
Granite gooseberry	*Ribes curvatum*	--	--	S2	Y
Granite loving flatsedge	*Cyperus granitophilus*	--	--	S2	Y[5]
Great yellow woodsorrel	*Oxalis grandis*	--	--	S1	Y
Green Pitcher-plant	*Sarracenia oreophila*	E	E	S2	Y

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
Harper's dodder	*Cuscuta harperi*	--	--	S2	Y[5]
Horse gentian	*Triosteum angustifolium*	--	--	S1	Y
Longleaf sunflower	*Helianthus longifolius*	--	--	S1S2	Y
Maidenhair spleenwort	*Asplenium trichomanes*	--	--	S2S3	Y
Michaux's gladecress	*Leavenworthia uniflora*	--	--	S2	Y
Morefield's Leather Flower	*Clematis morefieldii*	E	E	S2	Y
Mountain camellia	*Stewartia ovata*	--	--	S2S3	Y
Rock muhly	*Muhlenbergua soblifera*	--	--	S1	Y[5]
Nuttall's rayless goldenrod	*Bigelowia nuttallii*	--	--	S3	Y
One-flowered broomrape	*Orobanche uniflora*	--	--	S2	Y
Pink turtlehead	*Chelone lyonii*	--	--	S1	Y[5]
Price's potato-bean	*Apios priceana*	T	T	S2	N
Prickly gooseberry	*Ribes cynosbati*	--	--	S1S2	Y
Purple sedge	*Carex purpurifera*	--	--	S2	Y
Shining indigo bush	*Amorpha nitens*	--	--	S1	Y
Small-flowered false hellebore	*Melanthium parviflorum*	--	--	S1S2	Y
Southern red trillium	*Trillium sulcatum*	--	--	S1	Y
Spikemoss	*Selaginella arenicola* ssp. *riddellii*	--	--	S2	N
Spotted mandarin	*Prosartes maculata*	--	--	S1	Y
Southern rein orchid	*Platanthera flava* var. *flava*	--	--	S2	Y[5]
Sunnybell	*Schoenolirion croceum*	--	--	S2	Y
Tennessee bladderfern	*Cystopteris tennesseensis*	--	--	S2	Y
Tennessee leafcup	*Polymnia laevigata*	--	--	S2S3	Y
Twinleaf	*Jeffersonia diphylla*	--	--	S2	Y[5]
Wahoo	*Euonymus atropurpureus*	--	--	S3	Y[5]

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
White leaved sunflower	*Helianthus glaucophyllus*	--	--	SH	N
Wister coralroot	*Corallorhiza wisteriana*	--	--	S2	Y
Woodland tickseed	*Coreopsis pulchra*	--	--	S2	Y[5]
Yellow giant hyssop	*Agastache nepetoides*	--	--	S1	Y[5]
Yellow wood	*Cladrastis kentukea*	--	--	S3	Y[5]

Notes:

1. Source: TVA Regional Natural Heritage Database, extracted September 2024, USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025a), and Alabama Natural Heritage Program (ANHP) 2020.
2. Status Codes: BCC=Bird of Conservation Concern, C= Candidate, D = Deemed in need of management; DM = Delisted, recovered, and still being monitored; E = Endangered; EXPN= Experimental Population, PE= Proposed Endangered, PT= Proposed Threatened, S = Special Concern; S-CE = Special Concern/Commercially Exploited, T = Threatened, UR = Under Review, XN = Experimental population, -- denotes no listing.
3. State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Rank of Breeding Population; S#N = Rank of Non-breeding population; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2), SP = State Protected, -- denotes no listing.
4. Y – Yes, N – No. Determination based on professional biologist/botanist field assessment.
5. Observed during 2023-2024 WSP Terrestrial Zoology Field Surveys (WSP 2025a), 2023-2024 WSP Botanical Field Survey (WSP 2024a), 2023-2024 Bat Mist-Net surveys (EnviroScience 2023a, 2024a), and TVA Internal Cave Surveys (TVA 2025a).

Bats

The Rorex Creek study area offers habitat for forest and cave dwelling bats. Areas of contiguous, relatively undisturbed forest occur along the escarpment and the banks of Guntersville Reservoir. Numerous snags and live trees were observed with peeling bark, open cavities, or both that could be utilized as potential bat roost trees. Additionally, several caves and other karst features are located within the study area. These various habitats would be expected to provide refuge for native species that occur in the region, including federally listed bats. Mist-net surveys were completed within the Rorex Creek study area in 2023 and 2024 (EnviroScience 2023a, 2024a). A total of 571 bats, representing five species, were captured during the 2023 survey of the study area primarily east of Guntersville Reservoir: 311 big brown bats (*Eptesicus fuscus*), 134 eastern red bats (*Lasiurus borealis*), 118 gray bats, five evening bats (*Nycticeius humeralis*), and three tricolored bats (EnviroScience 2023a). Eight of the 118 gray bats were adult females, comprised of two pregnant, one lactating, and five nonreproductive individuals. Nine of the 118 gray bats were juveniles (EnviroScience 2023a). Transmitters were attached to the three tricolored bats resulting in the documentation of two roost trees in the Rorex Creek study area but outside of the disturbance area. The confirmed capture of one targeted species (tricolored bat) indicates their presence within the eastern portion of the study area during the maternity season (EnviroScience 2023a, 2024a).

A total of 236 bats, representing eight species, were captured during the 2024 survey of the study area west of the reservoir, including the transmission line corridor. Results of the survey included the capture of 77 big brown bats, 63 eastern red bats, 84 gray bats (including nine reproductive adult females and forty juveniles), seven evening bats, one hoary bat (*Lasiurus cinereus*), one Indiana bat, one eastern small-footed bat (*Myotis leibii*), and two tricolored bats. No northern long-eared bats or little brown bats were captured during the surveys, indicating that these species are not likely present within the study area during the maternity season. However, one adult male federally endangered Indiana bat was captured within the transmission line corridor on June 28, 2024, and a total of 202 federally endangered gray bats were captured in 2023 and 2024, including several reproductive adult females and juveniles, indicating that a maternity cave may be located in the vicinity of the study area. The male Indiana bat was captured adjacent to, but outside of, the ROW and tracked to an off-site wetland with high quality summer roosting habitat for Indiana bats, approximately 0.8 miles from proposed actions along the ROW. Two tricolored bats (both male) were also captured in June 2024. Tricolored bat tracking resulted in a different tricolored bat summer roosting area than was documented in 2023. This additional roosting area is off site and approximately 2.8 miles from proposed actions along the ROW. The confirmed capture of two target species (Indiana bat and tricolored bat) indicates their presence within the western portion of the study area during the maternity season (EnviroScience 2023a, 2024a). Bat mist net survey reports are included in Appendix D.

Bat portal surveys conducted in 2023 and 2024 identified eight potential bat portals; however, these areas exhibited no signs of bat use (e.g., guano, staining, foraging signs) (EnviroScience 2023b, 2024b). Although data was collected for each portal, not all portals were recommended for internal winter surveys or spring/fall trapping. Seven of the eight identified portals were recommended for further surveys by EnviroScience.

Additional field surveys documenting karst features at the Rorex Creek site were conducted in August 2023, January 2024, and January 2025 (TVA 2025a). Results of these surveys determined that one bat species (tricolored bat) was identified as using two caves within the study area and one cave within the proposed ROW as winter hibernacula. All documented hibernacula within the project boundary have relatively small numbers of tricolored bats. Seven portal openings were examined within the transmission line corridor in January 2025. Of the seven portals, one was determined to be a cave and two portals were observed as being connected, thus resulting in a total of four karst features and one cave. One tricolored bat was observed during internal cave surveys on the transmission line corridor.

<u>Amphibians</u>

The Rorex Creek study area contains potentially suitable habitats for the green and Ocoee salamanders, which are both species of conservation concern tracked by the state of Alabama. Habitat descriptions for these salamanders are provided in Appendix C.

Several caves and other karst features in the study area provide suitable habitat for the green salamander. Potentially suitable habitat was observed along the escarpment on the east side of Guntersville Reservoir (WSP 2025) and within several small karst features along both banks of the reservoir. Suitable habitat was also observed at the northern end of the transmission line corridor on the west side of the reservoir, which crosses Crow Mountain and has similar terrain to the escarpment on the east side of the reservoir.

Floodplain along the western bank of the Guntersville Reservoir and a rocky forested escarpment along the eastern bank of the reservoir may provide suitable habitat for the Ocoee salamander. Despite suitable habitat presence and visual encounter surveys performed by WSP and TVA targeting these habitats, no green or Ocoee salamanders were observed in 2023 and 2024.

Birds

As shown in Table 3-10 and in Appendix B, several BCCs were observed within the Rorex Creek study area including bald eagle, chimney swift, eastern whip-poor-will, Kentucky warbler, osprey, prairie warbler, prothonotary warbler, and wood thrush (WSP 2025). Appendix C contains more detailed species' habitat descriptions.

Three bald eagle nests have been reported in the vicinity of the Rorex Creek study area. Two of these records are over 10 years old. The most recent nesting record is from 2023, but the nest fell in 2024 and is no longer active. No eagle nests have been identified within the study area. Nine osprey nests were observed within the study area during the 2023 and 2024 field surveys (Figures 3-4a and 3-4b).

Potentially suitable foraging habitat for the whooping crane occurs within the Rorex Creek study area in agricultural fields and wetlands. Although not observed on the site during 2023-2024 field surveys, whooping cranes have been recorded during winter in northern Alabama at Wheeler National Wildlife Refuge in Decatur, Alabama, about 60 miles west of the study area (WWRA 2024).

Arthropods

Open fields and roadside areas with flowering plants on the plateau within the study area provide potential foraging habitats for the eastern population of adult monarch butterflies during the spring breeding season and migration. Milkweed was observed within the study area, including on the plateau in the southeastern portion of the study area that could provide potential spring breeding habitat.

Nesticus barri is a cave-obligate spider known from nearly 60 caves on the southern Cumberland Plateau in south-central Tennessee and northeastern Alabama. This species is a terrestrial obligate cave species, which is known as a troglobite. As this species is restricted to cool, moist cave environments, caves effectively provide "islands" of habitat. This species has been recorded in caves in Jackson County (Snowman et al. 2010). Although the cave obligate spider was not observed during field surveys, potential habitat occurs in caves within the Rorex Creek study area.

Plants

Review of the TVA Natural Heritage database resulted in records of 41 state-listed plant species recorded within five miles of the study area and five federally listed plant species that have been recorded from Jackson County, Alabama. The IPaC identified four federally listed vascular plants species with the potential to occur with the study area, including green pitcher plant (*Sarracenia oreophila*), Morefield's leather flower (*Clematis morefieldii*), Price's potato-bean (*Apios priceana*), and American Hart's tongue fern (*Asplenium scolopendrium var. americanum*) (USFWS 2025a). Botanical field surveys of the study area were conducted in June, July, and September of 2023 and August 2024 (Appendix E) (WSP 2024a). While marginal potential habitat was observed for the five federally listed species in the study area during WSP's 2023 surveys, none of the species were identified during field investigations (WSP 2024c). A total of 24 state-sensitive vascular plant species were identified during field surveys of the Rorex Creek study area (Table 3-10).

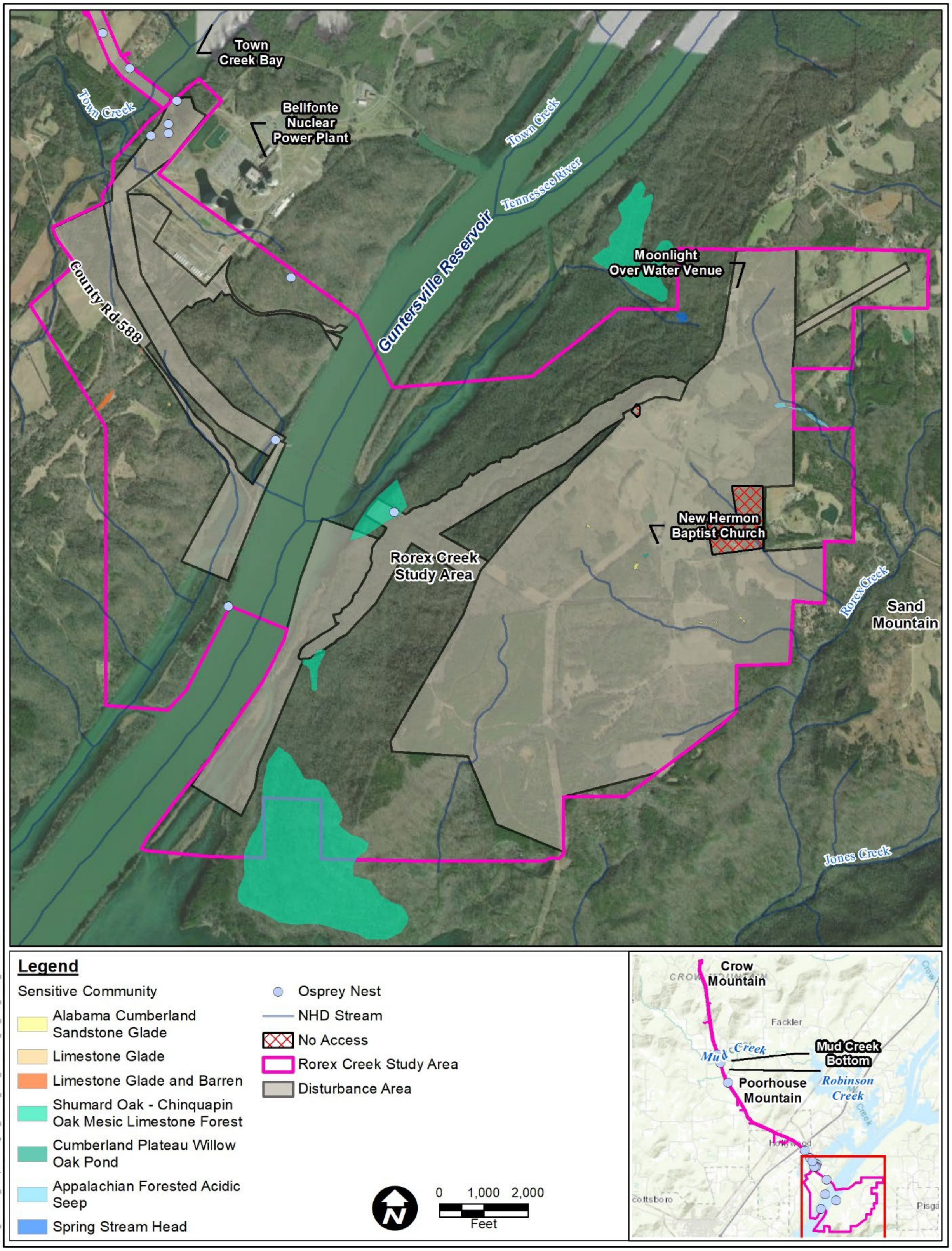

Figure 3-4a. Sensitive Biological Resources at the Rorex Creek Study Area

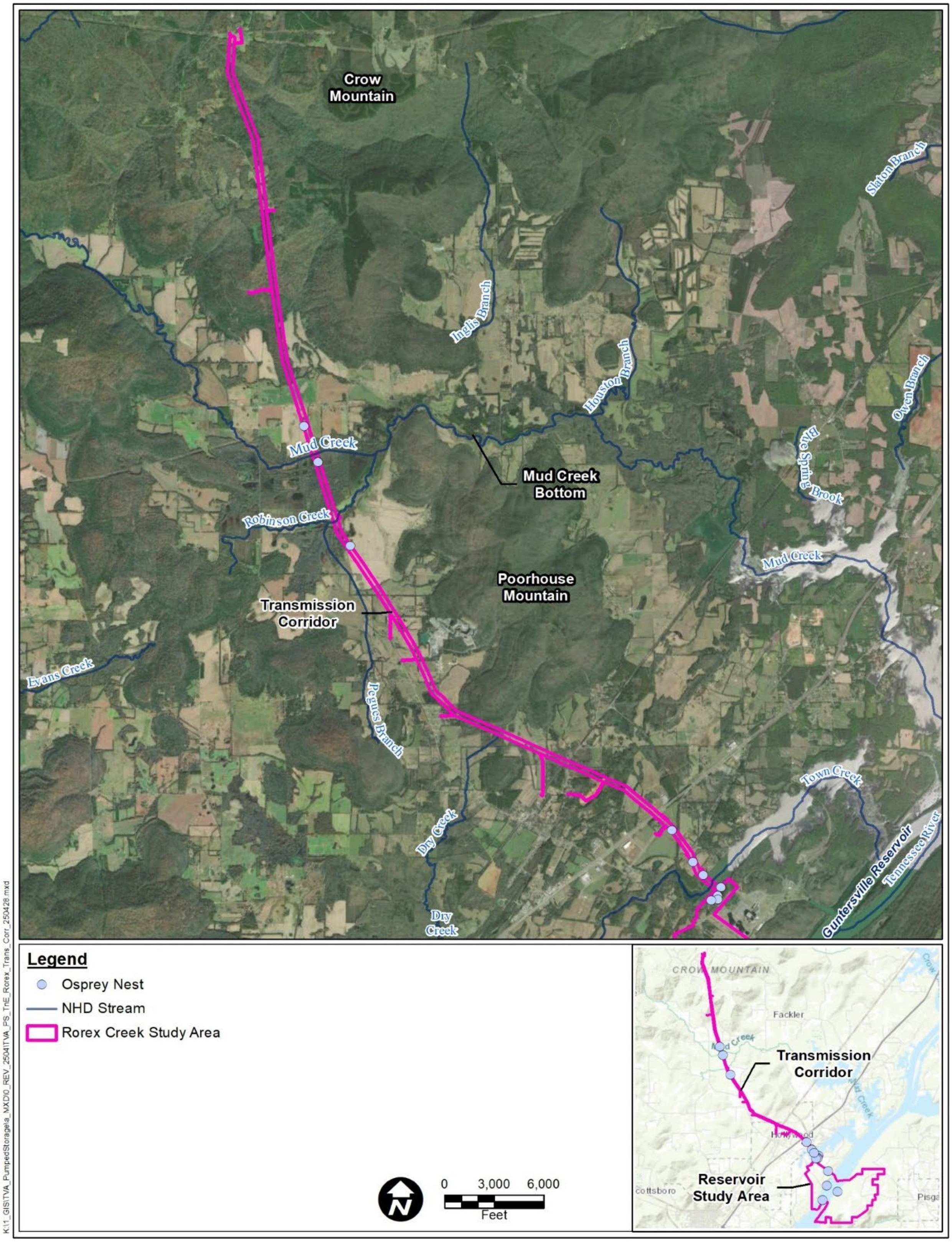

Figure 3-4b. Sensitive Biological Resources at the Rorex Creek Study Area

3.4.1.1.2 Widows Creek Study Area

According to the USFWS IPaC website, six federally listed terrestrial animal species, including the federally endangered gray bat, Indiana bat, and northern long-eared bat; the proposed endangered tricolored bat, the proposed threatened monarch butterfly; and the whooping crane, designated as a nonessential experimental population, have the potential to occur within the Widows Creek study area (USFWS 2025b). Review of the TVA RNHD resulted in records of three federally or state protected terrestrial animal species recorded within three miles of the study area (Table 3-11). In addition, a colonial wading bird colony has also been recorded within three miles of the study area.

Review of the IPaC website also resulted in the identification of six BCCs that could occur within the project site, including the bald eagle, chimney swift, Kentucky warbler, prairie warbler, red-headed woodpecker, and rusty blackbird (USFWS 2025b). Of these, three were observed within the study area during the WSP 2023 Terrestrial Zoology Field Survey: the chimney swift, Kentucky warbler, and prairie warbler (WSP 2024a).

According to the USFWS IPaC, four federally listed plant species have the potential to occur within the Widows Creek study area (USFWS 2025b; Table 3-11). A review of the TVA RNHD resulted in records of 16 state-listed or protected terrestrial plant species that have been recorded within five miles of the study area. No designated critical habitat for terrestrial animal or plant species occurs within the proposed study area.

Detailed species descriptions for threatened and endangered species in the study area are included in Appendix C, and terrestrial habitats within the study areas are described in Section 3.2, Vegetation.

Field surveys to identify existing terrestrial resources and potential habitats for threatened and endangered species within the Widows Creek study area were conducted by WSP in 2023 (Appendix B) (WSP 2024d). Specialized mist net surveys for protected bat species were conducted by EnviroScience (Appendix D) (EnviroScience 2023b). Additionally, bat portal surveys were conducted in November 2023 to identify any cave openings, mine openings or other rock features that may provide bat habitat within the study area (EnviroScience 2024c). During these surveys, four osprey nests were observed within the Widows Creek study area. Ospreys are protected under EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds.

Table 3-11. Terrestrial Plant and Animal Species of Conservation Concern Known from Within Three Miles (Animals) and Five Miles (Plants) of the Widows Creek Study Area and Federally Listed Terrestrial Species Reported from Jackson County, Alabama

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
Amphibians					
Eastern hellbender	*Cryptobranchus alleganiensis*	PE	--	--	N
Green salamander	*Aneides aeneus*	--	SP	S3	Y
Birds					
Bald eagle	*Haliaeetus leucocephalus*	DM	D	S3	Y
Chimney swift	*Chaetura pelagica*	BCC	--	--	Y[5]
Kentucky warbler	*Geothlypis formosa*	BCC	--	--	Y[5]
Osprey	*Pandion haliaetus*	--	SP	S4	Y[5]
Prairie warbler	*Setophaga discolor*	BCC	--	--	Y[5]
Red-headed woodpecker	*Melanerpes erythrocephalus*	BCC	--	--	Y
Rusty blackbird	*Euphagus carolinu*	BCC	--	--	Y
Whooping crane	*Grus americana*	EXPN	T, XN, SP	--	Y
Insects					
Monarch butterfly	*Dananus plexippus*	PT	--	--	Y[5]
Mammals					
Gray bat	*Myotis grisescens*	E	E	S2	Y[5]
Indiana bat	*Myotis sodalis*	E	E	S1	Y
Northern long-eared bat	*Myotis septentrionalis*	T	T	S1S2	Y
Tricolored bat	*Permimyotis subflavus*	PE	--	--	Y[5]
Plants					
American columbo	*Frasera caroliniensis*	--	--	S2	Y
American ginseng	*Panax quinquefolius*	--	--	S4	Y[5]
American hart's tonguefern	*Asplenium scolopendrium* var. *americanum*	T	T	S1	Y
Appalachian rose gentian	*Sabatia capitata*	--	--	S2	Y[5]
Appalachian golden banner	*Thermopsis mollis*	--	--	S1	Y[5]

Common Name	Scientific Name	Federal Status[1,2]	State Status[1,2]	State Rank[1,3]	Suitable Habitat within the Study Area (Y/N)[4]
Bastard toadflax	*Comandra umbellata*	--	--	S1	Y[5]
Broadleaf Barbara's buttons	*Marshallia trinervia*	--	--	S3	Y[5]
Creeping aster	*Eurybia surculosa*	--	--	S1	Y[5]
Common eastern pinesap	*Hypopitys monotropa*	--	--	S2	Y[5]
Cumberland rosinweed	*Silphium brachiatum*	--	--	S2	Y
Dutchman's breeches	*Dicentra cucullaria*	--	--	S2	Y
Flatrock pimpernel	*Lindernia monticola*	--	--	S3	Y[5]
Granite gooseberry	*Ribes curvatum*	--	--	S2	Y
Green pitcher-plant	*Sarracenia oreophila*	E	E	S2	N
Harper's dodder	*Cuscuta harperi*	--	--	S2	Y
Large whorled pogonia	*Isotria verticillata*	--	--	S2	Y[5]
Longleaf sunflower	*Helianthus longifolius*	--	--	S1S2	Y[5]
Mohr's rosinweed	*Silphium mohrii*	--	--	S1	N
Morefield's leather flower	*Clematis morefieldii*	E	E	S2	Y
Pink lady's slipper	*Cypripedium acaule*	--	--	S3	Y[5]
Pussywillow	*Salix humilis*	--	--	S2S3	Y
Purple sedge	*Carex purpurifera*	--	--	S2	Y[5]
Roundleaf catchfly	*Silene rotundifolia*	--	--	S1S2	Y
Scarlet Indian paintbrush	*Castilleja coccinea*	--	--	S1	Y
Sunnybell	*Schoenolirion croceum*	--	--	S2	Y
White fringeless orchid	*Platanthera integrilabia*	T	T	S2	Y
Woodland tickseed	*Coreopsis pulchra*	--	--	S2	Y[5]
Yellow giant hyssop	*Agastache nepetoides*	--	--	S1	Y

Notes:

1. Source: TVA Regional Natural Heritage Database, extracted May 2023, USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025b), and Alabama Natural Heritage Program (ANHP) 2020.
2. Status Codes: BCC=Bird of Conservation Concern, C= Candidate, D = Deemed in need of management; DM = Delisted, recovered, and still being monitored; E = Endangered; EXPN= Experimental Population, PE= Proposed Endangered, PT= Proposed Threatened, S = Special Concern; S-CE = Special Concern/Commercially Exploited, T = Threatened, UR = Under Review, XN = Experimental population, -- denotes no listing.
3. State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Rank of Breeding Population; S#N = Rank of Non-breeding population; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2), SP = State Protected, -- denotes no listing.
4. Y – Yes, N – No, Determination based on professional biologist/botanist field assessment.
5. Observed during 2023 WSP field surveys (WSP 2024d), 2023 WSP Botanical Survey (WSP 2024b), and 2023 Bat Mist-Net Survey (EnviroScience 2023c).

Bats

Mist-net surveys were completed within the Widows Creek study area in 2023 (EnviroScience 2023b). A total of 208 bats, representing five species, were captured during the survey including 86 big brown bats, 51 eastern red bats, 43 gray bats, 25 evening bats, and three tricolored bats. No Indiana bats, northern long-eared bats, or little brown bats were captured during the survey, indicating that these species are not likely present within the study area during the maternity season (EnviroScience 2023b). Bat portal surveys conducted in 2023 and resulted in no caves, portals, or mine openings in the study area (EnviroScience 2024c). However, two known caves occur within the study area at Widows Creek and were not able to be surveyed due to land access restrictions. EnviroScience recommended that if Widows Creek is chosen as the preferred project alternative, a more thorough on-the-ground search of portals be conducted (EnviroScience 2024c).

Amphibians

According to the 2023 WSP field survey, potentially suitable habitat for the green salamander was observed in several locations along the escarpment separating the plateau from the floodplain (WSP 2024a). These areas had steep rocky outcrops with crevices consistent with descriptions of suitable habitat. However, no green salamanders were observed during field surveys (WSP 2024d).

Birds

Several BCCs were observed within the Widows Creek study area, including chimney swift, Kentucky warbler, osprey, and prairie warbler (WSP 2024d). The number of these individuals observed is included in Appendix B. For more detailed species descriptions see Appendix C.

Four osprey nests were observed within the Widows Creek study area during WSP field surveys during 2023 (Figure 3-5). However, no bald eagle nests were observed in the study area.

Potentially suitable habitat for the federally listed whooping crane occurs within the Widows Creek study area. Although not recorded at the site, whooping cranes have been recorded during winter in northern Alabama at Wheeler National Wildlife Refuge in Decatur, Alabama (WWRA 2024).

Arthropods

Open fields, glades, and roadside areas with flowering plants on the plateau within the Widows Creek study area provide potential foraging habitat for the eastern population of adult monarch butterflies during the spring breeding season and migration. No monarchs were observed during field surveys

Plants

Review of the TVA Natural Heritage database returned records for one federally listed species and 16 state listed species recorded within five miles of the study area; a total of five federally listed species have been recorded from Jackson County, Alabama. The IPaC identified four federally listed vascular plants species with the potential to occur within the study area, including the green pitcher plant, Morefield's leather flower, the white fringeless orchid (*Platanthera integrilabia*), and American Hart's tonguefern (USFWS 2025b). All federally listed plants identified in the IPaC report have been recorded from Jackson County, Alabama, in additional to Price's potato-bean. No federally designated critical habitat occurs within the study area. Botanical field surveys of the Widows Creek study area were conducted in June, July, and September of 2023 (Appendix E) (WSP 2024b). While marginal potential habitat was observed for three of the four species in the study area during WSP's 2023 Botanical Field Surveys, none were identified during the field investigation (WSP 2024d). Thirteen state sensitive vascular plant species with a NatureServe subnational (S) ranking of S3 (vulnerable) or higher, or of conservation concern because of commercial exploitation in Alabama were identified during field surveys of the Widows Creek study area (WSP 2024d).

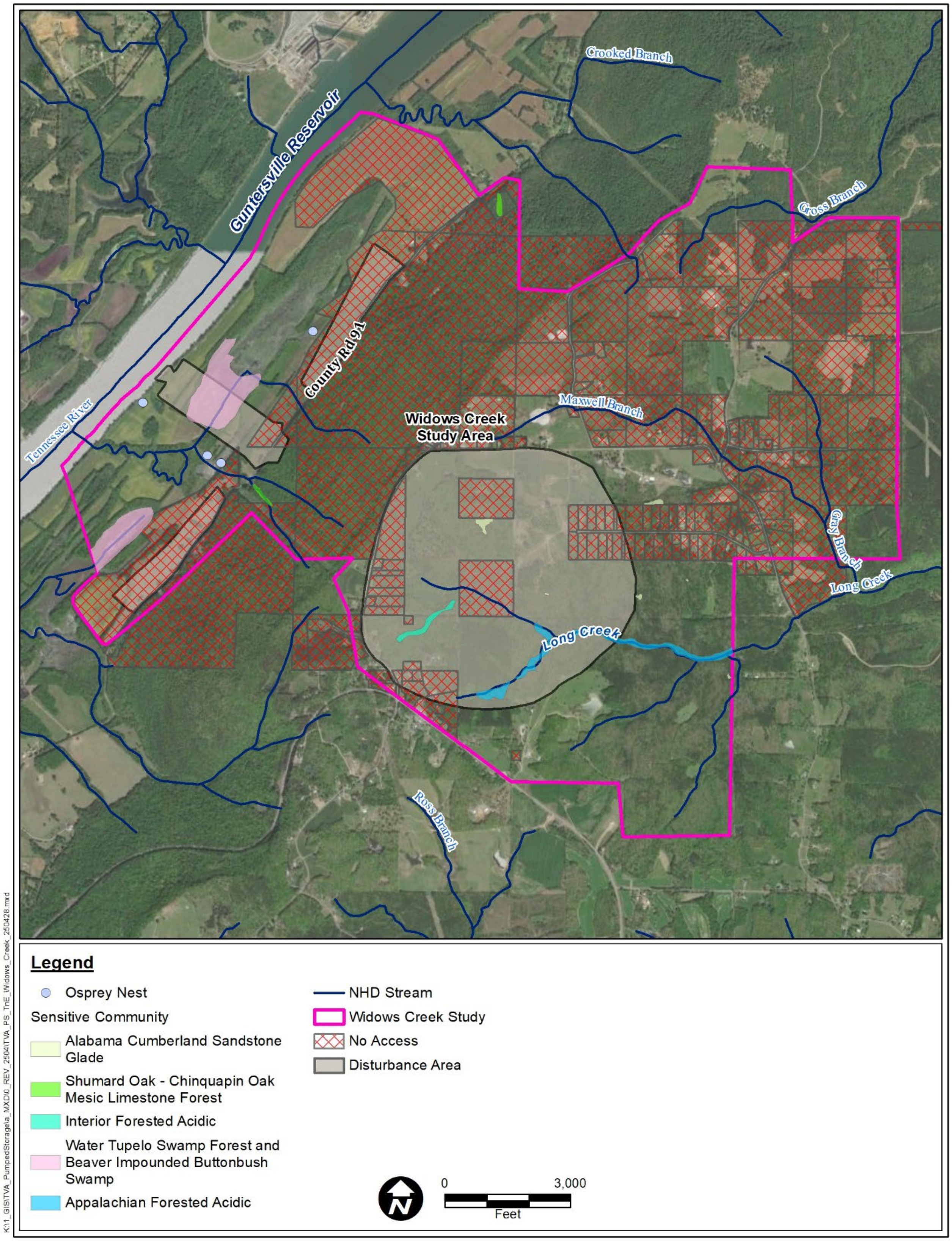

Figure 3-5. Sensitive Biological Resources at the Widows Creek Study Area

3.4.1.1.3 Raccoon Mountain Study Area

According to the USFWS IPaC website, five federally listed terrestrial animal species, including the federally endangered gray bat, and northern long-eared bat; the proposed endangered tricolored bat, the proposed threatened monarch butterfly; and the whooping crane, designated as a nonessential experimental population, have the potential to occur within the Raccoon Mountain study area (USFWS 2025c). Review of the TVA RNHD resulted in records of four state-listed or protected terrestrial animal species that have been recorded within three miles of the study area (Table 3-12).

A review of the IPaC website also identified 14 BCCs that could occur within the project site, including the bald eagle, black-billed cuckoo, bobolink, Canada warbler, cerulean warbler, chimney swift, eastern whip-poor-will, golden-winged warbler, Kentucky warbler, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, and wood thrush (USFWS 2025c). Of these, five were observed within the study area during the June 2023 field survey, including the bald eagle, chimney swift, eastern whip-poor-will, prairie warbler, and wood thrush.

In addition, seven federally listed plant species have the potential to occur within the Raccoon Mountain study area (USFWS 2025c). Review of the TVA RNHD resulted in records of 29 federally and state-listed or protected terrestrial plant species that have been recorded within five miles of the study area. No designated critical habitat for terrestrial animal or plant species occurs within the study area.

Detailed species descriptions for threatened and endangered species in the study area are included in Appendix C and terrestrial habitats within the study areas are described in Section 3.2, Vegetation.

Terrestrial zoology field surveys to identify existing terrestrial resources and potential habitat for threatened and endangered species within the Raccoon Mountain study area were conducted by WSP in 2023 (Appendix B) (WSP 2024e). Specialized mist net surveys for protected bat species were conducted by EnviroScience (Appendix D) (EnviroScience 2023c). Additionally, bat portal surveys were conducted in October and November 2023 to identify any cave openings, mine openings or other rock features that may provide bat habitat within the study area (EnviroScience 2024c).

Table 3-12. Terrestrial Plant and Animal Species of Conservation Concern Known from Within Three Miles (Animals) and Five Miles (Plants) of the Raccoon Mountain Study Area and Federally Listed Terrestrial Species Reported from Hamilton and Marion Counties, Tennessee

Common Name	Scientific Name	Federal Status[1, 2]	State Status[1, 2]	State Rank[1, 3]	Suitable Habitat within the Study Area (Y/N/P)[4]
Amphibians					
Green salamander	<u>*Aneides aeneus*</u>	--	--	S3S4	Y
Ocoee salamander	*Desmognathus ocoee*	--	E	S3	Y[5]
Tennessee cave salamander	*Gyrinophilus palleucus*	--	T	S2	Y
Birds					
Bachman's sparrow	*Paucaea aestivalis*	BCC	E	S1	N
Bald eagle	*Haliaeetus leucocephalus*	DM	D	S3	Y[5]
Black-billed cuckoo	*Coccyzus erythropthalmus*	BCC	--	--	Y
Bobolink	*Dolichonyx oryzivorus*	BCC	--	--	N
Canada warbler	*Cardellina canadensis*	BCC	--	--	N
Cerulean warbler	*Setophaga cerulea*	BCC	D	S3	Y
Chimney swift	*Chaetura pelagica*	BCC	--	--	Y[5]
Eastern whip-poor-will	*Antrostomus vociferus*	BCC	--	--	Y[5]
Golden-winged warbler	*Vermivora chrysoptera*	UR	--	--	N
Kentucky warbler	*Geothlypis formosa*	BCC	--	--	Y
Osprey	*Pandion haliaetus*	--	--	S3	Y[5]
Peregrine falcon	*Falco peregrinus*	PS/LE	--	--	Y
Prairie warbler	*Setophaga discolor*	BCC	--	--	Y[5]
Prothonotary warbler	*Protonotaria citrea*	BCC	--	--	Y
Red-headed woodpecker	*Melanerpes erythrocephalus*	BCC	--	--	Y
Rusty blackbird	*Euphagus carolinus*	BCC	--	--	Y
Sharp-shinned hawk	*Accipiter striatus*	PS	--	--	Y
Swainson's warbler	*Limnothylypis swainsonii*	BCC	D	S3	Y
Wood thrush	*Hylocichla mustelina*	BCC	--	--	Y
Whooping crane	*Grus americana*	EXPN	-	-	Y

Common Name	Scientific Name	Federal Status[1, 2]	State Status[1, 2]	State Rank[1, 3]	Suitable Habitat within the Study Area (Y/N/P)[4]
Insects					
Monarch butterfly	*Danaus plexippus*	PT	--	--	Y[5]
Mammals					
Eastern small-footed bat	*Myotis lebeii*	--	D	S2S3	Y[5]
Gray bat	*Myotis grisescens*	E	E	S2	Y[5]
Northern long-eared bat	*Myotis septentrionalis*	T	T	S1S2	Y
Tricolored bat	*Permimyotis subflavus*	PE	T	S2S3	Y
Plants					
American ginseng	*Panax quinquefolius*	--	S-CE	S3S4	Y[5]
American hart's tonguefern	*Asplenium scolopendrium* var. *americanum*	T	T	S1	Y
Appalachian golden banner	*Thermopsis mollis*	--	S	S2S3	Y[5]
Ash-leaved bushpea	*Thermopsis fraxinifolia*	--	T	S3	Y
Blue-eyed Mary	*Collinsia verna*	--	E	S1	Y
Butternut	*Juglans cinerea*	--	T	S3	Y
Compass plant	*Silphium laciniatum*	--	T	S2	N
Cumberland rose gentian	*Sabatia capitata*	--	E	S2	N
Florida hedge hyssop	*Gratiola floridana*	--	E	S1	Y
Fraser loosestrife	*Lysimachia fraseri*	--	E	S2	N
Lanceleaf trillium	*Trillium lancifolium*	--	E	S1	Y
Large-flowered skullcap	*Scutellaria montana*	T	T	S4	Y[5]
Long-sepal beardtongue	*Penstemon calycosus*	--	SH	--	Y
Limestone fame flower	*Phemeranthus calcaricus*	--	S	S3	N
Manna grass	*Glyceria acutiflora*	--	S	S2	N
Menge's fame flower	*Phemeranthus mengesii*	--	T	S2	Y[5]
Morefield's leather flower	*Clematis morefieldii*	E	E	S2	N
Mountain bittercress	*Cardamine diphylla*	--	--	S3	Y[5]
Mountain bush honeysuckle	*Diervilla rivularis*	--	T	S2	Y[5]
Northern bush honeysuckle	*Diervilla lonicera*	--	T	S2	Y
Purple sedge	*Carex purpurifera*	--	--	S3	Y[5]

Common Name	Scientific Name	Federal Status[1, 2]	State Status[1, 2]	State Rank[1, 3]	Suitable Habitat within the Study Area (Y/N/P)[4]
Price's potato-bean	*Apios priceana*	T	T	S2	N
Round-leaved serviceberry	*Amelanchier sanguinea*	--	T	S2	Y[5]
September elm	*Ulmus serotina*	--	--	S3	Y[5]
Shining indigo-bush	*Amorpha nitens*	--	--	S1?	Y
Small's stonecrop	*Diamorpha smallii*	--	E	S2S2	N
Small whorled pogonia	*Isotria medeoloides*	T	E	S1	Y
Southern morning glory	*Stylisma humistrata*	--	T	S1	Y
Spreading false-foxglove	*Aureolaria patula*	--	S	S3	Y
Tennessee leafcup	*Polymnia laevigata*	--	--	S3	Y[5]
Virginia spiraea	*Spiraea virginiana*	T	E	S2	N
White fringeless orchid	*Platanthera integrilabia*	T	E	S2S3	Y
Whiteleaf leatherflower	*Clematis glaucophylla*	--	S	S1	N
Whorled horsebalm	*Collinsonia verticillata*	--	--	S2	Y[5]
Witch alder	*Fothergilla major*	--	T	S2	N
Wood lily	*Lilium philadelphicum*	--	E	S1	Y
Yellow honeysuckle	*Lonicera flava*	--	T	S1	Y
Yellow jessamine	*Gelsemium sempervirens*	--	--	S1	Y

Notes:

1. Source: TVA Regional Natural Heritage Database, extracted May 2023, USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025c), and Tennessee Department of Environment and Conservation (TDEC) Rare Species by County, extracted November 2024.
2. Status Codes: BCC=Bird of Conservation Concern, C= Candidate, D = Deemed in need of management; DM = Delisted, recovered, and still being monitored; E = Endangered; EXPN = Experimental Population, PE = Proposed Endangered, PS = Partial Status, PT= Proposed Threatened, S = Special Concern; S-CE = Special Concern/Commercially Exploited, T = Threatened, UR = Under Review, XN= Experimental population. -- denotes no listing.
3. State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Rank of Breeding Population; S#N = Rank of Non-breeding population; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2), S#? = State rank is not assessed, SH= Historical, element occurred historically in the state with expectation that it may be rediscovered.
4. Y – Yes, N – No, Determination based on professional biologist/botanist field assessment.
5. Observed during 2023 WSP Terrestrial Zoology field survey (WSP 2024e), 2023 WSP Botanical Field Survey (WSP 2024c), and 2023 Bat Mist-Net Survey (EnviroScience 2023d).

Bats

The study area also offers a potential summer roosting habitat for forest-dwelling bats, including contiguous, relatively undisturbed forest along the escarpment and undeveloped portions of the study area. Common species such as white oak (*Quercus alba*) and shagbark hickory (*Carya ovata*) as well as numerous snags were observed with peeling bark and open cavities—ideal features typically used by bats for roosting.

Mist-net surveys for bat species were conducted within the Raccoon Mountain study area in 2023 (EnviroScience 2023c). A total of 104 bats, representing six species, were captured during the survey, including 18 big brown bats, 10 eastern red bats, one Seminole bat, 71 gray bats, three eastern small-footed bats, and one evening bat. No Indiana bats, northern long-eared bats, tricolored bats, or little brown bats were captured during the survey, indicating that these species are not likely present within the study area during the maternity season.

Bat portal surveys conducted in 2023 resulted in no caves, portals, or mine openings present within the study area (EnviroScience 2024c).

Amphibians

According to the 2023 field surveys of the Raccoon Mountain study area, potentially suitable habitat for the green salamander was observed in several locations along the steep escarpment separating the plateau on top of Raccoon Mountain from the floodplain (WSP 2024e). These areas had steep rocky outcrops with crevices consistent with descriptions of suitable habitat. Because Ocoee salamander occupies similar habitat, both the green salamander and Ocoee salamander could be present within the study area. However, the Tennessee cave salamander only occurs within aquatic habitat in limestone caves (Appendix C). No subterranean salamander surveys were conducted. Although the green salamander and Tennessee cave salamander were not found during field surveys, the state tracked Ocoee salamander was observed in the study area in June 2023.

Birds

Several BBCs were observed within the Raccoon Mountain study area and include bald eagle, chimney swift, eastern whip-poor-will, osprey, and prairie warbler (WSP 2024e). The number of these individuals observed is included in Appendix B. For more detailed species descriptions see Appendix C.

During WSP 2023 field surveys, one potential bald eagle nest was located on a transmission tower within the Raccoon Mountain study area (Figure 3-6). On December 28, 2023, two adult bald eagles were observed flying near the nest. Additionally, one osprey nest was observed within the study area during field surveys. Ospreys are protected under EO 13186, Responsibilities of Federal Agencies to Protect Migratory birds and bald eagles are protected under that same EO and the BGEPA.

Foraging habitat for the whooping crane does not occur in the study area, and this species is not known to breed in Tennessee.

Arthropods

Open fields, barrens, and roadside areas with flowering plants on the plateau within the Raccoon Mountain study area provide potential foraging habitat for the eastern population of adult monarch butterflies during the spring breeding season and migration. This species was also observed during field surveys of the study area (WSP 2024e).

Plants

Review of the TVA Natural Heritage database returned records for one federally listed species and 28 state listed species recorded within five miles of the study area; a total of six federally listed species have been recorded from Hamilton and Marion counties in Tennessee. The IPaC identified seven federally listed vascular plants species with the potential to occur within the study area, including the large-flowered skullcap (*Scutellaria montana*), Morefield's leather flower, Price's potato-bean, and American Hart's tonguefern, small whorled pogonia (*Isotria medeoloides*), Virginia spiraea (*Spiraea virginiana*), and white fringeless orchid (USFWS 2025c). One additional federally listed species, the Tennessee yellow eyed grass (*Xyris tennesseensis*), was identified as having the potential to occur within Hamilton and Marion counties, Tennessee. No federally designated critical habitat occurs within the study area. Botanical field surveys of the Raccoon Mountain study area were conducted in June and September of 2023 (WSP 2024c). Multiple subpopulations of the federally threatened large-flowered skullcap were recorded by TVA from the study area in 2010 (WSP 2024e); WSP subsequently relocated two subpopulations during surveys in 2024. Eleven state sensitive vascular plant species with a NatureServe subnational (S) ranking of S3 (vulnerable) or higher, or of conservation concern because of commercial exploitation in Tennessee were identified during field surveys of the Raccoon Mountain study area (Table 3-12).

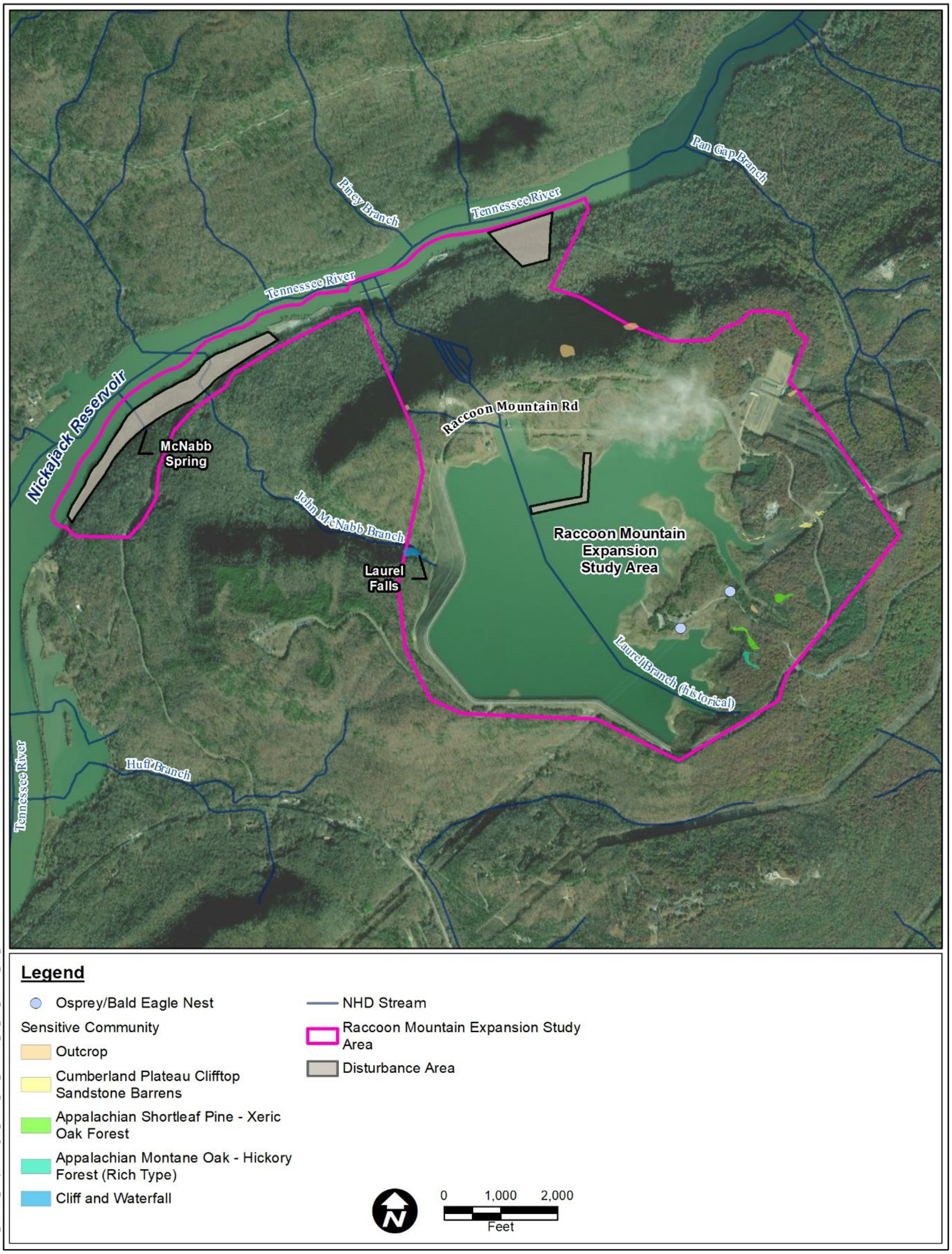

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Figure 3-6. Sensitive Biological Resources at the Raccoon Mountain Study Area

3.4.1.2 Aquatic Species

Dams within Tennessee rivers disrupt the natural flow of water and fragment important habitat for numerous aquatic species, which may explain the disappearance of some aquatic species, especially freshwater mollusks (Bullard 2020). Aquatic species that may be present in a given reservoir (i.e., in the vicinity of the locks/dams) but absent from the study areas are not described in detail, as impacts to those species would be indirect or discountable.

Aquatic species of conservation concern that are known from or have the potential to occur within the 10-digit hydrologic unit code (HUC) watersheds encompassing the Rorex Creek, Widows Creek, and Raccoon Mountain study areas are listed in Table 3-13, Table 3-14, and Table 3-15 (USFWS 2025a, b, c; TVA 2023a, b; TVA 2024b). Species with an element rank of historical (H), possibly historical (H?), extirpated (X), or possibly extirpated (X?) are considered to be extremely rare or no longer occur within the 10-digit HUCs in which they were once documented. Aquatic habitats within the study areas are described in Section 3.6, Aquatic Ecology.

Table 3-13. Records of Aquatic Animal Species of Conservation Concern Within Rorex Creek Study Area (Mud Creek - Tennessee River – 0603000104 10-Digit HUC Watershed1) and within Jackson County, Alabama

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N)[6]
Amphibians						
Eastern hellbender	*Cryptobranchus alleganiensis*	S1S2	SP	--	PE	N
Crayfish						
Southern cave crayfish	*Orconectes australis australis*	S3	--	E		Y
Fishes						
Southern cavefish	*Typhlichthys subterraneus*	S3	SP	E	--	Y
Mollusks						
Butterfly	*Ellipsaria lineolata*	S4	PSM	--	--	Y[7]
Orange-foot pimpleback	*Plethobasus cooperianus*	SX	SP	E		Y
Sheepnose	*Plethobasus cyphyus*	S1	SP	H	EXN	Y
Ohio pigtoe	*Pleurobema cordatum*	S2	PSM	H	E	Y[7]
Pyramid pigtoe	*Pleurobema sintoxia*	S1	SP	E	--	Y
Winged mapleleaf	*Quadrula fragosa*	SNA	SP	H		Y

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N)[6]
Monkeyface	*Theliderma metanevra*	S3	PSM	H	EXN	Y[7]
Pink mucket	*Lampsilis abrupta*	S2	E	E	E	Y[7]
Snails						
Anthony's river snail	*Athearnia anthonyi*	--	--	E	EXN	Y
Spiny riversnail	*Lo fluvialis*	--	--	H	UR	Y
Corpulent hornsnail	Pleurocera corpulenta	--	--	E	UR	Y

[1]TVA Regional Natural Heritage Database, extracted September 2024 and USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025a).

[2]State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; SX = Extirpated, SNA= A conservation status rank is not applicable because the species is not a suitable target for conservation activities in the state.

[3]Status Codes: SP= State Protected, PSM= Protected State Mussel

[4]Heritage Element (=population) Rank: A= Excellent estimated viability, B= Good estimated viability, C= Fair estimated viability, E= Verified extant (viability integrity not assessed), H= Historical, ? = uncertain status; X = Extirpated

[5]Federal Status: T =Threatened; E =Endangered, PT=Proposed Threatened, PE=Proposed Endangered, UR=Under Review, EXN= Experimental Population. -- Denotes no listing

[6]Y – Yes, N – No, Determination based on lack of records and professional biologist habitat assessment.

[7]Observed during 2023/2024 mollusk surveys (Dinkins Biological Consulting, LLC. 2024).

Table 3-14. Records of Aquatic Animal Species of Conservation Concern Within Widows Creek Study Area (Widows Creek – Tennessee River River – 0603000102 10-Digit HUC Watershed1) and within Jackson County, Alabama

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N/P)[6]
Amphibians						
Eastern hellbender	*Cryptobranchus alleganiensis*	S1S2	SP	--	PE	N
Crayfish						
Southern cave crayfish	*Orconectes australis australis*	S3	--	E	--	Y
Fishes						
Snail darter	*Percina tanasi*	S2S3	T	H?	DL	Y
Southern cavefish	*Typhlichthys subterraneus*	S3	SP	E	--	Y
Mollusks						
Fanshell	*Cyprogenia stegaria*	S1	E	H	EXN	Y
Dromedary pearlymussel	*Dromus dromas*	SX	SP	X	EXN	Y

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N/P)[6]
Butterfly	*Ellipsaria lineolata*	S4	PSM	E		Y
Snuffbox	*Epioblasma triquetra*	S1	PSM	H	E	Y
Pink Mucket	*Lampsilis abrupta*	S2	E	E	E	Y
Pocketbook	*Lampsilis ovata*	S2	PSM	H		Y[7]
Tennessee heelsplilter	*Lasmigona holstonia*	S1	PSM	H	UR	Y
Smooth mudalia	*Leptoxis virgata*	S1	--	E	--	Y
Hickorynut	*Obovaria olivaria*	SX	PSM	H		Y
Ring pink	*Obovaria retusa*	SH	SP	X	EXN	Y
Orange-foot pimpleback	*Plethobasus cooperianus*	SX	SP	H	EXN	Y
Sheepnose	*Plethobasus cyphyus*	S1	SP	H	E	Y
Ohio pigtoe	*Pleurobema cordatum*	S2	PSM	E	--	Y
Rough pigtoe	*Pleurobema plenum*	S1	SP	X	EXN	Y
Pyramid pigtoe	*Pleurobema rubrum*	S1	--	H	PT	Y
Slabside pearlymussel	*Pleuronaia dolabelloides*	S1	SP	H	E	Y
Kidneyshell	*Ptychobranchus fasciolaris*	S2	PSM	H	--	Y
Smooth rabbitsfoot	*Quadrula cylindrica cylindrica*	S1	SP	H	T	Y
Winged mapleleaf	*Quadrula fragosa*	SNA	SP	H	EXN	Y
Cumberland monkeyface	*Quadrula intermedia*	SX	SP	X	EXN	Y
Monkeyface	*Theliderma metanevra*	S3	PSM	E	--	Y[7]
Snails						
Anthony's riversnail	*Antherarnia anthonyi*	S1	SP	E	E	Y
Spiny riversnail	*Lo fluvialis*	S2	--	E	UR	Y
Armored rocksnail	*Lithasia armigera*	S1S2	--	E	--	Y
Warty rocksnail	*Lithasia lima*	S2	--	E	--	Y
Varicose rocksnail	*Lithasia verrucosa*	S3	--	E		Y
Corpulent hornsnail	*Pleurocera corpulenta*	S1	E	--	UR	Y

[1]TVA Regional Natural Heritage Database extracted May 2023 and USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025b).

[2]State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; SH= Historical (Possibly Extirpated), SX = Extirpated, SNA= A conservation status rank is not applicable because the species is not a suitable target for conservation activities in the state, S#S# = Range of uncertainty about the status of a species.

[3]Status Codes: SP= State Protected, PSM = Protected State Mussel, E = Endangered

[4]Heritage Element (=population) Rank: A = Excellent estimated viability, B = Good estimated viability, C = Fair estimated viability, E = Verified extant (viability integrity not assessed), H = Historical, ? = uncertain status; X = Extirpated

[5]Federal Status: T =Threatened; E =Endangered, PT=Proposed Threatened, PE=Proposed Endangered, UR=Under Review, EXN= Experimental Population, DL= Delisted, -- Denotes no listing

[6] Y – Yes, N – No, Determination based on lack of records and professional biologist habitat assessment.

[7]Observed during 2023/2024 mollusk surveys (Dinkins Biological Consulting, LLC. 2024).

Table 3-15. Records of Aquatic Animal Species of Conservation Concern Within Raccoon Mountain Study Area (Nickajack Lake -Tennessee River – 0602000112 and Lookout Creek 0602000111 10-Digit HUC Watersheds[1]) and within Hamilton and Marion Counties, Tennessee

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N)[6]
Amphipods						
Dickson's cave amphipod	*Stygobromus dicksoni*	SNR	--	H	--	Y
Nortons cave amphipod	*Stygobromus nortoni*	SH	--	H	--	Y
Crayfish						
Longnose crayfish	*Cambarus longirostris*	S1		H	--	Y
Fishes						
Tennessee dace	*Chrosomus tennesseensis*	S1		E		Y
Black darter	*Etheostoma duryi*	S1	R	E	--	Y
Blueside darter	*Etheostoma jessiae*	S2S3	--	E	--	Y
Northern studfish	*Fundulus catenatus*	S2	R	E	--	Y
Popeye shiner	*Notropis ariommus*	S1	E	H?	UR	Y
Telescope shiner	*Notropis telescopus*	S2	--	E	--	Y
Snail darter	*Percina tanasi*	S2S3	T	AC	DL	Y
Southern cavefish	*Typhlichthys subterraneus*	S1, S3	E, SP	E, H	--	Y
Isopods						
Isopod	*Amerigoniscus proximus*	--	SNR	H	--	Y
Nickajack cave isopod	*Caecidotea nickajackensis*	--	--	E	--	Y
Mollusks						
Dromedary pearlymussel	*Dromus dromas*	S1	E	X	EXN	Y
Tuberculed blossom pearlymussel	*Epioblasma torulosa torulosa*	S1	E	X	E, PDL	Y
Cumberland moccasinshell	*Medionidus conradicus*	--	--	--	PE	Y
Tennessee pigtoe	*Pleuronaia barnesiana*	--	--	--	PE	Y
Pink mucket	*Lampsilis abrupta*	S2	E	E	E	Y
Orange-foot pimpleback	*Plethobasus cooperianus*	S1	E	E	EXN	Y

Common Name	Scientific Name	State Rank[2]	State Status[3]	Element Rank[4]	Federal Status[5]	Suitable Habitat within the Study Area (Y/N)[6]
Rough pigtoe	*Pleurobema plenum*	S1	E	E	EXN	Y
Cumberland monkeyface	*Quadrula intermedia*	S1	E	X	EXN	Y
Mountain creekshell	*Villosa vanuxemensis*	S4	--	H?	--	Y
Snails						
Spiny riversnail	*Lo fluvialis*	S2	--	X	UR	Y
Ornate rocksnail	*Lithasia geniculata*	S2	--	H	--	Y

[1]TVA Regional Natural Heritage Database, extracted May 2023 and USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted January 2025 (USFWS 2025c).

[2]State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; SH= Historical (Possibly Extirpated), SX = Extirpated, SNA= A conservation status rank is not applicable because the species is not a suitable target for conservation activities in the state, SNR= State Status Not Ranked, S#S#= Range of uncertainty about the status of a species.

[3]Status Codes: SP= State Protected, SNR=State Status Not Ranked, E=Endangered, R= Rare.

[4]Heritage Element (=population) Rank: A = Excellent estimated viability, B = Good estimated viability, C = Fair estimated viability, E = Verified extant (viability integrity not assessed), H = Historical, ? = uncertain status; X = Extirpated

[5]Federal Status: T = Threatened; E = Endangered, PT = Proposed Threatened, PE=Proposed Endangered, PDL = Proposed Delisted, UR = Under Review, EXN = Experimental Population, DL= Delisted, -- Denotes no listing

[6] Y – Yes, N – No, Determination based on lack of records and professional biologist habitat assessment.

3.4.1.2.1 Rorex Creek Study Area

According to the USFWS IPaC website, the federally listed endangered pink mucket (*Lampsilis abrupta*) has the potential to occur within the Rorex Creek study area (USFWS 2025a). Rare aquatic species identified through the TVA RNHD for the 10-digit HUC watersheds that encompass the Rorex Creek study area include: orange-foot pimpleback (*Plethobasus cooperianus*), sheepnose (*Plethobasus cyphyus*), pyramid pigtoe (*Pleurobema rubrum*), winged mapleleaf (*Quadrula fragosa*), Cumberland monkeyface (*Theliderma intermedia*), and southern cavefish (*Typhlichthys subterraneus*). The Cumberland monkeyface is considered extirpated from the watersheds that encompass the Rorex Creek study area.

A mollusk survey was conducted to investigate the mussel fauna in Guntersville Reservoir at the Rorex Creek study area (Dinkins Biological Consulting, LLC. 2024). No live federally protected mussel species were encountered in the 2023 survey. Further, no federally protected snails were encountered in the survey, and no suitable habitat for Anthony’s riversnail (*Athearnia anthony*) was observed (Dinkins Biological Consulting, LLC. 2024). The mussel fauna in this section of Guntersville Reservoir is generally categorized as depauperate and is comprised of common, widespread species like butterfly (*Ellipsaria lineolata*), pocketbook (*Lampsilis cardium*), Ohio pigtoe (*Pleurobema cordatum*), and monkeyface (*Thelimerma metanevra*).

Fisheries surveys were conducted in 2024 by TVA in Guntersville Reservoir in the vicinity of the Rorex Creek study area. No state or federally listed fish species were observed during sampling (TVA 2025b).

Habitat characterization for the eastern hellbender is included in species descriptions in Appendix C. Potentially suitable habitat for the eastern hellbender was not observed within the Rorex Creek study area; therefore, this species would not be expected to occur within the study area.

3.4.1.2.2 Widows Creek Study Area

According to the USFWS IPaC website, the federally listed pink mucket (pearlymussel) has the potential to occur within the Widows Creek study area (USFWS 2025b). State-protected aquatic species identified through the TVA RNHD for the 10-digit HUC watersheds that encompass the Widows Creek study area include: Anthony’s riversnail, dromedary pearlymussel, ring pink, orange-foot pimpleback, sheepnose, rough pigtoe, pyramid pigtoe, slabside pearlymussel, smooth rabbitsfoot, winged mapleleaf, Cumberland monkeyface, and southern cavefish. The ring pink, dromedary pearlymussel, and Cumberland monkeyface are considered extirpated from the 10-digit HUC watersheds that encompass the Widows Creek study area.

A mollusk survey was conducted to assess the presence of federally endangered mollusks in Guntersville Reservoir at the Widows Creek study area (Dinkins Biological Consulting, LLC. 2024). No live federally protected mussel species were encountered in the 2023 survey. Further, no federally protected snails were encountered in the survey, and no suitable habitat for Anthony’s riversnail was observed (Dinkins Biological Consulting, LLC. 2024). State-listed mollusks observed live in the survey at Widows Creek included pocketbook and monkeyface.

3.4.1.2.3 Raccoon Mountain Study Area

No federally or state listed species have been observed in the existing RPS upper reservoir, or within the pumped storage facility (TVA 2015c; TVA 2022d). According to the USFWS IPaC website, the following federally listed aquatic species have the potential to occur within the Raccoon Mountain study area: cumberland monkeyface (pearlymussel); dromedary pearlymussel; orange-foot pimpleback (pearlymussel); pink mucket (pearlymussel); rough pigtoe; tubercled blossom (pearlymussel); and Anthony's riversnail (USFWS 2025c). An additional state-listed aquatic species identified through the TVA RNHD with Tennessee records in the 10-digit HUC watersheds that encompass Raccoon Mountain study area is the snail darter. The dromedary pearlymussel, tubercled blossom, and Cumberland monkeyface are considered extirpated from the 10-digit HUC watersheds that encompass the Raccoon Mountain study area; therefore, no mussel surveys were conducted.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not construct or expand and operate a pumped storage facility at the proposed locations; therefore, no project-related environmental impacts with respect to threatened or endangered species or species of conservation concern, or any suitable habitat, would occur under this alternative.

3.4.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

3.4.2.2.1 Terrestrial Species

Potential impacts to terrestrial threatened and endangered species Under Alternative B are described in the following subsections. Potential effects of the PSH project on threatened and endangered terrestrial species are primarily associated with the loss of potential summer roosting and foraging habitat and actions near hibernacula for federally listed bat species and habitat alteration for other state listed wildlife and plant species. In general, avoidance, minimization, and conservation measures would be developed in consultation with the USFWS and would be implemented to reduce impacts to species of conservation concern. Impacts to threatened and endangered species under Alternative B would be minor to moderate as discussed below.

Bats

Impacts to federally listed bats are expected under Alternative B due to the proposed removal of approximately 1,395 acres of forest within the disturbance area. These areas provide suitable summer roosting and foraging habitat for bats. Internal cave surveys documented winter hibernacula for small numbers of tricolored bats across the study area. Summer mist net surveys confirmed the presence of tricolored bat and gray bat across the study area, and Indiana bat in the northern portion of the study area along the proposed ROW. In compliance with Section 7 of the ESA, TVA is consulting with USFWS on potential effects of the Proposed Action on federally listed bat species and final correspondence will be included with the final EIS. Moderate impacts are anticipated for federally protected bats based on the results of the habitat assessments and mist-net surveys. This determination also accounts for the presence of reproductively active and winter roosting tricolored bats. However, avoiding direct impacts to documented roosting trees and hibernacula and adherence to tree clearing during the winter season, particularly in these sensitive summer roosting areas, is anticipated to avoid or minimize impacts to the bat species.

TVA would commit to conservation measures outlined during consultation in compliance with Section 7 of the ESA. In addition, TVA would avoid direct impacts to documented roost trees and hibernacula, implement seasonal tree clearing near documented summer roosting trees, install cave gates at important hibernacula within the study area and the region, and conduct seismic studies to determine potential for noise and vibration impacts on bats. TVA would continue to monitor caves within the Rorex Creek study area to document seasonal use and monitor local bat populations in conjunction with state, federal, and non-governmental organization partners as a part of white-nose syndrome response efforts to monitor bat populations. With the use of avoidance, minimization, and conservation measures, TVA has determined implementation of Alternative B may affect, but is not likely to adversely affect gray bat, Indiana bat, or northern long-eared bat, and would not jeopardize the continued existence of tricolored bat. Therefore, impacts to bat species due to the proposed action are anticipated to be moderate.

Amphibians

Construction activities under Alternative B have the potential to adversely impact individual green and Ocoee salamanders, but is unlikely to impact populations. Construction of access roads would occur in suitable habitat for these salamander species and would include vegetation clearing, cutting into the side slope, and grading. However, impacts to salamander species are anticipated to be minor due to lack of observations despite targeted surveys, and the availability of similar, suitable habitat in the vicinity of the study area. In addition, proposed conservation measures described to protect bat species may also reduce the impact on salamanders found within caves in the study area.

Birds

Osprey and bald eagles are protected by EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), and some actions near nesting osprey and colonial nesting bird colonies are prohibited while birds are actively nesting. Additionally, bald eagles are protected under the BGEPA. Avoidance, minimization, and conservation measures implemented in coordination with USDA Wildlife Services and USFWS to comply with EO 13186 would be conducted by TVA to minimize potential impacts to osprey or bald eagle nests (if present) within the study area.

Small amounts of foraging habitat for the whooping crane occur in wetlands and corn fields (if landowners plant corn in agricultural fields in the proposed reservoir area). As the whooping crane has not been recorded utilizing the site and would only use the site temporarily to forage in small numbers, TVA has determined implementation of Alternative B would not jeopardize the continued existence of the non-essential experimental whooping crane population in Alabama.

Migratory birds federally listed as a BCC were also observed during general terrestrial field surveys of the study area in 2023 and 2024. Observations included the following species: chimney swift, eastern whip-poor-will, Kentucky warbler, prairie warbler, prothonotary warbler, and wood thrush. These species would have impacts from tree clearing for proposed construction activities. Impacts to BCCs are anticipated to be minor due to the amount of suitable habitat that would remain outside of disturbance limits, along with the abundance of suitable forested habitat (Table 3-2) in the vicinity of the study area. Therefore, impacts to federally protected bird species from construction and operation of the proposed PSH facility would be minor.

Arthropods

The monarch butterfly is a proposed threatened species under the ESA and has the potential to occur in the Rorex Creek study area. Potentially suitable herbaceous and scrub-shrub foraging habitat, approximately 262 acres, for the monarch butterfly could be affected by PSH construction activities. Vegetation and this loss would represent only a fraction of the herbaceous, pasture, and scrub-shrub habitats available within the 5-mile vicinity. Additionally, TVA would commit to implement sustainability practices during construction activities to include glade restoration and development of four to five acres of pollinator habitat, which would lessen temporary adverse impacts to the monarch butterfly. Finally, transmission line corridor clearing and ongoing management would maintain low growing plants, potentially providing suitable habitat for this species. Therefore, TVA has determined that impacts to this species are expected to be minor, and proposed actions would not jeopardize the continued existence of the monarch butterfly.

Nesticus barri, a cave obligate spider, is a species of conservation concern tracked by the State of Alabama. It has the potential to occur within caves in the study area. Proposed conservation measures described to protect bat species may also lessen the impacts to other cave dwelling species under this alternative. Therefore, impacts to the cave obligate spider are anticipated to be minor.

Plants

No federally listed plant species have been documented within the Rorex Creek study area; however, because suitable habitat is present and occurrence of these species cannot be ruled out entirely, TVA has determined that implementation of Alternative B may affect, but is not likely to adversely affect American Hart's-tongue fern, Green Pitcher-plant, Morefield's Leather Flower, or Price's Potato-bean. Additionally, a number of sensitive plant species that are not federally listed as threatened or endangered have the potential to occur within the disturbance area at the Rorex Creek study area. There would be major impacts to sensitive plant species located within proposed flooding areas and within the footprint of PSH facility permanent infrastructure areas. This could include a net loss in species abundance, and in some cases, total population loss. In temporary workspaces, clearing and disturbance from project activities would likely result in loss of sensitive plants through direct removal or displacement from habitat degradation. To minimize impacts from temporary disturbance, TVA would commit to avoid sensitive species, when possible. Additionally, vegetation clearing and invasive species minimization would follow BMPs outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities* (TVA 2022c).

Land clearing operations would be conducted in a manner that would prevent any unnecessary damage to the remaining natural vegetation, would protect wetlands and streams to the extent practicable, and would prevent soil erosion (TVA 2022c). Additionally, for vegetation cleared within transmission line corridors, clearing activities would follow the TVA *Transmission System Vegetation Management Program* which would include restoration activities with a goal of meadow-like end-states (TVA 2019c). However, even with minimization and conservation measures in place, impacts to a number of sensitive species or portions of their associated habitats would likely result in significant impacts to those species.

Several locally secure but regionally or globally rare species have been observed within the Rorex Creek disturbance area, including ten populations/subpopulations of American ginseng, two subpopulations of yellow giant hyssop, one subpopulation of Gattinger's prairie clover, three subpopulations of yellow wood, one population of flatrock pimpernel, one population of southern rein orchid, five subpopulations of elf orphine, two subpopulations of wahoo, and three populations/subpopulations of cream avens. Where possible, TVA would consult with its botanist to avoid impacting these species occurrences. Impacts to these species would be considered minor as they would not impact regional and global population numbers.

Several globally or locally rare species were observed during 2023/2024 field surveys in association with the sensitive sandstone glade (and barren) Alabama Cumberland Sandstone Glade Association within the Rorex Creek disturbance area, including: eight populations and subpopulations of woodland coreopsis, two populations of fame flower, one population of granite flatsedge, one population of Harper's dodder, and one population of creeping aster (NatureServe 1998). Wherever possible, TVA will seek to avoid impacting this community and its resident sensitive species where the disturbance area overlaps occurrences. As described in Section 3.2, Vegetation, to minimize anticipated impacts TVA would commit to conservation measures including restoration of unaffected habitat associated with this community at a goal of 1:3 (impacted to restored acreage) ratio and to work with its botanist to transplant sensitive species to unaffected suitable habitat. Potential on-site locations may include existing intact glades, degraded existing glades, or former glade sites outside the proposed disturbance area. TVA's botanist identified potential offsite transplant locations.

One occurrence of a significantly regionally rare species tracked by the Alabama Natural Heritage Program (ANHP), Alabama snowwreath, is located within the Rorex Creek disturbance area. When possible, TVA would work with its botanist to avoid impacting this species' occurrence. However, avoidance cannot be guaranteed. As a result, impacts to this species from construction activities under Alternative B are anticipated to be significant.

A total of 7.1 acres of Shumard Oak - Chinquapin Oak Mesic Limestone Forest association is located within a calcareous woodland and bluff occur within the proposed disturbance area (NatureServe 2008). Several sensitive species associated with this community were identified within the study area, including two subpopulations of rock muhly, two subpopulations of smoke tree, one subpopulation of yellow wood, one population of Cumberland rosinweed, one subpopulation of Alabama snowwreath, one population of Canadian milkvetch, one population of Dutchman's breeches, and one population of twinleaf. However, TVA would commit to avoiding impacts to this sensitive community and its resident sensitive species through consultation with its botanist.

A number of sensitive species occurrences were located in the Rorex Creek study area outside the proposed disturbance area and are not anticipated to be impacted through direct removal or through surrounding habitat alteration. These include four subpopulations of American ginseng, one population of woodland tickseed, one subpopulation of cream avens, two populations of rock muhly, two subpopulations of southern rein orchid, one population of American spikenard, one population of bronze willowherb, two subpopulations of Gattinger's prairie clover, and one population of pink turtlehead. No impacts to these species' occurrences are anticipated unless unforeseen project activities occur outside of the proposed disturbance area.

Multiple sensitive species were identified by the USFWS IPaC and by TVA RNHD records located within five miles of the Rorex Creek study area (Table 3-10) (USFWS 2025a; TVA 2024b). Suitable habitat and undetected occurrences of these species may exist within the study area. However, 2023/2024 botanical surveys were concentrated within the proposed disturbance area and areas identified as possessing favorable habitat for sensitive species. Therefore, impacts to undocumented occurrences of sensitive species are anticipated to be minor.

3.4.2.2.2 Aquatic Species

Impacts to aquatic species under Alternative B are described in Section 3.6, Aquatic Ecology. Construction activities within Guntersville Reservoir may result in localized loss of aquatic habitats and mortality for benthic non-motile organisms. Avoidance of the construction areas by mobile species decreases mortality and nonlethal adverse impacts to those individuals. The benthic aquatic communities (i.e., macroinvertebrates and mollusks) displaced by the installation of the intake, bridge, and barge facilities are expected to be reestablished in the disturbed area.

No live federally protected mussel species were observed in 2024 surveys of the Rorex Creek study area within Guntersville Reservoir. In this survey, one fresh dead pink mucket was observed near the study area (Dinkins Biological Consulting, LLC. 2024). Construction of the bridge, intake structure, and outlet channel would not exceed the boundaries of the 2024 mussel survey. As discussed in Section 3.5, Surface Water Resources, TVA would implement BMPs to protect water quality in Guntersville Reservoir and project construction and operation would have minimal effect on the substrates of the reservoir where pink mucket has potential to occur. Thus, TVA has determined implementation of Alternative B may affect but is not likely to adversely affect pink mucket. Impacts of construction and operation on mollusk communities would be negligible.

No protected fish were collected in Guntersville Reservoir in the vicinity of the Rorex Creek study area in 2024 fisheries surveys (TVA 2025b). Therefore, it is not expected that construction would negatively impact federally or state listed fish species.

3.4.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

3.4.2.3.1 Terrestrial Species

Potential impacts to terrestrial threatened and endangered species Under Alternative C are described in the following subsections and are similar to those described under Alternative B. Potential effects of the PSH project on threatened and endangered terrestrial species are primarily associated with the loss of potential summer roosting and foraging habitat for federally listed bat species and habitat alteration for other state listed wildlife and plant species. In general, avoidance, minimization, and conservation measures would be developed in consultation with the USFWS and TVA biologists and would be implemented to reduce impacts to species of conservation concern. Impacts to threatened and endangered species under Alternative B would be minor to moderate.

Bats

Potential bat summer roosting habitat is present within the Widows Creek study area. Two caves are also present in the Widows Creek study area, but their potential to be used by bats was not determined due to lack of landowner permissions to survey the caves. Potential impacts to protected bat species would be similar to those described for Alternative B. When feasible, tree removal would occur in winter (October 15 – March 31) to minimize impacts to tree-roosting bats. Consultation under Section 7 of the ESA would occur when specific designs have been selected and scope of the project has been refined. By implementing minimization measures such as winter tree removal and any additional conservation measures that may result from the Section 7 consultation, major impacts to state and federally listed bats are not anticipated. TVA has determined implementation of Alternative B may affect, but is not likely to adversely affect gray bat, Indiana bat, northern long-eared bat, nor would the proposed action jeopardize the continued existence of the tricolored bat.

Amphibians

Impacts to the green salamander could occur from construction activities and would be similar to those described in Alternative B. Potential habitat for this species occurs within the study area, though no records of these species are known from the site. Impacts to the green salamander are anticipated to be minor due to the abundance of suitable habitat in the vicinity of the study area.

Birds

Impacts to protected bird species would be similar to but slightly less than those described for Alternative B, due to the slightly reduced size of the disturbance area. With implementation of avoidance, minimization and conservation measures in coordination with USDA Wildlife Services and USFWS, impacts to nesting osprey from construction and operation of the proposed PSH facility would be minor.

Migratory birds federally listed as a BCC observed during 2023 field surveys included: chimney swift, Kentucky warbler, and prairie warbler. Impacts to these species from tree clearing are anticipated to be minor due to abundance of suitable habitat in the vicinity of the study area (Table 3-4).

Arthropods

Potential impacts to the monarch butterfly would be similar to those discussed for Alternative B. Minor impacts to this species are anticipated from vegetation clearing associated with the proposed action. Therefore, TVA has determined that impacts to this species are expected to be minor, and proposed actions would not jeopardize the continued existence of the monarch butterfly.

Plants

Potential impacts to sensitive plant species would be similar to those described for Alternative B. Within the proposed Widows Creek disturbance area, one subpopulation of bastard toadflax, one population of flatrock pimpernel, two subpopulations of woodland tickseed, four subpopulations of longleaf sunflower, one population of American ginseng, two subpopulations of Appalachian golden banner, one population of common pinesap, one subpopulation of pink lady’s slipper, one population of broadleaf Barbara’s buttons, one population of large whorled pogonia, and two subpopulations of Cumberland rose gentian occur (Appendix E). Where possible, TVA will work with its botanist to avoid disturbing occurrences of these species during project activities. While some of these species are well represented locally and globally, many are either locally or globally scarce. In order to minimize anticipated impacts to these species, TVA would commit to consulting with its botanist to address their potential loss. Overall, project impacts to these sensitive species are anticipated to be significant. TVA has determined implementation of Alternative C would have no effect on American Hart's-tongue fern, Green Pitcher-plant, Morefield’s Leather Flower, White Fringeless Orchid.

A number of sensitive species occurrences were located outside the proposed disturbance area and are not anticipated to be impacted, including seven populations/subpopulations of American ginseng, nine subpopulations of woodland tickseed, two subpopulations of longleaf sunflower, eight populations/subpopulations of common pinesap, two subpopulations of purple sedge, two populations of creeping aster, two subpopulations of flatrock pimpernel, and two subpopulations of bastard toadflax. No impacts to these species’ occurrences are anticipated unless unforeseen project activities occur outside of the proposed disturbance area.

Multiple sensitive species were identified by the USFWS IPaC and by TVA RNHD records located within five miles of the Widows Creek study area (Table 3-11) (USFWS 2025a; TVA 2023a). Suitable habitat and undetected occurrences of these species may exist within the study area. However, 2023 botanical surveys were concentrated within the proposed disturbance area and areas identified as possessing favorable habitat for sensitive species. Therefore, impacts to any undocumented occurrences of sensitive species are anticipated to be minor.

3.4.2.3.2 Aquatic Species

Potential impacts to threatened and endangered aquatic species would be similar to those discussed under Alternative B and would be negligible. No live federally protected mussel species were observed in 2024 surveys of the Widows Creek study area within Guntersville Reservoir. In this survey, one relic pink mucket was observed near the study area (Dinkins Biological Consulting, LLC 2024). As discussed in Section 3.5, Surface Water Resources, TVA would implement BMPs to protect water quality in Guntersville Reservoir and project construction and operation would have minimal effect on the substrates of the reservoir where pearly mucket has potential to occur. Thus, TVA has determined implementation of Alternative B may affect but is not likely to adversely affect pearly mucket.

3.4.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

3.4.2.4.1 Terrestrial Species

Potential impacts to threatened and endangered terrestrial species under Alternative D are described in the following subsections and are similar to those described under Alternative B, though would be reduced due to the smaller disturbance area footprint. Impacts are primarily associated with the loss of potential summer roosting and foraging habitat for state and federally listed bat species and habitat alteration for other state listed wildlife and plant species. In general, avoidance, minimization, and conservation measures would be developed in consultation with the USFWS and TVA biologists and would be implemented to reduce impacts to species of conservation concern. Impacts to threatened and endangered terrestrial species under Alternative D would be minor to moderate.

Bats

Similar to Alternative B, consultation under Section 7 of the ESA would occur when specific project designs have been selected, and scope of the project has been refined. Minimization and conservation efforts described under Alternative B and C would also be used for the proposed action under Alternative D. However, because federally listed bat species that rely on forested habitat for summer roosting were not observed during the mist-nest survey at the Raccoon Mountain study area, and due to the reduced size of the construction footprint of this alternative, it is anticipated that impacts to bat species would be less than those associated with the other action alternatives. By implementing minimization measures such as winter tree removal to minimize impacts to state-listed bat species and any additional conservation measures that may result from the Section 7 consultation, major impacts to state and federally listed bats are not anticipated under Alternative D. TVA has determined implementation of this alternative may effect, but is not likely to adversely affect gray bat, northern long-eared bat, nor would it jeopardize the continued existence of the tricolored bat. In addition, proposed actions are not expected to impact populations of the state-listed eastern small-footed bat.

Amphibians

According to the 2023 field surveys of the Raccoon Mountain study area, potentially suitable habitat for the green salamander and the Tennessee cave salamander (Figure 3-6) was observed in several locations along the steep escarpment separating the plateau from the floodplain. Impacts to green salamander are anticipated to be minor and similar to those described for Alternative C. Impacts to Tennessee cave salamander are not anticipated due to lack of suitable habitat within action areas.

Birds

One bald eagle and one osprey nest was located within the Raccoon Mountain study area during 2023 field surveys and could potentially be impacted by project activities (Appendix B). TVA would first attempt to time construction activities near the nests to occur when these nests are not active. If these avoidance measures cannot be adhered to, TVA would engage USDA-Wildlife Services or USFWS as appropriate to provide guidance on avoidance and minimization measures and ensure compliance under federal law prior to commencement of work. With these measures, impacts to bald eagles or ospreys under Alternative D would be minor.

Migratory birds federally listed as a BCC observed during 2023 field surveys included: chimney swift, eastern whip-poor-will, and prairie warbler. Impacts to these species from tree clearing are anticipated to be minor due to abundance of suitable habitat in the vicinity of the study area (Table 3-6).

Arthropods

Potential impacts to the monarch butterfly would be similar to those discussed for Alternative B. Impacts to this species from vegetation clearing associated with the proposed action are anticipated to be negligible due to the availability of suitable habitat within the vicinity of the study area. Therefore, TVA has determined that impacts to this species are minor, and proposed actions would not jeopardize the continued existence of the monarch butterfly.

Plants

Potential impacts to sensitive plant species would be similar to those discussed under Alternatives B and C. However, due to the reduced size of the disturbance area footprint, fewer sensitive plant occurrences would be affected, and impacts would be substantially less than those described under Alternative B or C. Within the proposed disturbance area, two subpopulations of whorled horsebalm and two subpopulations of American ginseng occur (Appendix E). Where possible, TVA would work with its botanist to avoid impacting occurrences of these species during project activities. However, these species are well represented regionally and globally, and the loss of these occurrences would not be expected to meaningfully affect the species' overall abundance or viability. In order to minimize impacts to these species, TVA would commit to work with its botanist to address their potential loss. TVA has determined implementation of this alternative would have no effect on American Hart's-tongue fern, large-flowered skullcap, Morefield's leather flower, Price's potato-bean, Small whorled pogonia, Virginia spiraea, and White fringeless orchid.

A number of sensitive species occurrences were located outside the proposed disturbance area and are not anticipated to be impacted through direct removal or through significant surrounding habitat alteration, including four subpopulations of American ginseng, five subpopulations of roundleaf serviceberry, one population of mountain bittercress, five subpopulations of whorled horsebalm, one population of mountain bittercress, five subpopulations of whorled horsebalm, two subpopulations of *Diervilla* sp., one population of mountain bush honeysuckle, four subpopulations of purple sedge, eight subpopulations Menge's fame flower, one population of Tennessee leafcup, one population of Tennessee leafcup, two subpopulations of Appalachian golden banner, one population of September elm, and two subpopulations of large flowered skullcap. When necessary, TVA would work with its botanist to ensure avoidance of these sensitive species occurrences and their associated habitat where they may be impacted by unforeseen project activity outside the proposed disturbance area. Overall, impacts to sensitive plant species under Alternative D are anticipated to be minor.

Multiple sensitive species identified by IPaC and by TVA RNHD records within five miles of the Raccoon Mountain study area (Table 3-12) were not observed during 2023 botanical surveys. Suitable habitat and undetected occurrences of these species may be possible within the study area. However, botanical surveys were concentrated within the proposed disturbance area and areas identified as possessing favorable habitat for sensitive species. However, it is possible that some undocumented species or occurrences of species that were found elsewhere in the study area may have avoided detection. For that reason, impacts to undocumented occurrences of sensitive species are anticipated to be minor.

3.4.2.4.2 Aquatic Species

Potential impacts to threatened and endangered aquatic species would be similar to those discussed in Alternative B. However, due to the reduced size of the disturbance area footprint, impacts would be substantially less than those described under Alternative B or C. Studies of fish mortality related to operation of the existing RPS Facility have not revealed mortality of sensitive fish species in the Nickajack Reservoir (TVA 2015c; TVA 2022d).

3.4.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, impacts to threatened and endangered species could occur in association with land clearing, habitat loss, or degradation of aquatic resources. Future actions such as roadway maintenance and improvements would be located near existing transportation corridors, within disturbed, developed, or artificially vegetated herbaceous habitats, less likely to result in impacts to sensitive species. Additionally, federally funded projects would typically have similar requirements for avoidance and minimization of potential impacts to federally listed species. As such, these actions would likely have minimal aggregate impacts on threatened and endangered species in the area.

3.5 Surface Water Resources

3.5.1 Affected Environment

3.5.1.1 Rorex Creek Study Area

The Rorex Creek study area is located in Jackson County, Alabama. The portion of the study area on the west side of the reservoir (including the southernmost end of the transmission line corridor and on the east side of the reservoir along the escarpment (steep slope) is within the Town Creek-Guntersville Lake Watershed (HUC-12 060300010408). The portion of the study area to the east of the escarpment is within the Rorex Creek-Jones Creek Watershed (HUC-12 060300010407) (WSP 2025b, c, 2024g). The proposed transmission line corridor also crosses the Riley Cove-Dry Creek Watershed (HUC-12 060300010602), the Upper Mud Creek Watershed (HUC-12 060300010404), and the Lower Mud Creek Watershed (HUC-12 060300010405).

3.5.1.1.1 Surface Water Features

Surface water features within the Rorex Creek study area include a portion of the Guntersville Reservoir, which is part of the Tennessee River and TVA Reservoir System, as well as numerous streams and ponds. The escarpment generally drains directly into the reservoir, while drainage on the plateau (on the east side of the reservoir) generally flows to the south and east towards Rorex Creek, which subsequently flows to the reservoir. Several streams are also present on the west side of the reservoir. Drainage on the west side of the reservoir either flows southeast toward the reservoir or northwest toward Town Creek (USGS 1984). The transmission line corridor also crosses Town, Robinson, and Mud Creeks.

Surface water features for the Rorex Creek study area include approximately 42 intermittent or perennial streams, 60 ephemeral channels, and 29 ponds. A few of these streams, including Robinson and Mud Creeks maintain perennial flow during most years. Surface water features located on the Rorex Creek study area are shown in Figures 3-7a through 3-7e (WSP 2025b, c, d). A total of 10,357 linear feet of perennial streams; 26,621 linear feet of intermittent streams and 51,245 linear feet of ephemeral streams were identified during field surveys of the Rorex Creek study area (WSP 2025b, c, 2024g). Surface water delineations are preliminary and are subject to regulatory review.

3.5.1.1.2 Guntersville Reservoir

The Guntersville Dam was constructed in 1935-1939 as a hydroelectric dam that has a summer peak net dependable capacity of 123 megawatts. The Guntersville Reservoir covers approximately 67,900 acres of water surface and has approximately 890 miles of shoreline. Minimum water elevation, typically in winter, is maintained at 593 feet, while typical summer operating water level varies between 594 and 595 feet (TVA 2024c). Inflow into Guntersville Reservoir is primarily from Nickajack Reservoir upstream, as well as tributary rivers and creeks that add volume and flow into the reservoir (TVA 2023c). Currently, typical daily fluctuation in water level within Guntersville Reservoir is approximately 0.5 foot per day, as shown in Figure 3-8.

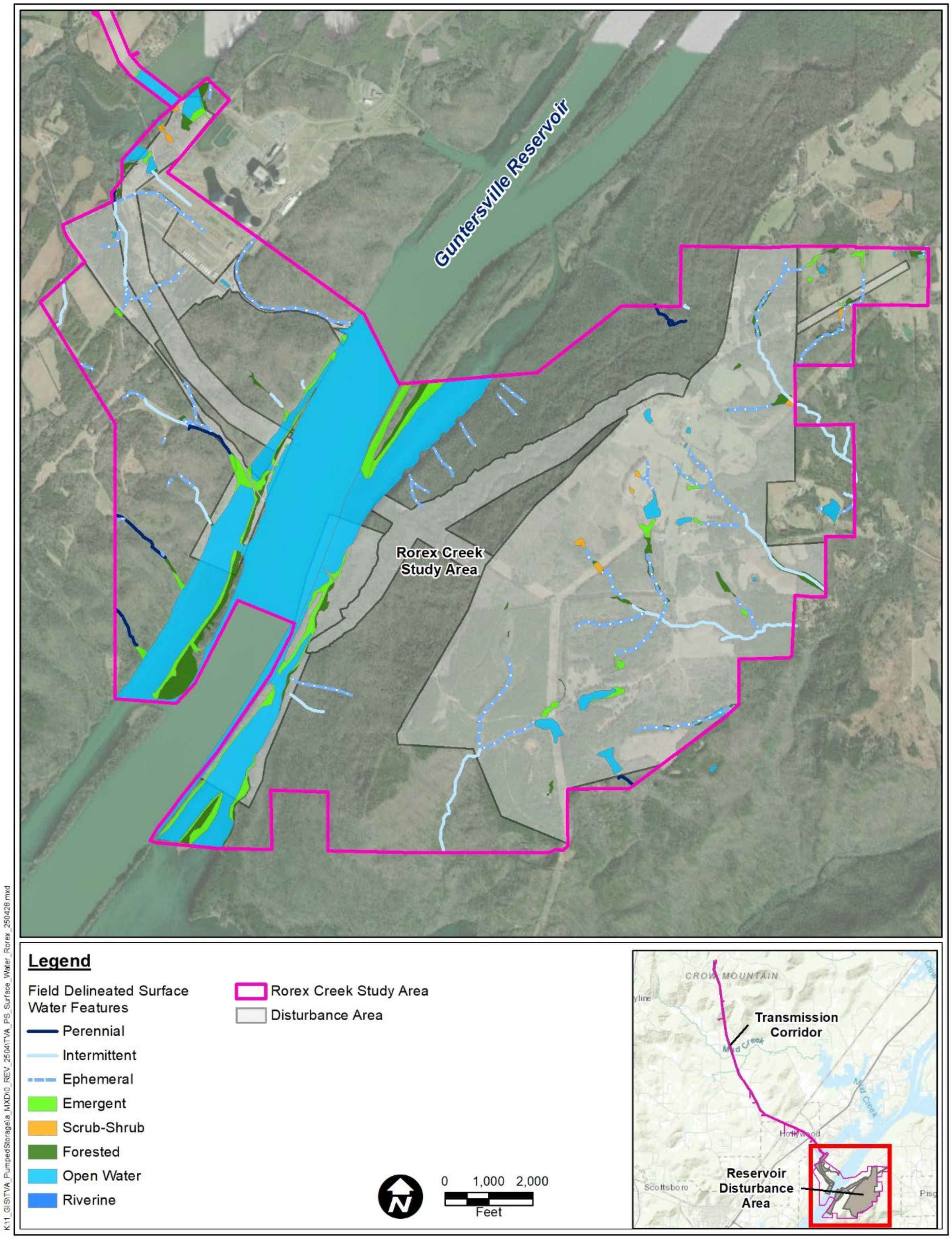


Figure 3-7 a. Surface Water Features Located on the Rorex Creek Study Area

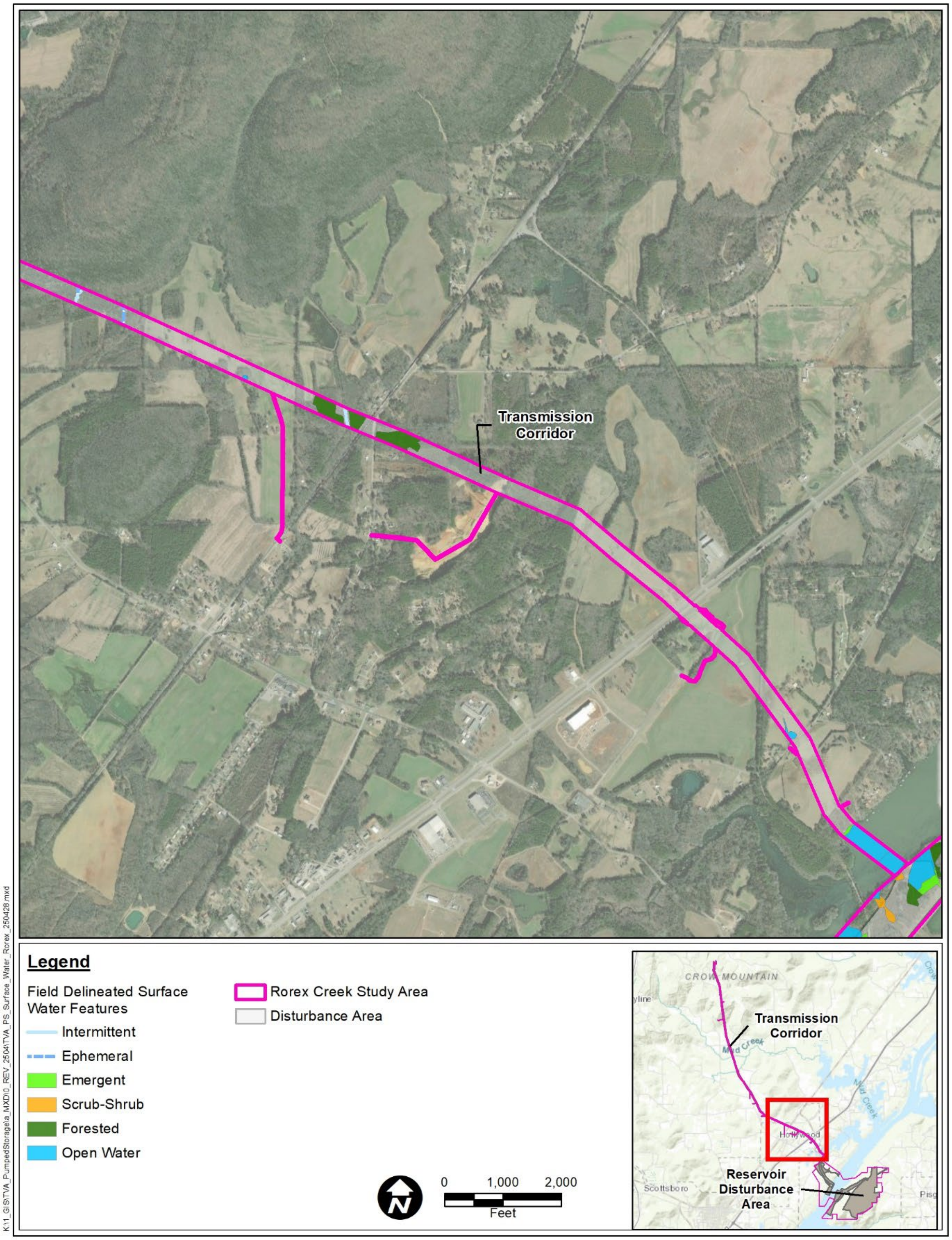


Figure 3-7b. Surface Water Features Located on the Rorex Creek Study Area

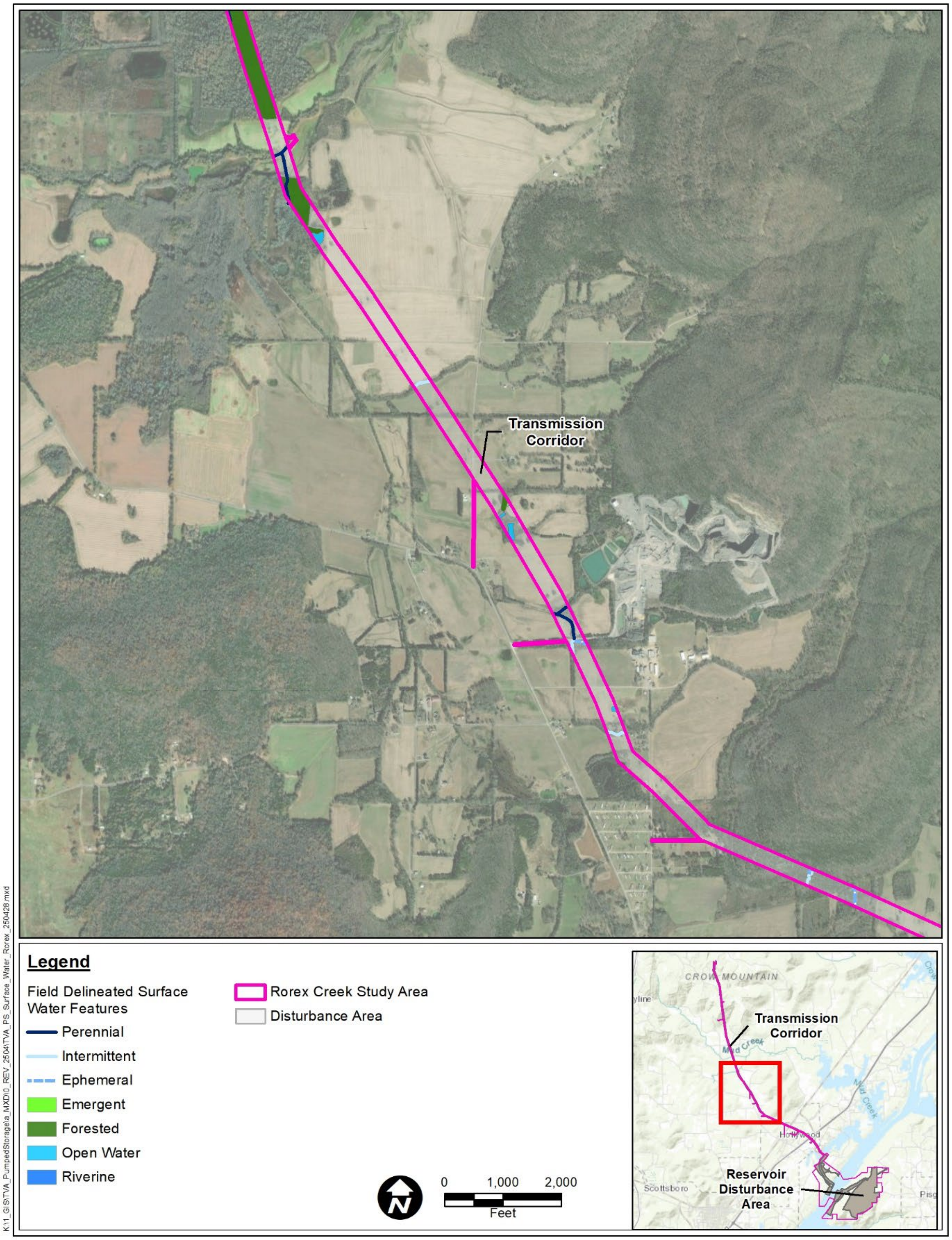


Figure 3-7c. Surface Water Features Located on the Rorex Creek Study Area

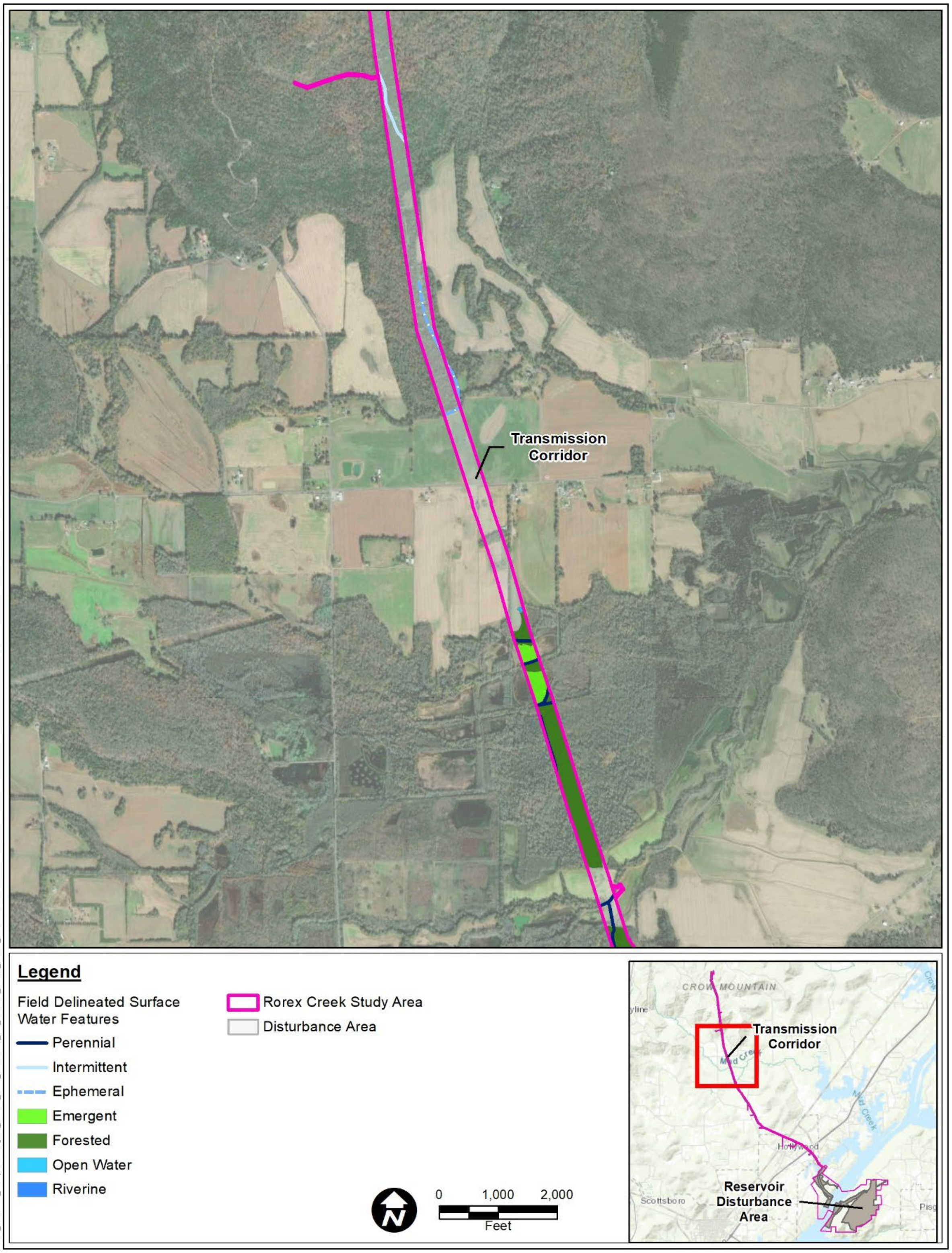


Figure 3-7d. Surface Water Features Located on the Rorex Creek Study Area

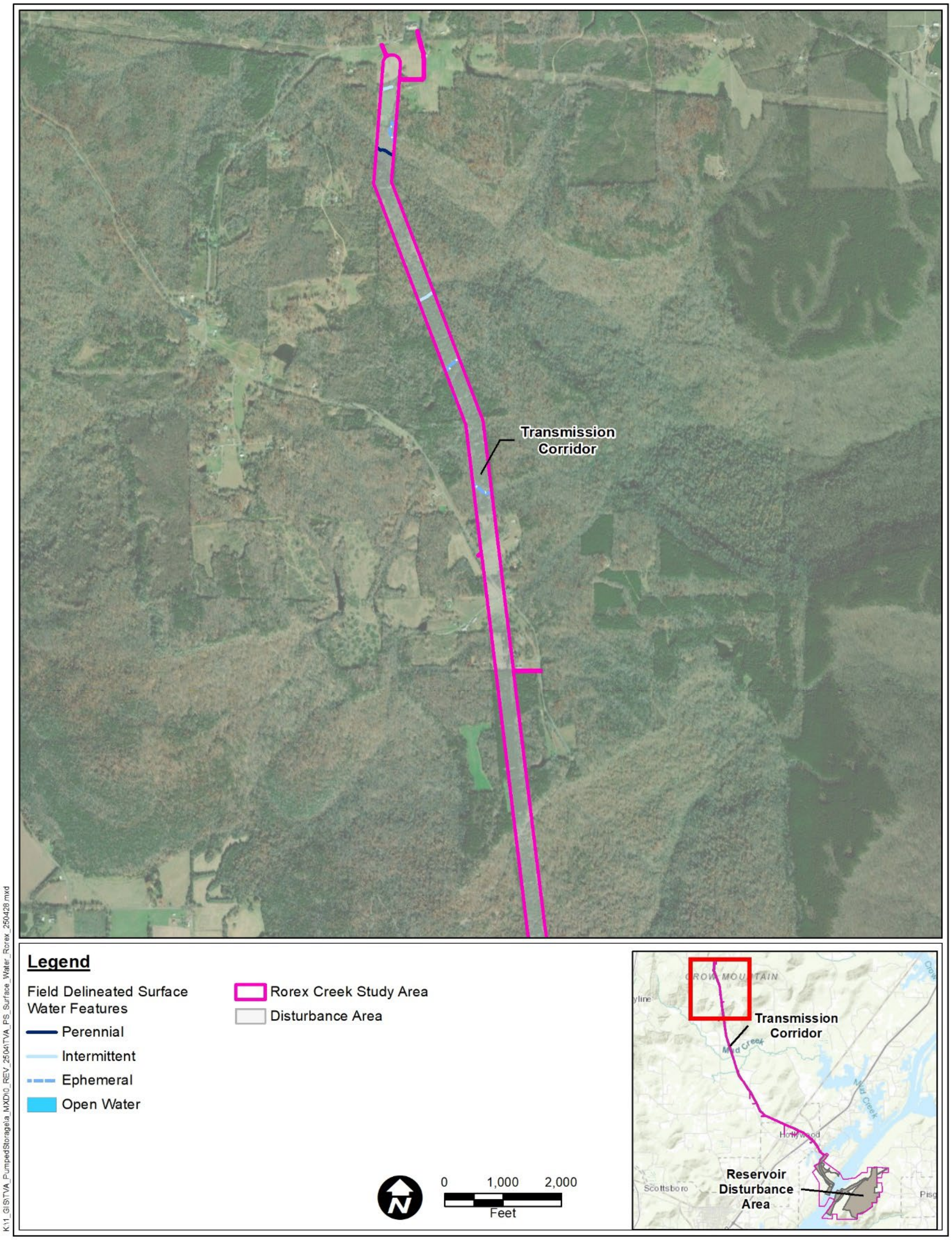


Figure 3-7e. Surface Water Features Located on the Rorex Creek Study Area

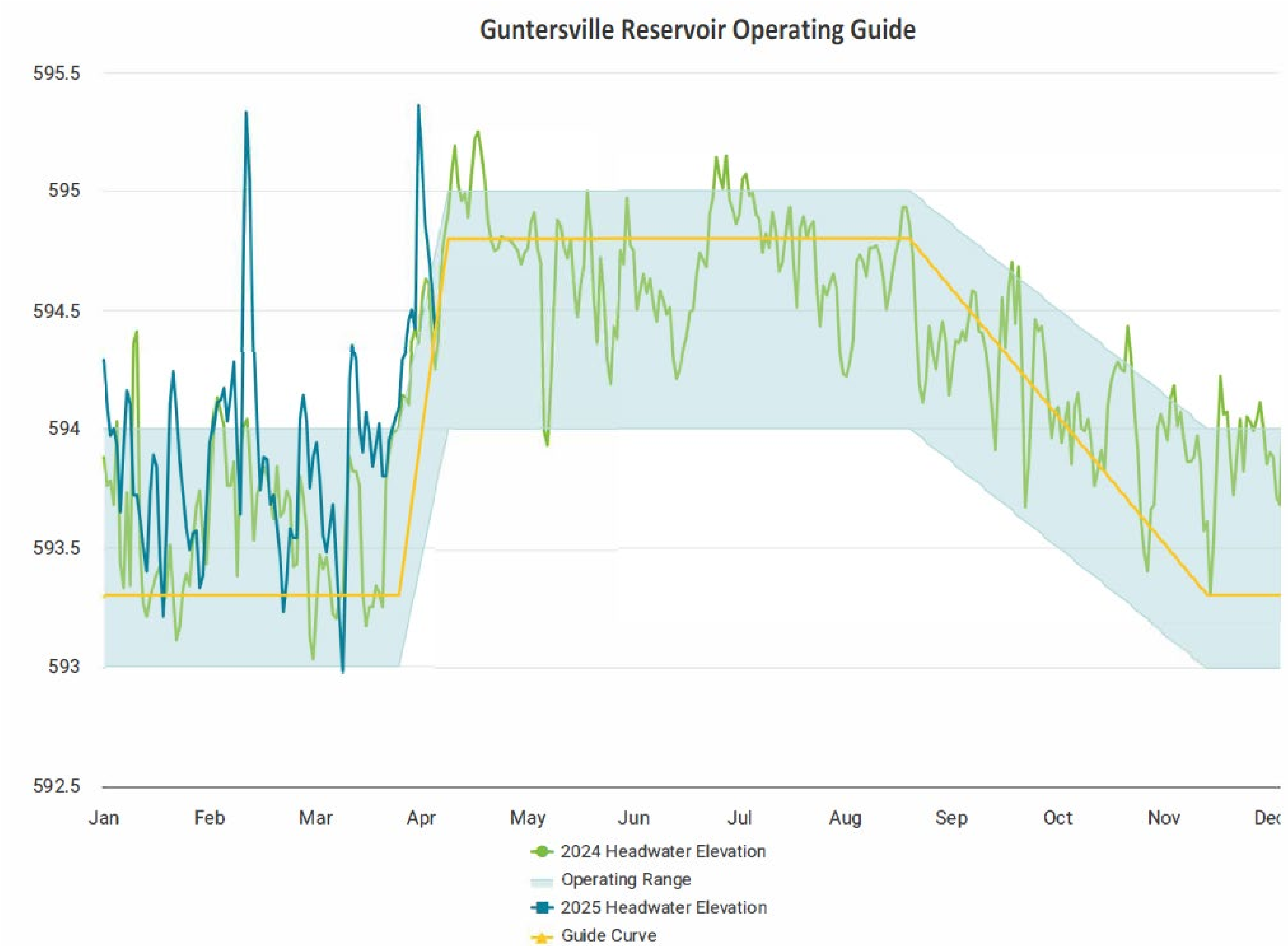


Figure 3-8. Guntersville Reservoir Typical Annual Pool Level Fluctuations

Surface Water Use

Surface water usages in Guntersville Reservoir include withdrawals related to thermoelectric power generation, irrigation, public water supply, and industrial uses. Surface water use in Guntersville Reservoir in 2020 is shown in Table 3-16 (Sharkey and Springston 2022). The largest use category for water withdrawals in Guntersville Reservoir is public water demand. Water from Guntersville Reservoir at the Brown's Creek embayment is used to supply drinking water to the City of Guntersville (Guntersville Water Board 2023). Total consumptive water use in Guntersville Reservoir in 2020 was approximately 33.54 million gallons per day (Sharkey and Springston 2022).

Table 3-16. Surface Water Withdrawals by Water Use Category in 2020

Reservoir	Use (MGD)				Total Water Withdrawals (MGD)
	Thermoelectric	Industrial	Public	Irrigation	
Nickajack		4.37	36.67	2.03	43.07
Guntersville	0.23	9.88	49.34	1.97	61.43

Source: Sharkey and Springston 2022.
Key: MGD = million gallons per day

Surface Water Quality

TVA monitors the ecological health of managed reservoirs. Ecological health evaluations focus on five indicators: dissolved oxygen, chlorophyll, sediment quality, benthic macroinvertebrate community, and the fish assemblage. TVA monitors three locations on Guntersville Reservoir—the forebay (deep, still water near the dam) at TRM 350.0; the mid-reservoir (middle part of the reservoir) which includes TRM 375.2; and the inflow (upstream river-like portion) at TRM 420.0 - 424.0. The overall ecological health of Guntersville Reservoir received a "good" rating in 2022 (TVA 2024d). The aquatic ecology of Guntersville Reservoir is described in depth in Section 3.6, Aquatic Ecology.

Dissolved oxygen in 2022 rated "good" at the two locations this indicator was monitored. Dissolved oxygen has rated "good" each year at the mid-reservoir. At the forebay, however, low dissolved oxygen concentrations (less than 2 milligrams per liter) sometimes develop in a small area along the reservoir bottom during summer. Low-flow conditions reduce mixing in the water column and can allow water to sit long enough that oxygen in the lower water column becomes depleted as it is used in the natural process of decomposition. Dissolved oxygen and chlorophyll, the ecological indicators most responsive to changes in weather conditions, tend to rate lower during dry, low-flow conditions, especially if periodic rain events wash nutrients and organic material into the reservoir. In turn, low dissolved oxygen conditions along the reservoir bottom negatively affect bottom life (TVA 2024d).

Sediment quality in 2022 rated "fair" at the forebay location where low concentrations of polychlorinated biphenyls (PCBs) were detected and "good" at the mid-reservoir location where no PCBs or pesticides were detected and concentrations of metals were within suggested background levels. Concentrations of chlordane and zinc have exhibited a trend of decreasing over the Ecological Health monitoring period. Chlordane was last detected at the forebay in 2002 and at the mid-reservoir in 2004. Zinc concentration has not exceeded suggested background levels since 2004 at either of the monitoring locations (TVA 2024d).

The typical annual water temperature range in Guntersville Reservoir is shown on Figure 3-9. The annual water temperature range in Guntersville Reservoir from winter to summer is approximately 20 degrees Celsius (°C) (36 degrees Fahrenheit [°F]). The lowest temperatures of the year usually occur in January or February, and the warmest water temperatures usually occur in mid-July to early August. The depth of Guntersville Reservoir provides some buffer from extreme cold winter temperatures (TVA 2023c). Guntersville Reservoir does not have significant vertical stratification due to high through-flow (i.e., low retention time), with typical water temperature differences from surface to bottom in the range of only 1 to 2°C or 1.8 to 3.6°F (TVA 2023d).

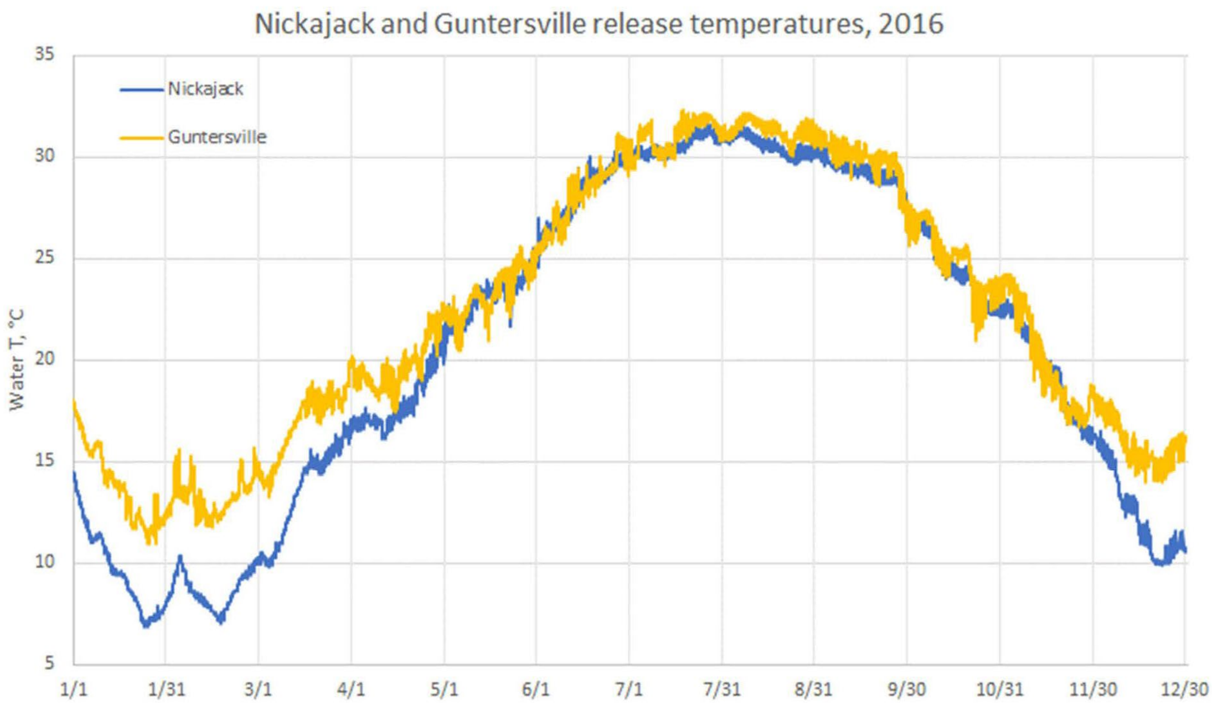


Figure 3-9. Guntersville Reservoir and Nickajack Reservoir Annual Water Temperature Ranges

3.5.1.2 Widows Creek Study Area

The Widows Creek study area is located in Jackson County, Alabama. The western portion of the study area toward Guntersville Reservoir is located within the Marshall Branch-TN Tennessee River watershed (060300010205). Most of the eastern portion of the Widows Creek study area is located within the Long Creek-Miller Creek Watershed (060300010202). A small section at the northernmost point of the study area is located within the Guest Creek-Long Island Creek Watershed (060300010203) (WSP 2024h).

Surface water features in the Widows Creek study area include portions of the Guntersville Reservoir, as described in Subsection 3.5.1.1.2, Guntersville Reservoir, above. Portions of both Maxwell Branch and Long Creek are located within the study area at the top of the escarpment. Surface water features identified within the Widows Creek study area include 10 ponds, 17 perennial or intermittent streams, and 21 ephemeral channels (WSP 2024g). Surface water features located on the Widows Creek study area are shown in Figure 3-10 (WSP 2024h). Approximately 26,155 linear feet of perennial streams, 32,791 linear feet of intermittent streams, and 14,262 linear feet of ephemeral streams were mapped on the Widows Creek study area during field reviews.

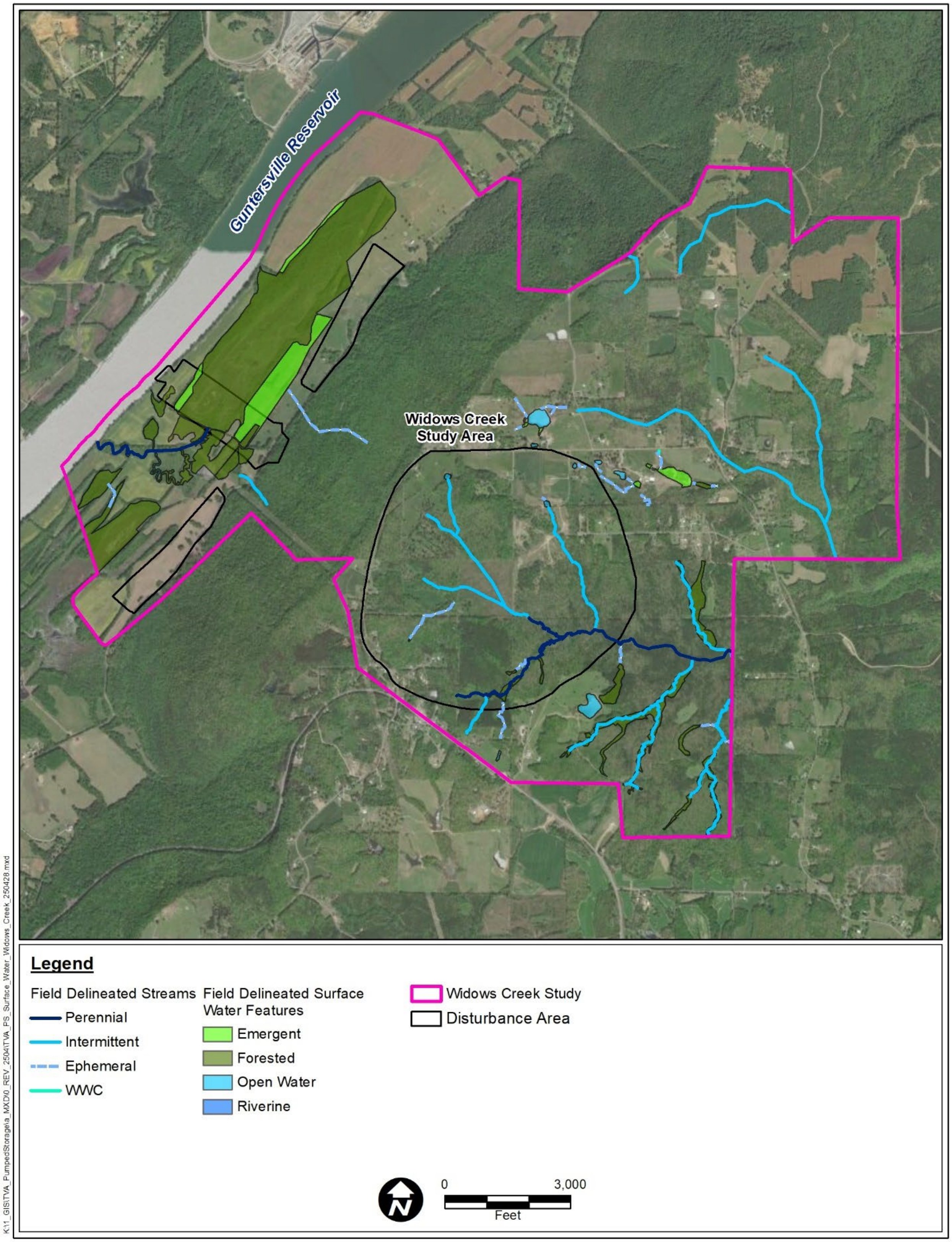


Figure 3-10. Surface Water Features Located on the Widows Creek Study Area

3.5.1.3 Raccoon Mountain Study Area

The Raccoon Mountain study area is located in Marion County, Tennessee. The study area is located within the Tennessee River-Nickajack Middle Watershed (HUC-12 060200011203) and encompasses the Raccoon Mountain Pumped Storage Reservoir (WSP 2024i).

3.5.1.3.1 Surface Water Features

Surface water features of the Raccoon Mountain study area are shown on Figure 3-11. Surface water features identified on the Raccoon Mountain study area include the existing upper reservoir and Nickajack Reservoir, which currently serves as the lower reservoir for the existing RPS Facility. Additionally, 3 ponds, 13 intermittent and perennial streams, and 17 ephemeral streams/wet weather conveyances (WWCs) are present in the vicinity of the Raccoon Mountain study area (WSP 2024i). John McNabb Branch runs through portions of the study area on the west side from Raccoon Mountain Reservoir to Nickajack Reservoir. A total of 3,723 lineal feet of perennial streams, 3,582 feet of intermittent streams, and 3,866 feet of ephemeral streams were mapped within the Raccoon Mountain study area during field surveys.

3.5.1.3.2 Existing Raccoon Mountain Pumped Storage Facility

The RPS facility on Nickajack Reservoir includes an upper reservoir and an intake/outflow structure on Nickajack Reservoir on the left bank (looking downstream) of the river. The existing intake structure on Nickajack Reservoir is located at TRM T444.6 (TVA 2023e). The upper reservoir has a surface area of about 528 acres. The existing upper reservoir fluctuates from a maximum operating level of 1,672 feet to a minimum operating level at elevation 1530 feet (TVA 2023e). The upper reservoir is shown in Figure 3-11.

3.5.1.3.3 Nickajack Reservoir

Nickajack Reservoir is bounded downstream by Nickajack Dam at TRM 424.7. The nearest dam upstream of Nickajack Reservoir is the Chickamauga Dam, located at TRM 471.0. Nickajack Reservoir had a year-round constant elevation target and does not undergo drawdown. Nickajack Reservoir is classified as a run-of-the-river reservoir as flow is generally passive (low retention time) and there is no significant level of water storage in the reservoir. As such, the reservoir is not subject to stratification (TVA 2023e).

The river flow and the pool elevations in Nickajack Reservoir are governed through reservoir operations policies by TVA and scheduled every day by the TVA River Forecast Center in Knoxville, Tennessee. Inflow to Nickajack Reservoir comes from the Chickamauga Dam upstream, that operates with a typical flow range of about 6,300 to 48,000 cubic feet per second (cfs), plus several unregulated tributaries. Nickajack headwater elevations vary due to changes in natural inflow, timing of releases from Chickamauga and Nickajack, and pumping or discharge at RPS, as indicated in Figure 3-12.

Surface Water Use

Surface water usages in Nickajack Reservoir include withdrawals related to irrigation, public water supply, and industrial uses. Surface water use in Nickajack Reservoir in 2020 is shown in Table 3-16. Net water demand in Nickajack Reservoir in 2020 was less than total withdrawals (Sharkey and Springston 2022).

Surface Water Quality

The portion of Nickajack Reservoir adjacent to the study area is listed on Tennessee’s list of impaired waters, under Section 303(d) of the CWA, due to levels of dioxins and PCBs that exceed the total maximum daily loads (TDEC 2022). John McNabb Branch runs through portions of the study area on the west side from Raccoon Mountain Reservoir to Nickajack Reservoir, but it has not been assessed for water quality (TDEC 2024b).

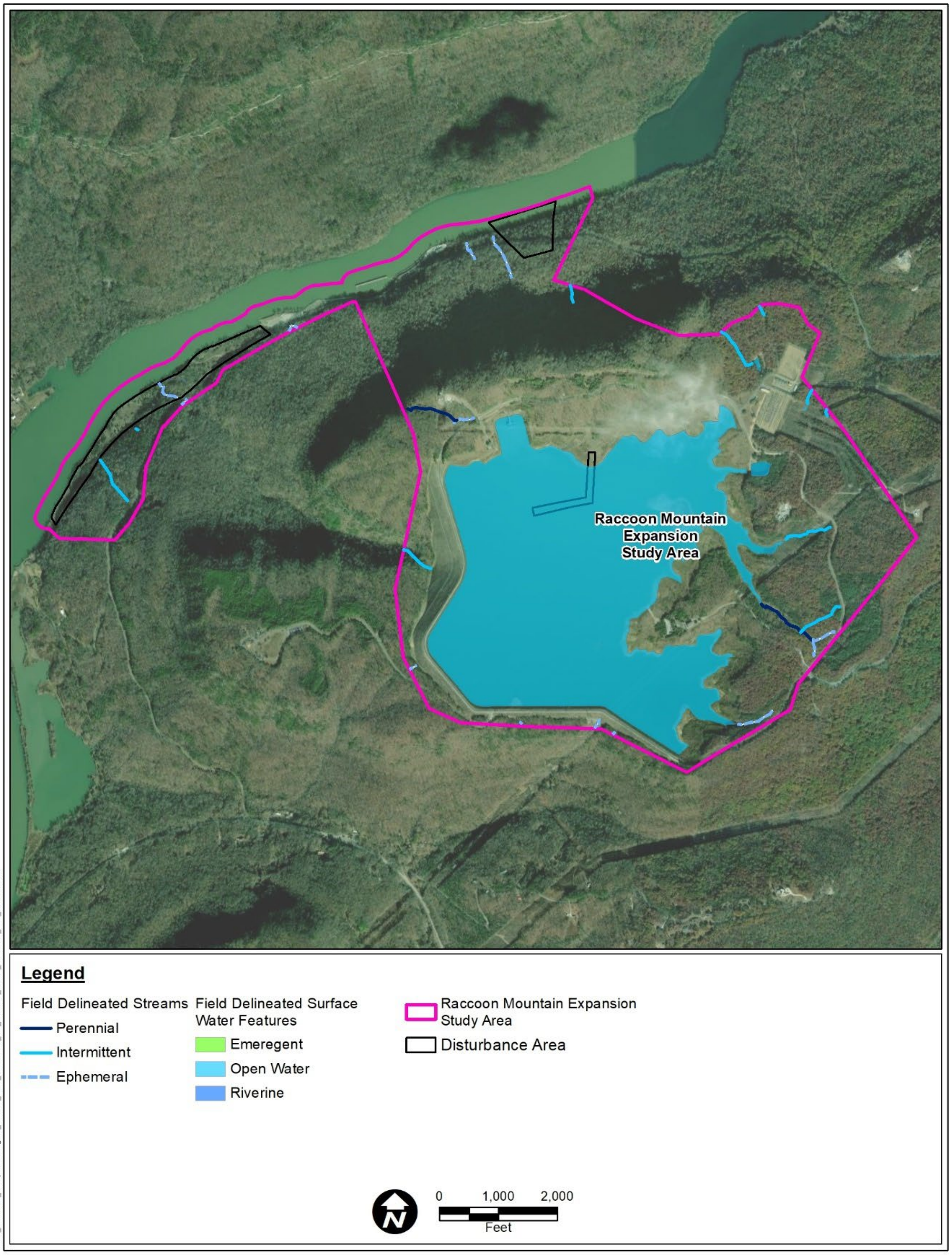


Figure 3-11. Surface Water Features Located on the Raccoon Mountain Study Area

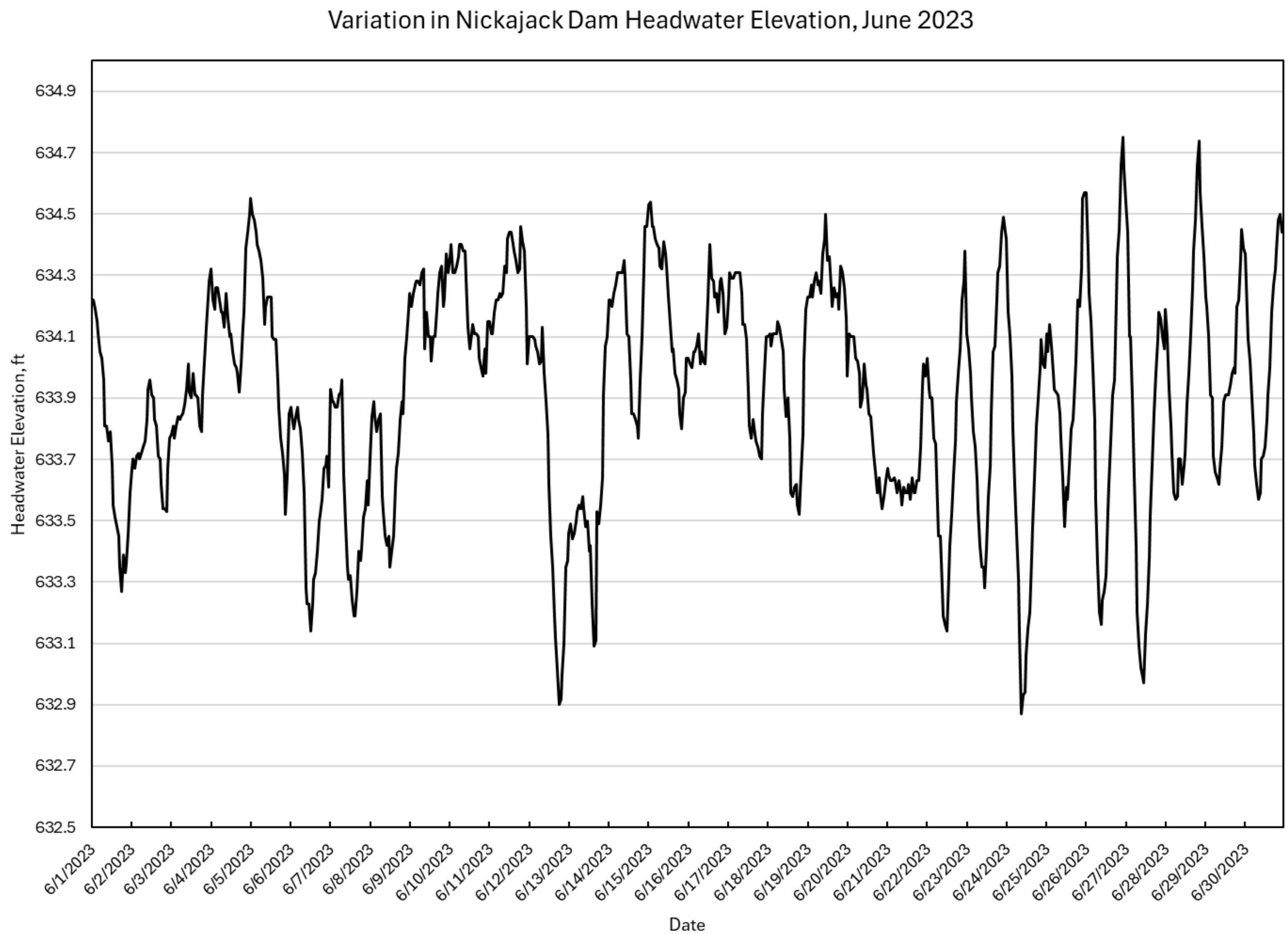


Figure 3-12. Typical Nickajack Reservoir Pool Elevation Range

TVA monitors the ecological health of managed reservoirs. Ecological health evaluations focus on five indicators: dissolved oxygen, chlorophyll, sediment quality, benthic macroinvertebrate community (bottom life), and the fish assemblage. TVA monitors two locations on Nickajack Reservoir—the forebay (deep, still water near the dam) at TRM 425.5 and the inflow (upstream river-like portion) at TRM 469 to 470. The ecological health of Nickajack Reservoir received a “good” rating in 2022. Section 3.6, Aquatic Ecology, details specific information regarding aquatic ecology in Nickajack Reservoir. In 2022, dissolved oxygen, chlorophyll, and sediment quality each rated “good.” No PCBs or pesticides were detected, and concentrations of metals were within suggested background levels (TVA 2024e).

The annual water temperature range in Nickajack Reservoir from winter to summer is about 25°C. The typical annual water temperature range in Nickajack Reservoir is indicated in Figure 3-9. The lowest temperatures of the year typically occur in January or February, and the warmest water temperatures usually occur in mid-July to early August (TVA 2023e). Nickajack Reservoir does not have significant stratification from top to bottom because of high through-flow (low retention time), with typical water temperature differences from surface to bottom in the range of only 1 to 2°C or 1.8 to 3.6°F (TVA 2023e).

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the RPS facility. Therefore, there would be no impacts to surface water resulting from the proposed action under this alternative.

3.5.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

3.5.2.2.1 Construction

Within the Rorex Creek disturbance area (including areas of off-site transmission line corridor and access roads), approximately 5,768 linear feet of perennial streams, 14,480 linear feet of intermittent streams, and approximately 28,149 linear feet of ephemeral streams are expected to be impacted by construction activities.

Activities in jurisdictional streams are regulated by state and federal agencies. Under Section 404 of the CWA, activities resulting in the discharge of dredge, fill, and associated secondary impacts to waters of the U. S. must be authorized by the USACE through a Nationwide, Regional, or Individual Permit. Section 401 of the CWA mandates state water quality certification for projects requiring USACE approval. The permitting process involves a demonstration of avoidance, minimization of disturbance, and compensation for loss of functions and values. TVA would obtain the necessary Section 404/401 CWA permits and required compensatory mitigation to ensure the proposed impacts are compensated to the extent deemed appropriate such that functions and values remain at the current capacity within larger affected basins. TVA would comply with required compensatory mitigation per the directive of the USACE and State to ensure no more than minimal impacts to the aquatic environment would result and the objectives of the CWA are upheld.

Per requirements of Section 402 of the CWA, construction activities will also be subject to ADEM’s NPDES General Permit for discharges from construction activities. As required by the General Permit, TVA will prepare and implement a CBMPP for the prevention and minimization of pollution in stormwater.

Surface Water Quality

Direct physical alteration of surface waters from activities such as in-filling of streams can result in adverse impacts to surface water quality. Indirect impacts on surface water quality during construction may be caused by activities such as erosion and sedimentation, accidental spills or releases of stormwater. Stormwater discharges associated with construction activities require a CBMPP. The CBMPP provides implementation of BMPs for controlling erosion and sedimentation from stormwater.

To minimize the impacts of construction activities on surface water quality, BMPs are used to control erosion and limit the amount of soil and sediment entering surface waters. These controls may include silt fencing, mulching, geotextiles, sod stabilization, flow diversion, buffer strips, and establishment of temporary or permanent vegetation. Site conditions dictate the specific BMPs to use. Within transmission line corridors, SMZs will be used along streams to minimize impacts to surface water quality. All SMZ will follow TVA's BMPs for construction and maintenance of transmission lines, A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities (TVA 2022c). Additionally, pursuant to 40 CFR Part 112, a Spill Prevention, Control and Countermeasure (SPCC) Plan will be prepared and implemented at the study area, which would include the use of BMPs aimed at preventing spills and limiting their potential effects on surface water. These BMPs include actions such as proper vehicle and equipment maintenance, containment for fuel or oil storage tanks, and the maintenance of spill response equipment and materials.

Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for construction may result in adverse effects on surface water quality. Designated storage areas for fuel and lubricants on the study area would be equipped with appropriate spill containment measures in accordance with spill prevention, control, and countermeasure (SPCC) plans to mitigate potential impacts.

Rorex Creek Study Area

An intake/outflow structure for this facility would be located at TRM 390.5 within Guntersville Reservoir in the Tennessee River. Impacts to surface water in Guntersville Reservoir would include dredging, fill, construction of a cofferdam, dewatering, and construction of a barge facility. The volume of fill associated with construction within Guntersville Reservoir would be approximately 2,000 acre-feet.

A cofferdam would be used during construction of the intake and outlet within Guntersville Reservoir at TRM 390.5. Dredging associated with cofferdam construction is expected. Sediment controls would be employed during dredging and cofferdam construction, including the use of BMPs, such as silt curtains. Dredging would be minimized to the extent possible during construction. After installation of the cofferdam, dewatering within the cofferdam would occur. BMPs would be used to minimize impacts to water quality during cofferdam installation and dewatering. Impacts to surface water resources from the use of cofferdams would be localized and temporary.

A retaining wall would be constructed at the outlet channel. The outlet channel wall would support the potential stockpiling of material and the staging of equipment behind the retaining wall (HDR 2024a). This outlet channel invert would extend to the cellular (flow deflection) structures installed in Guntersville Reservoir. The northern wall would be approximately 650 feet long and the southern wall would be approximately 725 feet long (HDR 2024a).

A bridge across the Tennessee River would be constructed downstream of the proposed intake and outlet. No dredging is expected to occur during construction of the bridge. Wet excavations with the use of BMPs (i.e., silt curtains) are expected to be utilized. Bridge piers would be designed to minimize disruption to water flow and will include riprap at the foundation to minimize impacts of scour (HDR 2024b). Impacts to flow dynamics and sediment transport as a result of construction of the outlet channel and bridge were modeled by HDR to determine impacts to flow.

A new barge facility is proposed on the left descending bank. The new barge dock would consist of approximately 370 plan feet of new anchored bulkhead wall with a minimum 300-foot-long berth basin in front of the wall. Granular fill would be placed behind the new bulkhead wall. The new, approximately 19-foot-tall bulkhead wall would be anchored with a continuous anchor wall (HDR 2024a). The use of BMPs would minimize impacts to surface water features in the Disturbance Area. These BMPs may include the use of turbidity curtains and other sediment controls.

3.5.2.2.2 Operation

Impacts of operation of a new PSH facility at Rorex Creek under Alternative C would include impacts to flow and temperature of the Tennessee River within Guntersville Reservoir.

Currently, Guntersville Reservoir pool has typical daily water level elevation fluctuations of up to about 0.5 feet. Under Alternative C, increased variability in inflows and outflows to Guntersville Reservoir would occur, however, two-dimensional modeling by TVA indicates that there would be minimal changes in the overall pool elevation (TVA 2023c). Maximum predicted Guntersville Reservoir pool water level elevation changes for the proposed pumped storage facility range from about 0.25 to 0.5 feet greater than and up to 0.25 feet less than current Guntersville water levels, as shown in Figure 3-13. Most of those larger pool water level fluctuations are during the winter months when high-flow or flood events occurred (TVA 2023c). The lower portion of Guntersville Reservoir has more storage volume and therefore allows for more dispersion and mixing of the pumped storage flow. As such, water level elevation fluctuations from Rorex Creek's pumped storage operations are not expected for the downstream Wheeler Reservoir (TVA 2023c).

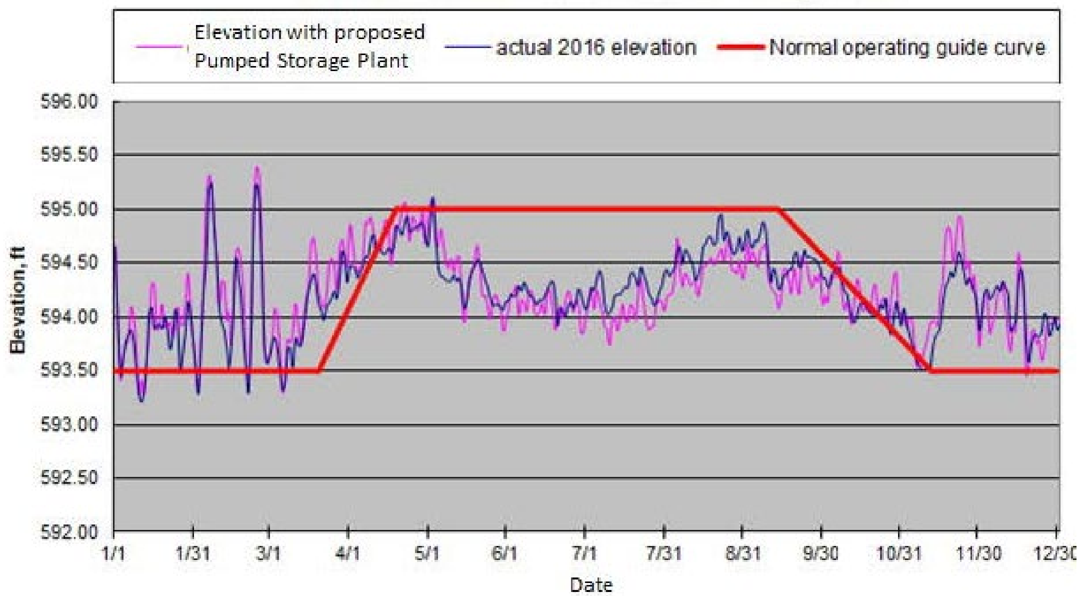


Figure 3-13. Expected Pool Elevation Impacts of Proposed PSH Facility on Guntersville Reservoir

Hydrothermal modeling was conducted in 2023 to analyze the impact of Alternative B on surface water temperatures in Guntersville Reservoir. The water temperature impacts in the Rorex Creek study area of Guntersville Reservoir are expected to be fairly localized and dissipate less than three river miles from the pumped storage intake/outflow structure, and the water temperature change during the summer months in that area of Guntersville Reservoir is expected to increase up to one degree C (1.8°F), as shown on Figure 3-14. These temperature increases come from discharging water from the upper reservoir back to Guntersville Reservoir, as the more quiescent upper reservoir is subject to more solar heating than the lower reservoir (TVA 2023c). Therefore, TVA has determined that, overall, this alternative would have minor long-term effects on surface waters resources.

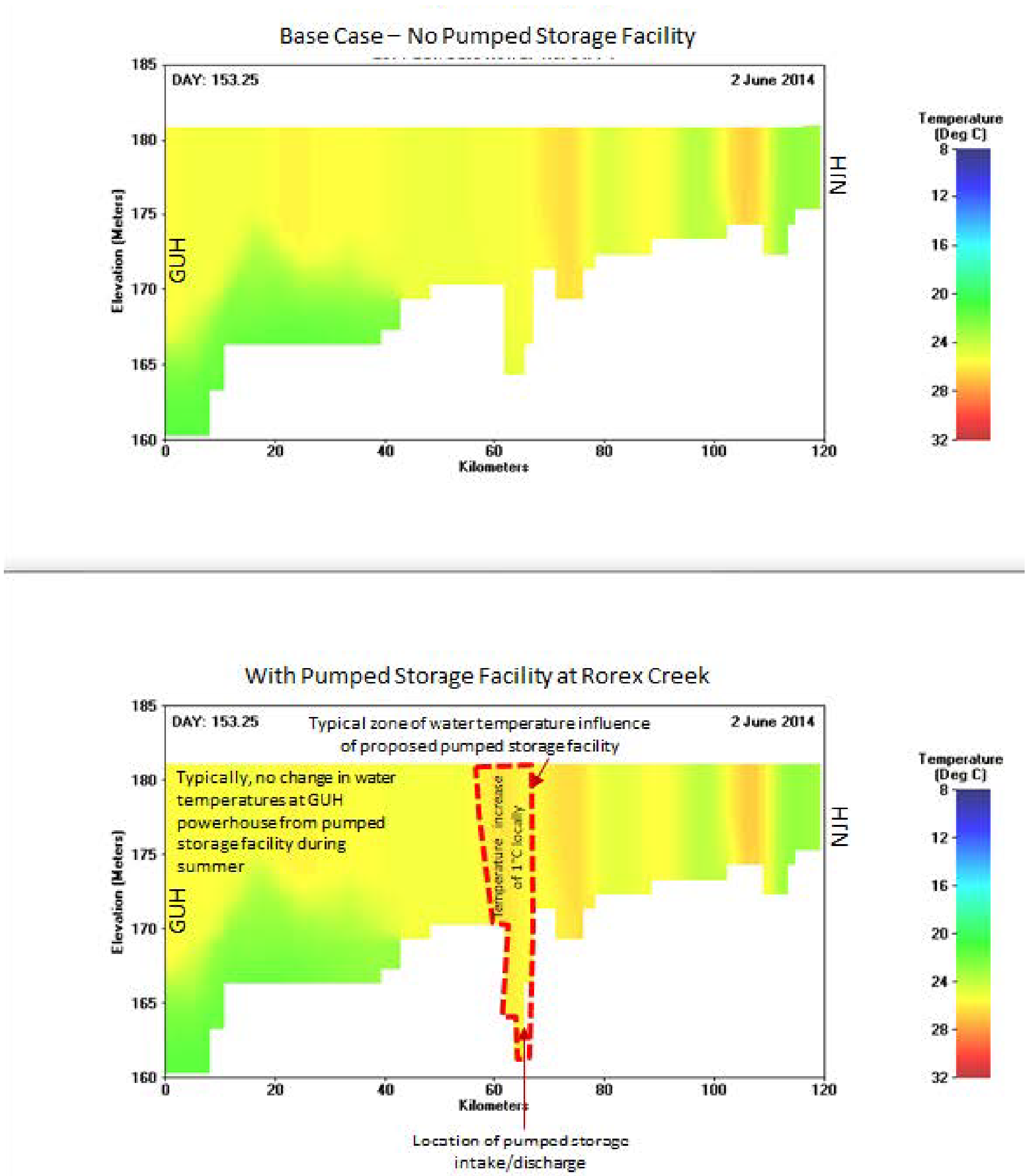


Figure 3-14. Water Temperature Model Results Comparing Guntersville Reservoir Temperatures with and without the Rorex Creek PSH Facility – June 2014

3.5.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, approximately 16,619 linear feet of perennial streams, 7,939 linear feet of intermittent streams, and 5,589 linear feet of ephemeral streams on the Widows Creek disturbance area are expected to be permanently impacted during construction activities. Impacts on surface water within Guntersville Reservoir are expected to be similar to those impacts described in Alternative B. However, no bridge construction would occur under this alternative.

As with Alternative B, project activities would be subject to CWA Sections 401, 402, and 404 permitting requirements.

3.5.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Within the Raccoon Mountain disturbance area, approximately 488 linear feet of ephemeral streams are expected to be impacted. Construction impacts within Nickajack Reservoir for the intake/outflow structure are expected to be similar to those indicated for construction of an intake and outlet structure under Alternative B. No bridge construction would occur under this alternative.

As with Alternative B, project activities would be subject to CWA Sections 401, 402, and 404 permitting requirements. The RPS Facility under Alternative D would result in up to 50 percent greater storage capacity. The impact of this would be increased fluctuation in pool water levels in Nickajack Reservoir. Modeled predicted flow under Alternative D is shown in Figure 3-15. Modeling indicates the predicted pool water level will likely fluctuate more than double the current water level range, with daily fluctuations of approximately 2 to 4 feet, and occasionally greater (TVA 2023c).

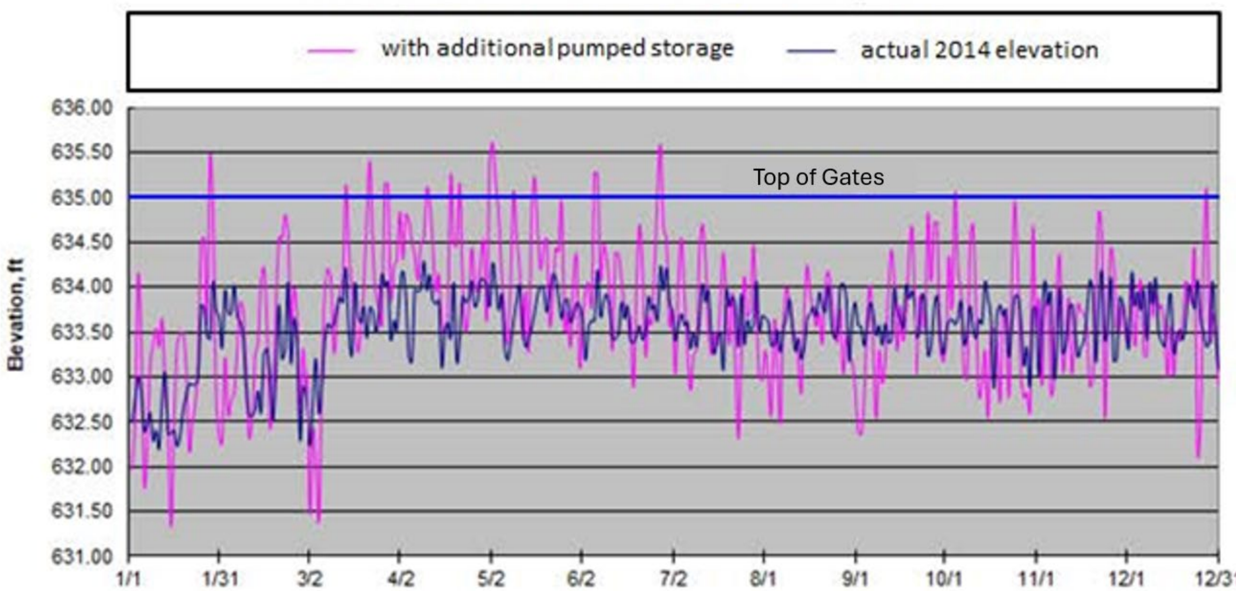


Figure 3-15. Nickajack Reservoir Pool Elevation Comparison – 2014

The water temperature impacts from increased pumped storage capacity at Raccoon Mountain were evaluated by TVA with a two-dimensional reservoir model (TVA 2023c). Figure 3-16 shows the modeled water temperature differences between the existing Raccoon Mountain pumped storage capacity and the proposed 50 percent expansion with modeled conditions similar to the summer of 2014 (TVA 2023c).

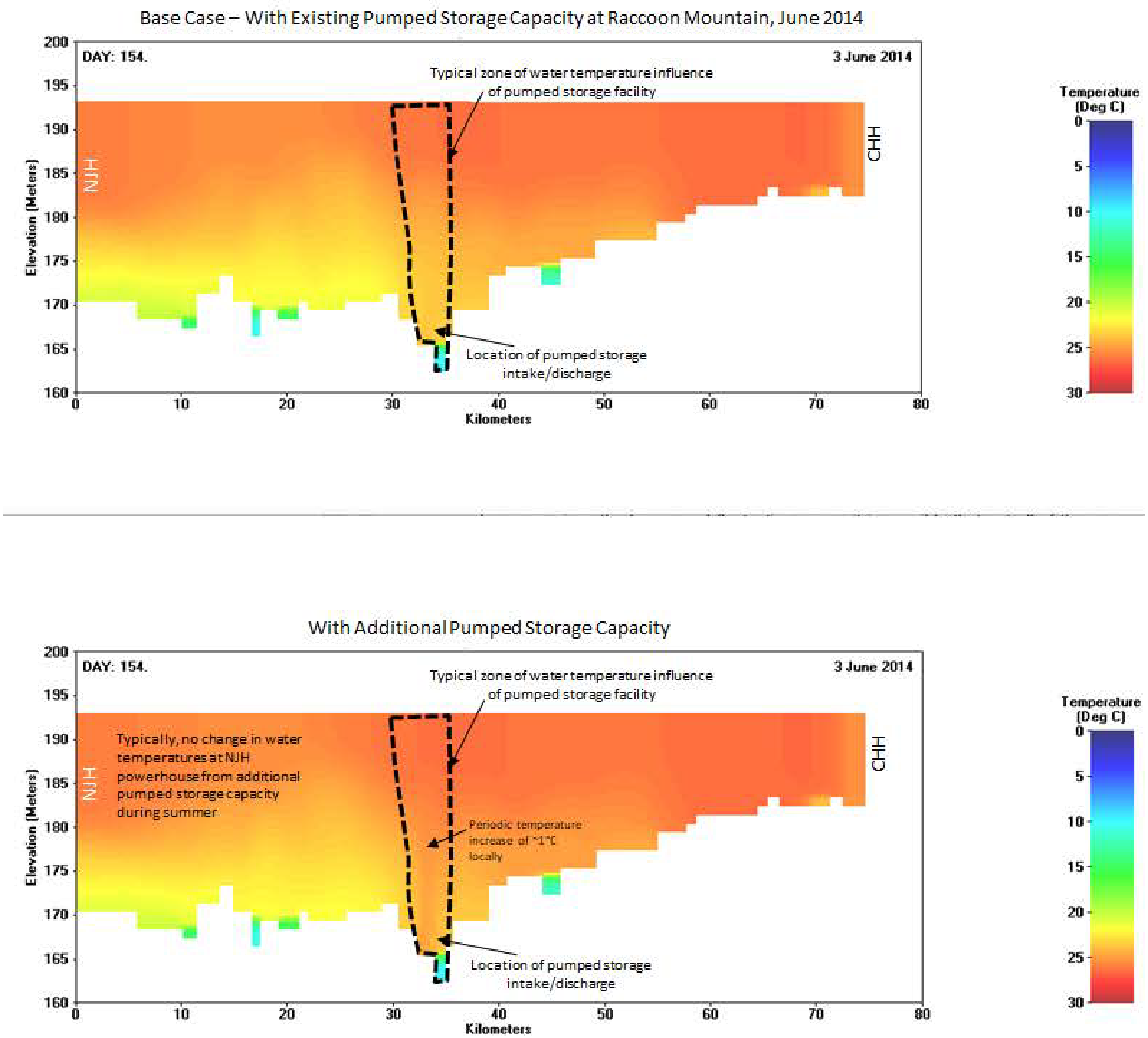


Figure 3-16. Water Temperature Comparison in Nickajack Reservoir with Existing and Proposed Additional PSH Capacity – June 2014

3.5.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, direct alteration of surface water resources may occur. Furthermore, many of these projects entail land disturbance activities that have the potential to increase site runoff and contribute to pollutant loading and sedimentation within associated surface water resources. However, potential impacts from those reasonably foreseeable future actions are expected to be localized and subject to regulatory requirements for implementing a SWPPP/CBMPP and associated erosion and sediment controls, and they would be required to comply with all relevant NPDES permitting requirements. As such, these actions would likely have minimal aggregate impacts on surface water resources in the area.

3.6 Aquatic Ecology

3.6.1 Affected Environment

Surface water resources within the study areas are described in Section 3.5, Surface Water Resources.

3.6.1.1 Guntersville Reservoir

The Rorex Creek study area and Widows Creek study area are located along the Guntersville Reservoir on the Tennessee River system.

TVA monitors the ecological health of managed reservoirs that focuses on indicators such as benthic macroinvertebrate community and the fish assemblage. TVA monitors three locations on Guntersville Reservoir—the deep, still water near the dam, called the forebay (TRM 350.0); the middle part of the reservoir (TRM 375.2); and the river-like area at the most upstream portion of the reservoir, called the inflow (TRM 420.0 - 424.0). The ecological health of Guntersville Reservoir received a “good” rating in 2022 (TVA 2024f). Benthic macroinvertebrate community in 2022 rated “good” at the inflow and “fair” at the mid-reservoir and forebay locations. The fish community in 2022 rated “fair” at the inflow and mid-reservoir locations, and “good” at the forebay. In 2022, the number and variety of fish observed at each location were consistent with long-term averages within Guntersville Reservoir. A total of 46 fish species were observed in 2022. Instances of disease and parasites were slightly elevated due to observations of fungus and parasites (TVA 2024f).

The aquatic habitats in the Tennessee portion of Guntersville Reservoir primarily consist of tailwater areas with associated characteristics (i.e., elevated river flows, riprap banks, and congregations of forage fish). The Sequatchie River empties into the Tennessee River at the northern end of Guntersville Reservoir and provides a unique fishery at its mouth and within. Several gamefish species can be caught in Guntersville Reservoir, such as largemouth bass (*Micropterus nigricans*), spotted bass (*Micropterus punctulatus*), smallmouth bass (*Micropterus dolomieu*), striped bass (*Morone saxatilis*), sauger (*Stizostedion canadense*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), white crappie (*Pomoxis annularis*), and catfish (*Siluriformes*). Strong populations of forage fish exist in this area like gizzard (*Dorosoma cepedianum*) and threadfin shad (*Dorosoma petenense*) as well as skipjack herring (*Alosa chrysochloris*). Benthic fishes such as drum (Sciaenidae) and buffalo (*Ictiobus* sp.) have been observed as well (TWRA 2025a).

Aquatic macrophytes are abundant in areas of Guntersville Reservoir. Fouling of the Guntersville Hydro Dam intake trash racks from aquatic macrophytes began in 2021, with macrophyte species of eelgrass (*Vallisneria* sp.), hydrilla (*Hydrilla verticillate*), and stargrass (*Heteranthera zosterifolia*). Aquatic macrophytes are dense at most embayments and along the main channel border in Guntersville Reservoir, particularly downstream and upstream of Rorex Creek (TVA 2023c).

A mollusk survey was conducted to investigate the mussel fauna in Guntersville Reservoir at Widows Creek and Rorex Creek (Appendix F) (Dinkins Biological Consulting, LLC 2024). Federally endangered mollusks with the potential to occur in Guntersville Reservoir, based upon habitat requirements and historical distribution, included one mussel, pink mucket (*Lampsilis abrupta*), and one snail, Anthony’s riversnail (*Athearnia anthony*).

3.6.1.1.1 Rorex Creek Study Area

The Rorex Creek study area is within the Town Creek-Guntersville Lake Watershed and the Rorex Creek-Jones Creek Watershed. In addition to Guntersville Reservoir, surface water features at the Rorex Creek study area include 24 intermittent or perennial streams, 52 ephemeral channels/WWCs, and 20 ponds (WSP 2024f). Outside the Rorex Creek study area, the transmission line corridor contains an additional 18 intermittent or perennial streams, eight ephemeral channels and nine ponds (WSP 2024f).

Aquatic ecology surveys were conducted at river mile 2.5 in Jones Creek on August 23, 2023 (Appendix G). Jones Creek is adjacent to the proposed Rorex Creek Pump Storage Facility Site and is downstream of the confluence with Rorex Creek. In-stream aquatic habitats in this reach were characterized as cobble substrate, with a mix of boulders and sand. Some sedimentation was observed in depositional areas. Fish assemblage data was collected using backpack electrofishing methods. A total of 250 fish were collected representing 17 species (Table 3-17). Low percentages of specialized insectivores and lithophilic spawners (i.e., species that deposit eggs onto rocks and into crevices of a river) contributed to the index of biological integrity (IBI) score of 38 (poor/fair) suggesting some degradation in the substrate habitat suitability both for the colonization of the benthic community and for fish spawning habitat. Other factors negatively affecting the IBI score for Jones Creek include species richness and percentage of omnivores and stonerollers (TVA 2024d).

Table 3-17. Taxonomic Composition of Fish Collected in Jones Creek, AL, August 2023

Common Name	Scientific Name	Number Collected
Largescale stoneroller	Campostoma oligolepis	58
Bluegill	Lepomis macrochirus	54
Redbreast sunfish	Lepomis auritus	40
Blackstripe topminnow	Fundulus notatus	24
Logperch	Percina caprodes	18
Largemouth bass	Micropterus nigricans	16
Redear sunfish	Lepomis microlophus	9
Snubnose darter	Etheostoma simoterum	8
Banded sculpin	Cottus carolinae	7
Redline darter	Nothonotus rufilineatus	4
Warmouth	Lepomis gulosus	3
Yellow perch	Perca flavescens	3
Northern hog sucker	Hypentelium nigricans	2
Blackspotted topminnow	Fundulus olivaceus	1
Green sunfish	Lepomis cyanellus	1
Yellow bullhead	Ameiurus natalis	1
Hybrid darter	Percina sp.	1
Total		**250**

Source: TVA 2025c

Additional fish surveys were conducted in Town Creek, located north of the right descending bank of the Tennessee River adjacent to the Rorex Creek study area on October 2, 2024. The targeted survey reach of Town Creek is impounded by the reservoir and the instream habitat can be characterized by pool habitat with dense aquatic vegetation, and some rip rap along the CR 33 corridor. It can be expected that the impounded sections of Town Creek would have a fish community that is comparable to that of the adjacent reservoir and species upstream in flowing water sections would not prefer the habitat conditions available in the impounded sections (TVA 2025b).

Fish species occurring in Guntersville Reservoir in the vicinity of the Rorex Creek study area were surveyed by TVA in 2024. Survey methods included gill netting and electrofishing. A list of species encountered in 2024 fish surveys of the Rorex Creek study area are shown in Table 3-17. A total of 768 fish were collected representing 32 species, 29 of which are considered indigenous. None of the species observed during sampling in 2024 are listed as threatened or endangered. Non-native species observed included common carp (*Cyprinus carpio*), yellow perch (*Perca flavescens*), and Mississippi silverside (*Menidia audens*). Low instances of disease and parasites were recorded (TVA 2025b). Full details on fisheries surveys can be found in Appendix F.

Table 3-18. Taxonomic Composition of Seasonal Fish Surveys Near the Rorex Creek Study Area

Common Name	Scientific Name	Trophic Level	Sunfish Species	Native Species	Tolerance	Electrofishing (Catch per Hour)	Total Fish - Electrofishing	Gill Netting (Catch per Net Night)	Total Fish – Gill Net	Total Fish Combined
Bluegill	*Lepomis macrochirus*	IN	X	X	TOL	56.35	204	.	.	204
Spotted gar	*Lepisosteus oculatus*	TC	.	X	.	39.78	144	0.1	1	145
Golden shiner	*Notemigonus crysoleucas*	OM	.	X	TOL	21.27	77	.	.	77
Gizzard shad	*Dorosoma cepedianum*	OM	.	X	TOL	19.89	72	.	.	72
Largemouth bass	*Micropterus nigricans*	TC	.	X	TOL	16.3	59	0.7	7	66
Spotted bass	*Micropterus punctulatus*	TC	.	X	.	0.28	1	2.3	23	24
Redear sunfish	*Lepomis microlophus*	IN	X	X	.	6.08	22	.	.	22
Flathead catfish	*Pylodictis olivaris*	TC	.	X	.	1.38	5	1.3	13	18
Channel catfish	*Ictalurus punctatus*	OM	.	X	.	2.21	8	0.8	8	16
Warmouth	*Lepomis gulosus*	IN	X	X	.	4.42	16	.	.	16
Longnose gar	*Lepisosteus*	TC	.	X	TOL	.	.	1.5	15	15
Bluntnose minnow	*Pimephales notatus*	OM	.	X	TOL	3.87	14	.	.	14
Common carp	*Cyprinus carpio*	OM	.	.	TOL	3.04	11	0.2	2	13
Black crappie	*Pomoxis nigromaculatus*	TC	X	X	.	2.21	8	0.5	5	13

Common Name	Scientific Name	Trophic Level	Sunfish Species	Native Species	Tolerance	Electrofishing (Catch per Hour)	Total Fish - Electrofishing	Gill Netting (Catch per Net Night)	Total Fish – Gill Net	Total Fish Combined
Spotted sunfish	*Lepomis punctatus*	IN	X	X	.	2.76	10	.	.	10
Bowfin	*Amia calva*	TC	.	X	.	1.93	7	.	.	7
Mississippi silverside*	*Menidia audens*	IN	.	.	.	1.38	5	.	.	5
Yellow bass	*Morone mississippiensis*	TC	.	X	.	.	.	0.4	4	4
Spotfin shiner	*Cyprinella spiloptera*	IN	.	X	TOL	0.83	3	.	.	3
Threadfin shad	*Dorosoma petenense*	PK	.	X	.	0.83	3	.	.	3
Blue catfish	*Ictalurus furcatus*	OM	.	X	.	.	.	0.3	3	3
Yellow perch	*Perca flavescens*	IN	.	.	.	0.83	3	.	.	3
Walleye	*Stizostedion vitreum*	TC	.	X	.	.	.	0.3	3	3
Freshwater drum	*Aplodinotus grunniens*	BI	.	X	.	.	.	0.3	3	3
Brook silverside	*Labidesthes sicculus*	IN	.	X	INT	0.55	2	.	.	2
Yellow bullhead	*Ameiurus natalis*	OM	.	X	TOL	0.28	1	.	.	1
Western mosquitofish	*Gambusia affinis*	IN	.	X	TOL	0.28	1	.	.	1
White crappie	*Pomoxis annularis*	TC	X	X	TOL	.	.	0.1	1	1

Common Name	Scientific Name	Trophic Level	Sunfish Species	Native Species	Tolerance	Electrofishing (Catch per Hour)	Total Fish - Electrofishing	Gill Netting (Catch per Net Night)	Total Fish – Gill Net	Total Fish Combined
Smallmouth buffalo	*Ictiobus bubalus*	OM	.	X	.	.	.	0.1	1	1
Blackstripe topminnow	*Fundulus notatus*	IN	.	X	.	0.28	1	.	.	1
Sauger	*Stizostedion canadense*	TC	.	X	.	.	.	0.1	1	1
Chestnut lamprey	*Ichthyomyzon castaneus*	PS	.	X	.	0.28	1	.	.	1
	Species Collected						**25**		**15**	**32**
	Totals					**187.31**	**678**	**9**	**90**	**768**

Source: TVA 2025a

Note: All species are considered representative important species. No species collected have a Federal Threatened or Endangered status.

Key: Trophic level: benthic invertivore (BI), herbivore (HB), insectivore (IN), omnivore (OM), planktivore (PK), parasitic (PS), specialized insectivore (SP), top carnivore (TC); Tolerance: tolerant species (TOL), intolerant species (INT).

At Rorex Creek during the 2024 mollusk survey, a total of 324 live mussels, 96 fresh dead shells, 496 relic shells, and 4 archeological specimens representing 23 mussel species were observed. A summary of mussel species encountered at Rorex Creek is provided in Table 3-19. The most common species in this survey area was washboard (*Megalonaias nervosa*) representing 27 percent of live mussels collected (n=86). One fresh dead pink mucket was observed near Rorex Creek (Dinkins Biological Consulting, LLC 2024).

Table 3-19. Summary of Freshwater Mussels Collected at Rorex Creek Study Area

Common Name	Scientific Name	Live	Fresh Dead	Relic Dead	Archeological Specimen	Total
Mucket	*Actinonaias ligamentina*			1		1
Threeridge	*Amblema plicata*	1		41		42
Pimpleback	*Cyclonaias pustulosa*	40	37	41		118
Purple wartyback	*Cyclonaias tuberculata*			11		11
Cyclonaias sp.[1]	*Cyclonaias* sp.		1			1
Dromedary pearlymussel	*Dromus dromas*				3	3
Butterfly	*Ellipsaria lineolata*	2	1	31		34
Elephantear	*Elliptio crassidens*	66	4	156		226
Lady finger	*Eurynia dilatata*			2		2
Pink mucket	*Lampsilis abrupta*		1	1		2
Plain pocketbook	*Lampsilis cardium*	1				1
Pocketbook	*Lampsilis ovata*	3		2		5
Black sandshell	*Ligumia recta*	1		8		9
Washboard	*Megalonaias nervosa*	86	12	35		133
Ring pink	*Obliquaria reflexa*	10	10	8		28
Golf stick pearlymussel	*Obovaria refusa*			1		1
Orange-foot pimpleback	*Pleurobema cooperianus*			3		3
Ohio pigtoe	*Pleurobema cordatum*	30	6	129		165
Rough pigtoe	*Pleurobema plenum*				1	1
Round pigtoe	*Pleurobema sintoxia*		1			1
Pink heelsplitter	*Potamilus alatus*	53	20	12		85
Fragile papershell	*Potamilus fragilis*		1			1
Mapleleaf	*Quadrula quadrula*	28	2	1		31
Monkeyface	*Theliderma metanevra*	3		9		12
Pistolgrip	*Tritogonia verrucosa*			4		4
Total Number of Individuals		**324**	**96**	**496**	**4**	**921**
Total Number of Species[1]		**13**	**11**	**19**	**2**	**24**

[1]Cyclonais sp. is not included in total number of species

Protected species that may potentially occur in the Rorex Creek study area were assessed in 2024. Aquatic species federally listed from the USFWS IPaC review for the Rorex Creek study area included: pink mucket (USFWS 2025a). Additional state-protected aquatic species identified through the TVA RNHD for the watershed include: orange-foot pimpleback (*Plethobasus cooperianus*), sheepnose (*Plethobasus cyphyus*), pyramid pigtoe (*Pleurobema rubrum*), winged mapleleaf (*Quadrula fragosa*), and southern cavefish (*Typhlichthys subterraneus*) (TVA 2024b). For more information on protected species in the Rorex Creek study area, see Section 3.4, Threatened and Endangered Species.

3.6.1.1.2 Widows Creek Study Area

The Widows Creek study area is located within the Marshall Branch-TN Tennessee River watershed, the Long Creek-Miller Creek Watershed, and the Guest Creek-Long Island Creek Watershed. In addition to Guntersville Reservoir, surface water features for the Widows Creek study area includes 10 ponds, 17 perennial or intermittent streams, and 21 ephemeral channels/WWC (WSP, 2024h).

During the 2024 mollusk survey for the Widows Creek study area, 76 live mussels, 50 fresh dead shells, 418 relic dead shells, and 14 archeological shells representing 22 mussel species were observed. Table 3-20 provides a summary of encountered mussel species. The most prevalent live species in this survey area was elephantear (*Elliptio crassidens*), representing 38 percent of live mussels collected (n=29). One relic pink mucket was collected near Widows Creek. One species of freshwater snail, varicose rocksnail (*Lithasia verrucosa*), was collected at the Widows Creek study area. This species is of low conservation concern and is considered secure across its range (Dinkins Biological Consulting, LLC 2024).

Table 3-20. Summary of Freshwater Mussels Collected at Widows Creek Study Area

Common Name	Scientific Name	Live	Fresh Dead	Relic Dead	Archeological Specimen	Total
Mucket	*Actinonaias ligamentina*	3		13		16
Threeridge	*Amblema plicata*			11		11
Pimpleback	*Cyclonaias pustulosa*	9	43	16		68
Purple wartyback	*Cyclonaias tuberculata*			8		8
Fanshell	*Cyprogenia stegaria*			1		1
Dromedary pearlymussel	*Dromus dromas*				11	11
Butterfly	*Ellipsaria lineolata*			62		62
Elephantear	*Elliptio crassidens*	29		118		144
Leafshell	*Epioblasma flexuosa*				1	1
Lady finger	*Eurynia dilatata*			1		1
Pink mucket	*Lampsilis abrupta*			3		3
Pocketbook	*Lampsilis ovata*	12		2		14
Mountain creekshell	*Leaunio vanuxemensis*	1				1
Black sandshell	*Ligumia recta*	3		3		6
Washboard	*Megalonaias nervosa*	2		7		9
Ring pink	*Obliquaria reflexa*	4	1	10		15
Ohio pigtoe	*Pleurobema cordatum*			155		155
Rough pigtoe	*Pleurobema plenum*				2	2
Round pigtoe	*Pleurobema sintoxia*			1		1
Pink heelsplitter	*Potamilus alatus*	12	5	1		18
Mapleleaf	*Quadrula quadrula*		1			1
Monkeyface	*Theliderma metanevra*	1		6		7
Total Number of Individuals		**76**	**50**	**418**	**14**	**555**
Total Number of Species		**10**	**4**	**17**	**3**	**22**

Protected aquatic species that may occur in the Widows Creek study area were assessed in 2024. Federally listed aquatic species from the USFWS IPaC review for the study area included: pink mucket (USFWS 2025b). Additional state-protected aquatic species identified through the TVA NHRD for the watershed include the following: Anthony’s riversnail, dromedary pearlymussel (*Dromus dromas*), ring pink (*Obovaria retusa*), orange-foot pimpleback, sheepnose, rough pigtoe (*Pleurobema plenum*), pyramid pigtoe, slabside pearlymussel (*Pleuronaia dolabelloides*), smooth rabbitsfoot (*Quadrula cylindrica cylindrica*), winged mapleleaf, Cumberland monkeyface (*Quadrula intermedia*), and southern cavefish (WSP 2024h). For more information on protected species in the Widows Creek study area, see Section 3.4, Threatened and Endangered Species.

3.6.1.2 Nickajack Reservoir

The Raccoon Mountain study area lies along the Tennessee River in the Nickajack Reservoir. The existing RPS has an intake and outlet on the Nickajack Reservoir at TRM 444.6.

TVA monitors the ecological health of managed reservoirs that focuses on indicators such as benthic macroinvertebrate community and the fish assemblage. TVA monitors two locations on Nickajack Reservoir — the deep, still water near the dam, called the forebay (TRM 425.5) and the river-like area at the most upstream portion of a reservoir, called the inflow (TRM 469 to 470). Ecological monitoring in 2022 resulted in an ecological health rating of Nickajack Reservoir of “good”. Benthic macroinvertebrate community in 2022 rated “good” at the inflow and “fair” at the forebay locations. A diversity of organisms are found at both locations, including long-lived and sensitive organisms—such as snails and mayflies—which are indicative of water quality and habitat conditions that promote long-term survival. Fish abundance was observed at historic highs at the forebay monitoring location where fish composition primarily consisted of tolerant species, while top carnivores, benthic invertivores, and intolerant species (species known to require good water quality conditions) were well represented at the inflow location. A total of 41 species were observed in 2022, and fish health was assessed with a “good” rating with low instances of disease and parasites at both locations (TVA 2024c).

Aquatic macrophytes, such as eelgrass and hydrilla, have been found within Nickajack Reservoir, however, there are no embayments that support aquatic macrophyte growth in the area of the existing RPS (TVA 2023c).

The upper portion of Nickajack Reservoir is mostly riverine with continuous reaches of riprap lining both sides of the channel. The lower end of the reservoir is characterized by low flow with more coves along the shoreline. Game species in Nickajack Reservoir include striped bass, white bass (*Morone chrysops*), catfish, sauger, bluegill, redear sunfish, black crappie (*Pomoxis nigromaculatus*), white crappie, spotted bass, smallmouth bass, and largemouth bass (TWRA 2025b).

3.6.1.2.1 Raccoon Mountain Study Area

The Raccoon Mountain study area is located within the Tennessee River-Nickajack Middle Watershed. In addition to Nickajack Reservoir, surface water features within the study area include 3 ponds, 13 intermittent and perennial streams, and 17 ephemeral streams/WWCs. Additionally, the area includes the upper reservoir of the existing RPS (WSP 2024i).

Protected species that may occur in aquatic habitats at the Raccoon Mountain study area were assessed in 2024. Federally listed aquatic species from the USFWS IPaC review for the study area included: Cumberland monkeyface, dromedary pearlymussel, orange-foot pimpleback, pink mucket; rough pigtoe, tubercled blossom (pearlymussel) (*Epioblasma torulosa*); and Anthony's riversnail (USFWS 2025c). The snail darter (*Percina tanasi*) is an additional state-listed aquatic species identified through the TVA NHRD with Tennessee occurrence records for the watershed (WSP 2024i). Protected species are discussed in greater detail in Section 3.4, Threatened and Endangered Species.

Habitat for aquatic biota within the upper reservoir is limited; however, some fish present in Nickajack Reservoir are pumped into the upper reservoir during normal operations. An assessment of fish mortality related to dewatering of the RPS upper reservoir was conducted in 2015 and 2022. In 2015, the two most dominant species encountered in the RPS upper reservoir were threadfin shad and blue catfish (*Ictalurus furcatus*), representing 96 percent and 1.6 percent, respectively (Table 3-21; TVA 2015c). A total of 473 fish, representing 21 species, were removed from the facility during 2022 dewatering, as shown in Table 3-22. The most dominant species encountered in 2022 were freshwater drum (*Aplodinotus grunniens*) and yellow bass (*Morone mississippiensis*), representing 32 percent and 24 percent of the overall total, respectively (TVA 2022d).

Table 3-21. Fish Removed from Raccoon Mountain Pump Storage Facility, October 2015

Common Name	Scientific Name	Number of Fish	Total Weight (lbs)
Threadfin shad	*Dorosoma petenense*	146,877	1,101.6
Blue catfish	*Ictalurus furcatus*	2,441	2,227.2
Channel catfish	*Ictalurus punctatus*	1,278	334.2
Smallmouth buffalo	*Ictiobus bubalus*	498	1,203.5
Gizzard shad	*Dorosoma cepedianum*	473	343.9
Freshwater drum	*Aplodinotus grunniens*	289	74.8
Flathead catfish	*Pylodictis olivaris*	232	786.4
White bass	*Morone chrysops*	202	111.0
Black crappie	*Pomoxis nigromaculatus*	63	47.2
Mississippi silverside	*Menidia audens*	61	0.2
Yellow bass	*Morone mississippiensis*	43	3.1
Bluegill	*Lepomis macrochirus*	35	2.1
Striped bass	*Morone saxatilis*	21	81.8
Black buffalo	*Ictiobus niger*	18	31.7
Largemouth bass	*Micropterus nigricans*	11	17.5
Logperch	*Percina caprodes*	9	0.1
Spotted bass	*Micropterus punctulatus*	5	5.6
Skipjack herring	*Alosa chrysochloris*	4	1.7
Bullhead minnow	*Pimephales vigilax*	2	<0.1
Chestnut lamprey	*Ichthyomyzon castaneus*	2	0.1
Bigmouth buffalo	*Ictiobus cyprinellus*	1	42.0
Redear sunfish	*Lepomis microlophus*	1	0.12
	Total	**152,566**	**6415.9**

Source: TVA 2015c

Table 3-22. Fish Removed from Raccoon Mountain Pump Storage Facility, April 2022

Common Name	Scientific Name	Number of Fish
Freshwater drum	*Aplodinotus grunniens*	153
Yellow bass	*Morone mississippiensis*	111
Bluegill	*Lepomis macrochirus*	70
Black crappie	*Pomoxis nigromaculatus*	31
Gizzard shad	*Dorosoma cepedianum*	19
Largemouth bass	*Micropterus nigricans*	18
White bass	*Morone chrysops*	16
Spotted bass	*Micropterus punctulatus*	14
Skipjack herring	*Alosa chrysochloris*	11
Walleye	*Sander vitreus*	6
Striped bass	*Morone saxatilis*	5
Logperch	*Percina caprodes*	4
Blue catfish	*Ictalurus furcatus*	3
Channel catfish	*Ictalurus punctatus*	3
Threadfin shad	*Dorosoma petenense*	3
Black buffalo	*Ictiobus niger*	1
Redbreast sunfish	*Lepomis auritus*	1
Sauger	*Sander canadensis*	1
Smallmouth buffalo	*Ictiobus bubalus*	1
Smallmouth bass	*Micropterus dolomieu*	1
Yellow perch	*Perca flavescens*	1
	Total	**473**

Source: TVA 2022d

Invasive species documented to be present in the existing RPS upper reservoir include Asiatic clams (*Corbicula* sp.), which are also present in Nickajack Reservoir (TVA 2015c). The only non-native fish found in the RPS upper reservoir in 2015 was Mississippi silverside (TVA 2015c).

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. Therefore, there would be no impacts to aquatic ecology resulting from the proposed action under this alternative.

3.6.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Physical impacts to surface water features and mitigation measures under Alternative B are described in Section 3.5, Surface Water Resources. Under this alternative, approximately 24,439 lineal feet of perennial streams and 6,106 lineal feet of intermittent streams on the Rorex Creek study area are expected to be impacted by construction activities.

3.6.2.2.1 Construction

Construction activities within Guntersville Reservoir may result in localized loss of aquatic habitats and mortality for non-mobile, benthic organisms. Areas in which localized habitat loss are anticipated include shoreline areas that are subject to shoreline stabilization, areas within the cofferdam, areas located within the footprint of the barge facility, and areas within the footprint of the bridge. Avoidance of the construction areas by mobile species decreases mortality and nonlethal adverse impacts to those individuals. The benthic macroinvertebrates displaced by the installation of the intake, bridge, and barge facilities are expected to reestablish in the disturbed area. Most construction-related impacts to aquatic habitats related to construction within Guntersville Reservoir are temporary.

A cofferdam will be required for the construction of the intake structure within Guntersville Reservoir at TRM 390.5. After installation of the cofferdam, temporary dewatering behind the cofferdam will occur to allow for construction of the intake structure. Minimization measures, such as turbidity curtains and fish rescue, will be used to minimize impacts of construction and dewatering on aquatic habitats in the vicinity of the cofferdam. After completion of construction, the cofferdam will be removed. Impacts of the cofferdam on aquatic habitats are expected to be localized and temporary.

Construction of the bridge downstream of the proposed intake and outlet may result in temporary, localized impacts to benthic habitats in the Tennessee River within Guntersville Reservoir. Bridge construction is expected to occur within those areas in which benthic mollusk communities have previously been surveyed by TVA. No dredging is expected to occur as a result of construction activities related to the bridge with anticipated excavation expected to be wet excavations. Due to the localized nature of impacts, it is expected that resettlement of sediments in the disturbed areas will occur quickly after the completion of bridge construction.

Other structures expected to be constructed within Guntersville Reservoir include a new barge facility and a wall associated with the outlet channel. Construction impacts of these structures are expected to be temporary and localized. Construction of these structures may result in loss of shoreline habitat in the immediate vicinity, however, as the footprint of these structures is relatively small, construction is not likely to have a long-term impact on aquatic communities within Guntersville Reservoir.

Localized impacts to aquatic ecosystems result from erosion and sedimentation that occurs as a part of the construction process. To minimize the impacts of construction on aquatic ecosystems, BMPs will be used to control erosion and limit the amount of soil and sediment entering surface waters. Site conditions dictate specific BMPs. A site-specific SWPPP as part of the NPDES permit compliance will manage stormwater and minimize pollutant loading within receiving waterbodies. Within transmission line corridors, SMZs will be used along streams to minimize impacts to surface water quality. All SMZs will follow TVA's BMPs for construction and maintenance of transmission lines, A Guide for Environmental

Protection and Best Management Practices for TVA Construction and Maintenance Activities (TVA 2022c).

Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for construction may result in adverse effects on aquatic ecosystems. Potential impacts are minimized by designating storage areas for fuel and lubricants on the project site that are equipped with appropriate spill containment measures in accordance with a site-specific SPCC plan.

In summary, impacts of construction within Guntersville Reservoir are expected to be localized and temporary. Impacts will be minimized through the use of BMPs and through compliance with NPDES permitting requirements. Therefore, impacts of construction are expected to be minor.

3.6.2.2.2 Operation

Operation of a new PSH facility under Alternative B can result in impacts to aquatic ecology as a result of potential thermal alterations, inadvertent chemical releases, alteration to flow, and entrainment/impingement of fish and shellfish. Alterations to flow are likely to occur as a result of construction and operation of a new PSH facility. These alterations are described in Section 3.5, Surface Water Resources. Altered flow regimes may result in alterations to the aquatic communities within Guntersville Reservoir. Inadvertent chemical releases from the PSH facility may result in negative impacts to aquatic communities in the vicinity of the PSH outlet.

It is expected that the composition of fish species pumped from the Tennessee River to the upper reservoir will be similar to that observed in the existing RPS. No federal or state listed fish species are expected to be impacted by pumping within the Guntersville Reservoir.

TVA would construct trashracks at the intake/outflow structure to prevent large debris from being pulled into the powerhouse and damaging the turbines. These trashracks create potential for currents to trap large organisms against the trashrack bars, causing injury or mortality. This is referred to as impingement. There is also potential for the water currents generated by the project’s pumping operation to sweep smaller organisms through the trashrack screens and turbines into the upper reservoir. This is referred to as entrainment. Some impingement and entrainment of fish and mollusks is expected to occur in the localized area. Intake velocities are expected to vary between 0.0 fps and 1.0 fps at maximum water elevations (i.e., 550.7 WSEL) and 0.5 fps and 2.0 fps at minimum water elevations (i.e., 547.0 WSEL). Burst swimming speeds for the majority of fishes in the Tennessee River are generally greater than expected intake velocities, allowing them to swim away from the project-generated currents, thereby decreasing potential for adult and juvenile fish entrainment and impingement. As the area of influence of the intake structure does not span the breadth of the Guntersville Reservoir, a zone of passage exists that allows free passage of fish upstream and downstream of the location of the intake structure. Entrainment of adult and juvenile fish during operation is expected to be similar in composition to that observed in the existing Racoon Mountain Pumped Storage Hydropower Facility, as indicated in Table 3-22. It is expected that some entrained fish will survive and establish in the newly constructed upper reservoir. Therefore, the impacts of entrainment and impingement on fish communities are expected to be minor.

Impacts of operation on temperatures in Guntersville Reservoir are described in Section 3.5, Surface Water Resources. The water temperature impacts in the Rorex Creek study area of Guntersville Reservoir are expected to be fairly localized and dissipate within three miles of the pumped storage intake/outlet area, and the water temperature change during the summer months in that area of Guntersville Reservoir is expected to increase by up to 1°C (1.8°F) (TVA 2023c). Negative impacts to aquatic communities are expected to be negligible, as the thermal impacts are localized and minor.

3.6.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Physical impacts to surface water features under Alternative C are described in Section 3.5, Surface Water Resources. Under this alternative, approximately 9,311 linear feet of streams on the Widows Creek study area are expected to be permanently impacted by building activities. Impacts to aquatic habitats and minimization measures to be used during building activities are similar to those described under Alternative B. Impacts to aquatic ecology during construction and operations under Alternative C within Guntersville Reservoir are similar to those described under Alternative B.

3.6.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Physical impacts to surface water features under Alternative D are described in Section 3.5, Surface Water Resources. Under this alternative, approximately 430 linear feet of streams on the Raccoon Mountain study area are expected to be permanently impacted by construction activities. Proposed impacts to aquatic habitats and minimization measures to be used during construction and operation activities are similar to those described under Alternatives B and C, however, under this alternative, impacts are expected to occur in Nickajack Reservoir.

3.6.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, impacts to aquatic ecology may occur in association with direct alteration of surface water resources or with land disturbance activities that increase site runoff and contribute to pollutant loading and sedimentation within surface water resources. However, potential impacts from those reasonably foreseeable future actions are expected to be localized and subject to regulatory requirements for implementing a SWPPP and associated BMPs, and they would be required to comply with all relevant NPDES permitting requirements. As such, these actions would likely have minimal aggregate impacts on aquatic ecology in the area.

3.7 Wetlands

3.7.1 Affected Environment

Wetlands are described by the USACE (33 CFR § 328.3) and the EPA (40 CFR § 230.3(t)) as “those areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas". Wetlands and wetland fringe areas can also be found along the edges of many watercourses and impounded waters (both natural and human-made). Wetland habitat provides valuable public benefits including flood storage, erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; USACE 2012). In addition, wetland condition was evaluated using the following methods:

- The TVA Rapid Assessment Method was used for wetlands within the Rorex Creek and Widows Creek study areas in Alabama. This method quantifies wetland function and classifies wetlands into three categories: low, moderate, or superior wetland function (TVA 2010b).
- The Tennessee Rapid Assessment Method was used for wetlands within the Raccoon Mountain study area in Tennessee. This method quantifies wetland function and classifies wetlands into three categories: low, moderate, or exceptional resource value (TDEC 2017).

Low quality wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input and connectivity, recent or on-going disturbance regimes, or predominance of non-native species. These wetlands provide low functionality and are considered low value. Moderate quality wetlands provide functions at a greater value due to a lesser degree of degradation, their habitat, or both; landscape position; or hydrologic input. Moderate quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate, or vegetation may be present to a degree at which valuable functional capacity is sustained. Wetlands with superior wetland function/exceptional resource value provide high functions and values within a watershed or are of regional/statewide concern. Those wetlands would exhibit little if any recent disturbance; provide essential or large-scale stormwater storage (or both), sediment retention, and toxin absorption; contain mature vegetation communities; or offer habitat to rare species.

In addition to determining wetland condition, each wetland area was classified as having one of the following habitat types: emergent, scrub-shrub, or forested. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated, inundated, or both. Scrub-shrub wetlands are dominated by woody vegetation generally less than 15 feet tall and three inches in diameter (Cowardin et al. 1979). Forested wetlands in general have deeper root systems and contain greater biomass (quantity of living matter) per acre than emergent and scrub-shrub wetlands, which do not grow as tall. As a result, forested wetlands provide higher levels of wetland functions, such as sediment retention, carbon storage, pollutant retention and transformation (detoxification), stormwater storage, and flood attenuation, all of which support better water quality and protection of downstream infrastructure (Ainslie et al. 1999; Scott et al. 1990; Wilder and Roberts 2002).

Field surveys were completed in June, July, September, and October 2023, and in March, May, July, and August 2024, and May 2025 to determine wetland presence, extent, and condition within each of the three study areas (Rorex Creek, Widows Creek, and Raccoon

Mountain). Wetland field survey reports for the study areas are included in Appendix G. Descriptions of each study area along with the results of the wetland field surveys are included in the sections below.

3.7.1.1 Rorex Creek Study Area

The Rorex Creek study area is located west of Pisgah in Jackson County, Alabama and encompasses approximately 4,920 acres. It spans both sides of Guntersville Reservoir along the Tennessee River. The majority of the study area is within the Mud Creek-Tennessee River watershed (HUC-10 0603000104). A small section of the transmission line corridor on the west side of Guntersville Reservoir is within the Upper Guntersville Lake watershed (HUC-10 0603000106).

Field surveys resulted in the delineation of approximately 188 acres of wetlands within the Rorex Creek study area (Figures 3-7a through 3-7e). These wetlands provide varying degrees of wetland functions and values within the surrounding watershed. Emergent, scrub-shrub, and forested wetlands within the study area primarily occur along streams and drainages and adjacent to Guntersville Reservoir. There are forested wetlands along some of the banks of the reservoir that grade into scrub-shrub and emergent wetlands. Moving out into the reservoir, the shallow edges of the reservoir contain mats of floating aquatic vegetation. The majority of wetlands within the study area are considered low to moderate value primarily due to past disturbances, presence of invasive species, or both. However, some of the wetlands along the edge of the reservoir and adjacent to islands in the reservoir may be considered as superior quality mainly due to size and diversity of habitats. A summary of the type and functional assessment of wetlands delineated within the Rorex Creek study area is provided in Table 3-23.

Table 3-23. Functional Category of Wetlands within Rorex Creek Study Area

Wetland Type	Functional Category	Acres Within Rorex Creek Study Area
PEM	Low	9.76
	Moderate	21.31
	Superior	49.53
PFO	Low	3.44
	Moderate	80.14
	Superior	17.92
PSS	Low	2.94
	Moderate	2.98
	Total	**188.06**

PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub

Most open water within the Rorex Creek study area is part of Guntersville Reservoir. Additionally, multiple ponds totaling approximately 24 acres were identified throughout the study area, primarily in cow pastures and agricultural fields on the plateau east of Guntersville Reservoir and along the transmission line corridor west of the reservoir. Ponds and other open waters were mapped and described during wetland delineation efforts (Appendix G).

Table 3-24 and Table 3-25 identify the wetland and open water acreages and types by watershed delineated within the Rorex Creek study area. Emergent, scrub-shrub, and forested wetlands within the study area account for approximately two percent of total wetlands within the encompassing watersheds. Open water/reservoir habitats within the Rorex study area account for approximately 2 percent of total open water habitats within the encompassing watersheds.

Table 3-24. Acreage of Wetland Type by Watershed Within the Rorex Creek Study Area

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Total Wetland Acreage in Study Area			
		Emergent	Scrub-Shrub	Forested	Total in Study Area
Mud Creek-Tennessee River (0603000104)	4,161	79.35	4.49	86.08	169.92
Upper Guntersville Lake (0603000106)	5,564	0	0	8.69	8.69
TOTAL	**9,725**	**79.35**	**4.49**	**94.77**	**178.61**

Source: National Wetland Inventory (USFWS 2023).

10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory

Table 3-25. Acreage of Open Water Habitat Type by Watershed Within the Rorex Creek Study Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Delineated Total Open Water Acreage in Study Area				
		L2AB	L1UB	L2UB	PUB	Total in Study Area
Mud Creek-Tennessee River (0603000104)	9,722	264.83	283.22	5.15	24.18	577.38
Upper Guntersville Lake (0603000106)	15,505	0	0	0	0.15	0.15
TOTAL	**25,227**	**264.83**	**283.22**	**5.15**	**24.33**	**577.53**

*Source: National Wetland Inventory (USFWS 2023).

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2AB= Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; L2UB=Lacustrine Littoral Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom.

3.7.1.2 Widows Creek Study Area

The Widows Creek study area is located in the unincorporated community of Long Island near Stevenson and Fabius, Jackson County, Alabama, comprising approximately 4,640 acres. It is located along the eastern bank of Guntersville Reservoir along the Tennessee River. Floodplain areas adjacent to the reservoir are occupied by expansive wetlands and agricultural fields. A rocky, forested escarpment separates the agricultural fields on the floodplain from the Sand Mountain plateau above. The plateau contains rural residential land, farmland, undeveloped forested areas, and maintained powerline easements.

The majority of the Widows Creek study area is within the Widows Creek-Tennessee River watershed (HUC-10 0603000102). A very small portion along the southern boundary is within the Mud Creek-Tennessee River watershed (HUC-10 0603000104).

Field surveys resulted in the delineation of approximately 391 acres of wetlands within the Widows Creek study area (Figure 3-10). These wetlands provide varying degrees of wetland functions and values within the surrounding watershed. Emergent, scrub-shrub, and forested wetlands within the study area primarily occur along streams and drainages and on the floodplain adjacent to the reservoir. The most prominent wetland feature at the site is an approximately 235-acre wetland complex on the floodplain; this wetland is mostly forested with deeper water open herbaceous and scrub-shrub pockets. Forested stands in portions of the wetland are hydrologically altered by beaver where standing water is regularly present and aquatic submergent, emergent, and floating vegetation persist. The deepest pockets of water are often open and dominated by similar aquatic species as found in scrub-shrub pockets, but they lack significant shrub or tree cover. A summary of the type and functional assessment of wetlands delineated within the Widows Creek study area is provided in Table 3-26.

Table 3-26. Functional Category of Wetlands within Widows Creek Study Area

Wetland Type	Functional Category	Acres Within Rorex Creek Study Area
PEM	Low	43.96
PFO	Low	7.97
	Moderate	65.19
PEM/PSS/PFO Mosaic	Low	0.43
	Moderate	37.27
	Superior	235.75
	Total	390.57

PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub

With the exception of the large wetland complex on the floodplain of the site, the majority of wetlands within the study area are considered low to moderate value primarily due to past disturbances, the presence of invasive species, or both. Portions of the large wetland complex on the floodplain may be considered as superior quality mainly due to size and diversity of habitats.

Open water areas within the Widows Creek study area totaled approximately 11 acres across 10 ponds, most of which were in open fields or cow pastures. A few of the ponds were located along forest edges.

Table 3-27 and Table 3-28 identify the wetland and open water acreage and type by watershed delineated within the Widows Creek study area. Emergent, scrub-shrub, and forested wetlands within the study area account for approximately one percent of total wetlands within the encompassing watersheds. Open water/reservoir habitats within the Widows Creek study area account for approximately one percent of total open water habitats within the encompassing watersheds.

Table 3-27. Acreage of Wetland Type by Watershed Within the Widows Creek Study Area

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Total Wetland Acreage in Study Area			
		Emergent	Forested	Mosaic[1]	Total in Study Area
Widows Creek-Tennessee River (0603000102)	3,680	43.96	73.16	273.45	390.57
Mud Creek-Tennessee River (0603000104)	4,161	0	0	0	0
TOTAL	**13,402**	**43.96**	**73.16**	**273.45**	**390.57**

*Source: National Wetland Inventory (USFWS 2023)

[1] Wetland included mosaic of forested/scrub-shrub, and emergent habitats.

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory

Table 3-28. Acreage of Open Water Habitat Type by Watershed Within the Widows Creek Study Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Delineated Total Open Water Acreage in Study Area			
		L2AB	L1UB	PUB	Total in Study Area
Widows Creek-Tennessee River (0603000102)	8,129		67.27	10.95	78.22
Mud Creek-Tennessee River (0603000104)	9,722	0	0	0	0
TOTAL	**12,290**	**0**	**67.27**	**10.95**	

*Source: National Wetland Inventory (USFWS 2023).

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2AB= Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom.

3.7.1.3 Raccoon Mountain Study Area

The Raccoon Mountain study area is located approximately six miles west of Chattanooga in Marion County, Tennessee, and comprises approximately 1,482 acres. It is located along the south side of Nickajack Reservoir on the Tennessee River and includes the existing RPS facility, including an existing upper reservoir (Raccoon Mountain Reservoir) on the mountain top or plateau.

The majority of the Raccoon Mountain study area is located within the Nickajack Lake-Tennessee River watershed (HUC-10 0602000112). A very small portion along the southern boundary is within the Lookout Creek watershed (HUC-10 0602000111).

Field surveys resulted in the delineation of two wetland areas, totaling approximately 0.05 acre; three ponds totaling approximately 2 acres; and the Raccoon Mountain Reservoir with approximately 450 acres of open water (Figure 3-11). Both wetlands were considered as low quality due to disturbance and size. Wetland acreage within the Raccoon Mountain study area is considered negligible within the encompassing watersheds. A summary of the type and functional assessment of wetlands delineated within the Raccoon Mountain study area is provided in Table 3-29.

Table 3-29. Functional Category of Wetlands within Raccoon Mountain Study Area

Wetland Type	Functional Category	Acres Within Raccoon Mountain Study Area
PEM	Low Quality	0.05

PEM = palustrine emergent

Table 3-30 and Table 3-31 identify the wetland and open water acreages and wetland types by watershed within the Raccoon Mountain study area.

Table 3-30. Acreage of Wetland Type by Watershed Within the Raccoon Mountain Study Area

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Total Wetland Acreage in Study Area			
		Emergent	Scrub-Shrub	Forested	Total in Study Area
Nickajack Lake-Tennessee River (0602000112)	227	0.03	0.00	0.00	0.03
Lookout Creek (0602000111)	788	0.02	0.00	0.00	0.02
TOTAL	**1,015**	**0.05**	**0.00**	**0.00**	**0.05**

*Source: National Wetland Inventory (USFWS 2023).

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory

Table 3-31. Acreage of Open Water by Watershed Within the Raccoon Mountain Study Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Delineated Total Open Water Acreage in Study Area			
		L2UB[1]	L1UB	PUB	Total in Study Area
Nickajack Lake-Tennessee River (0602000112)	10,946	456.89	76.16	2.07	535.12
Lookout Creek (0602000111)	548	0	0	0	0
TOTAL	**11,494**	**456.89**	**76.16**	**2.07**	**535.12**

*Source: National Wetland Inventory (USFWS 2023).

[1] Acreage includes Raccoon Mountain Pumped Storage upper reservoir, which is approximately 450 acres.

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2UB= Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom.

3.7.2 Environmental Consequences

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under the CWA §404, activities resulting in the discharge of dredge, fill, and associated secondary impacts to waters of the U. S., including wetlands, must be authorized by the USACE through a Nationwide, Regional, or Individual Permit. CWA §401 mandates state water quality certification for projects requiring USACE approval. Lastly, EO 11990 requires federal agencies to minimize wetland destruction, loss, or degradation, and to avoid new construction in wetlands wherever there is a practicable alternative.

For any alternative that proposes work within the delineated wetland boundaries, TVA would minimize wetland disturbance through adherence to wetland BMPs. With wetland avoidance and wetland minimization techniques in place, TVA would comply with all USACE/State mitigation requirements to compensate for the proposed loss of wetland resources, functions, and values. To remain in compliance with EO 11990, TVA would obtain the necessary Section 404/401 CWA permits and required compensatory mitigation to ensure the proposed wetland impacts are compensated to the extent deemed appropriate such that wetland functions and values remain at the current capacity within larger affected basins. TVA would comply with required compensatory mitigation per the directive of the USACE and State to ensure no more than minimal impacts to the aquatic environment would result and the objectives of the CWA are upheld.

For any applicable alternative, loss of wetland habitat due to wetland fill would be compensated through wetland mitigation banking (or other acceptable method). Loss of wetland functions and values from wetland impacts would be compensated for at the discretion of the appropriate regulators. Unavoidable impacts to wetlands and other potentially jurisdictional on-site waters would be minimized during final design and mitigated as required by applicable permits. With mitigation requirements in place that would ensure no net loss of wetland function, impacts to wetlands at the watershed level would not be considered significant.

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility at either the Rorex Creek or Widows Creek locations or expand the RPS facility. Therefore, no new construction activities would occur that would potentially fill wetlands or alter open water areas within the study areas. Under Alternative A, there would be no impacts to wetlands or other potentially jurisdictional waters.

3.7.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, construction would require extensive excavation and construction of an earthen embankment; rock removal from within Sand Mountain to create spaces for the underground powerhouse and associated structures, construction of access roads leading from Guntersville Reservoir shoreline to the upper reservoir; excavation of material for a combined intake/outflow structure on Guntersville Reservoir; and disposal of blasting material and excavation spoils along the left-descending bank of Guntersville Reservoir to create surfaces necessary for project staging and construction support. In addition to the PSH facility itself, construction of a new transformer yard and switchyard facilities, clearing of an existing transmission line corridor, and construction of barge port facility and a bridge extending from CR 558 across Guntersville Reservoir would also be developed.

Efforts were made during project planning and siting to avoid wetlands to the extent practicable. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other resources, no practicable alternative was available that would allow complete avoidance of wetlands.

Approximately 137.4 acres of wetlands would be disturbed or filled by the proposed activities (Table 3-32). This includes 92.9 acres of wetlands within the footprint of the proposed upper reservoir, associated conduits, new bridge and roadway, and other associated structures required for the development of the Rorex Creek site. Filled wetlands also include wetlands within the footprint of the proposed spoils disposal area along the eastern bank of the reservoir, which is necessary for full site build-out and grading in support of needed infrastructure. Functions of disturbed or filled wetlands would be lost. In addition, approximately 44.4 acres of forested wetlands within the off-site transmission line corridor would be converted to emergent or scrub-shrub wetlands, as adequate clearance between tall vegetation and transmission line conductors would require trees within the transmission line corridor to be cleared. Existing emergent wetlands within the transmission line corridor may be temporarily disturbed during project construction, but they would be expected to return to current conditions in the long term. The extent of these impacts is detailed in Table 3-32 and summarized in Table 3-33. It should be noted that the forested wetlands within the off-site transmission line corridor are the result of lack of maintenance over recent years and these wetlands were previously cleared when the transmission line was originally constructed.

Table 3-32. Functional Categories of Wetlands within the Rorex Creek Disturbance Area

Wetland Type	Functional Category	Acres Impacted	Type of Impact
Rorex Creek Disturbance Area (excluding off-site ROW)			
PEM	Low	4.77	Loss of Resource Value[6]
PEM	Moderate	14.09	Loss of Resource Value
PEM	Superior	32.20	Loss of Resource Value
PFO	Low	2.37	Loss of Resource Value
PFO	Moderate	25.92	Loss of Resource Value
PFO	Superior	8.65	Loss of Resource Value
PSS	Low	2.94	Loss of Resource Value
PSS	Moderate	1.55	Loss of Resource Value
	Total	92.94	
Off-Site Transmission Line ROW			
PEM	Low	2.12	Temp Disturbance
PEM	Moderate	3.52	Temp Disturbance
PFO	Moderate	38.77	Wetland Conversion
	Total	44.41	
Total Acres Impacted		**137.35**	

ROW = right-of-way; PEM = palustrine emergent; PFO = palustrine forested; PSS = Palustrine scrub-shrub

Table 3-33. Summary of Wetland Loss and Conversion Within the Rorex Creek Disturbance Area[1]

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Approximate Wetland Loss within Disturbance Area (excluding off-site ROW) (acres)				Wetland Conversion (Off-site ROW) (acres)
		Emergent	Scrub-Shrub	Forested	Total in Disturbance Area	Conversion of Forested/shrub Wetlands to Emergent Wetlands
Mud Creek-Tennessee River (0603000104)	4,161	32.23	4.10	24.08	60.41	30.07
Upper Guntersville Lake (0603000106)	5,564	0.00	0.00	0.00	0.00	8.70
TOTAL	**9,725**	**32.23**	**4.10**	**24.08**	**60.41**	**38.77**

[1] Table does not include emergent wetlands along the off-site Transmission ROW, as these will remain as PEM wetlands.
*Source: National Wetland Inventory (USFWS 2023).
Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory

[6] Loss of resource value includes fill, vegetation removal, grading, or other permanent disturbance to wetlands.

Wetland functional loss is subject to the authority of the regulatory agencies to ensure no net loss of wetland functions and values, per the directive of the CWA and the federal no net loss of wetland policy (USEPA 1990). The CWA authorizes regulatory oversight for these impacts. The USACE and states exert this oversight through an established permit process that ensures maintenance of the physical, biological, and chemical integrity of the nation’s waters, including wetlands, and the objectives of the CWA are upheld. The permitting process involves a demonstration of wetland avoidance, minimization of disturbance, and compensatory mitigation for loss of wetland functions and values.

In compliance with the CWA and EO11990, TVA has considered options to avoid and minimize wetland impacts, resulting in the least wetland disturbance practicable. The presence and condition of wetlands was one of the key considerations used in identifying and assessing potential alternative locations when developing the project.

In addition to wetland loss, wetland habitat located peripheral to major construction activities could experience minor and temporary impacts during construction. TVA would minimize wetland disturbance through adherence to wetland BMPs for any and all work necessary within the delineated wetland boundaries. This includes the use of low ground pressure vehicles, mats, or other wetland crossings to minimize rutting to less than 12 inches, erosion control techniques to deter indirect impacts through siltation into adjacent wetland area, dry season work, etc. BMPs would be implemented in accordance with *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2022c), the *Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas* (Alabama Soil and Water Conservation Committee 2022), and the project-specific SWPPP, the CBMPP, or both.

Approximately 142 acres of open water within Guntersville Reservoir would be disturbed or filled by the proposed activities (Table 3-34); the majority of impacted aquatic habitat is located within the footprint of the proposed spoils disposal area along the eastern bank of the reservoir, which is necessary for full site build-out and grading in support of needed infrastructure. The impacted open water habitat represents a very small percentage (approximately 0.5 to 1 percent) of open water habitat within the affected watersheds. Potential impacts to surface water resources are further discussed in Section 3.5, Surface Water Resources.

Table 3-34. Loss of Open Water Habitat Within the Rorex Creek Disturbance Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Open Water Loss within Disturbance Area (acres)				
		L2AB	L1UB	L2UB	PUB	Total Loss in Disturbance Area
Mud Creek-Tennessee River (0603000104)	9,722	94.52	22.09	5.08	20.43	142.11
Upper Guntersville Lake (0603000106)	15,505	0	0	0	0	0
TOTAL	**25,227**	**94.52**	**22.09**	**5.08**	**20.43**	**142.11**

*Source: National Wetland Inventory (USFWS 2023).

Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2AB= Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom; L2UB=Lacustrine Littoral Unconsolidated Bottom

Impacts to wetlands under Alternative B are considered moderate due to the amount of potential wetland impacts associated with this alternative. However, implementation of wetland impact avoidance and minimization techniques and adherence to wetland mitigation requirements as discussed at the beginning of Section 3.7.2 would ensure no net loss of wetland function, and that the project complies with EO 11990.

3.7.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, construction activities would be similar to those described under Alternative B. However, neither a new bridge nor potential transmission line upgrades were evaluated under Alternative C. Efforts were made during project planning and siting to avoid wetlands to the extent practicable. However, because of project and topographic constraints, and because of the goal of minimizing impacts to other resources, no practicable alternative was available that would allow complete avoidance of wetlands.

As detailed in Table 3-35, Table 3-36, and Table 3-37, approximately 51.97 acres of wetlands and 1.61 acre of open water would be disturbed or filled by the proposed activities. This includes wetlands and open waters within the footprint of the proposed upper reservoir, associated conduits, and other associated structures. Filled wetlands also include wetlands within the footprint of the proposed spoils disposal area along the floodplain within the study area, which is necessary for full site build-out and grading in support of needed infrastructure. During construction of the underground powerhouse, sufficient space would be required at the tunnel entrance to house temporary construction facilities and support areas, such as office trailers, warehousing, labor resources, shop space, concrete plants, wastewater treatment areas, etc. TVA would need to repurpose tunnel spoils as fill material to construct these construction support areas adjacent to the tunnel entrances and existing lower reservoir.

Even though the total wetland loss proposed by this alternative is slightly less than that proposed by Alternative B, this alternative proposes greater loss of superiorly functioning wetlands. In addition to the wetland loss within the disturbance area, as shown in Table 3-35, this alternative would require use of dredging, underwater excavation, or both to create a water conveyance system, or tailrace, for the lower reservoir inlet and outlet structures across the existing approximately 236-acre superior quality forested wetland complex adjacent to the Guntersville Reservoir (see Figure 3-10). These activities would cause substantial disruption to surface and subsurface hydrology within this wetland complex. Functions of filled wetlands would be lost and subject to regulatory requirements as discussed under Alternative B.

Table 3-35. Functional Categories of Wetlands Affected by the Widows Creek Project[7]

Wetland Type	Functional Category	Acres Impacted	Type of Impact
PEM	Low Quality	43.14	Loss of Resource Value[8]
PFO	Low Quality	7.97	Loss of Resource Value
PFO	Moderate	17.93	Loss of Resource Value
PFO/PSS	Moderate	32.66	Loss of Resource Value
PEM/PSS/PFO Mosaic	Superior	235.75	Loss of Resource Value
Total		**337.51**	

Key: PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub

Table 3-36. Approximate Loss of Wetlands Within the Widows Creek Disturbance Area

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Wetland Loss within Disturbance Area			
		Emergent	Forested	Mosaic[1]	Total in Disturbance Area
Widows Creek-Tennessee River (0603000102)	3,680	43.14	8.22	32.71	51.97
Mud Creek-Tennessee River (0603000104)	9,722	0	0	0	0
TOTAL	**13,402**	**43.14**	**25.95**	**268.40**	**337.5**

*Source: National Wetland Inventory (USFWS 2023).
Note: [1]. Wetland included a mosaic of forested/scrub-shrub, and emergent habitats.
Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory

[7] Acreages of wetland effects include wetlands within the project footprint, based on current level of design, and wetlands where value would be diminished resulting from construction related changes to local hydrology.
[8] Loss of resource value includes fill, vegetation removal, grading, or other permanent disturbance to wetlands.

Table 3-37. Approximate Loss of Open Water by Watershed Within the Widows Creek Disturbance Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Delineated Total Open Water Acreage in Disturbance Area			
		L2AB	L1UB	PUB	Total in Disturbance Area
Widows Creek-Tennessee River (0603000102)	8,129	0	0.53	1.08	**1.61**
Mud Creek-Tennessee River (0603000104)	4,161	0	0	0	**0**
TOTAL	**12,290**	**0**	**0.53**	**1.08**	**1.61**

*Source: National Wetland Inventory (USFWS 2023).
Key: 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2AB = Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom.

Wetland habitat located peripheral to major construction activities could experience minor and temporary impacts during construction. TVA would minimize wetland disturbance through adherence to wetland BMPs for any and all work necessary within the delineated wetland boundaries.

Impacts to wetlands under Alternative C are considered moderate due to the amount of potential wetland impacts associated with this alternative. However, implementation of wetland impact avoidance and minimization techniques and adherence to wetland mitigation requirements as discussed at the beginning of Section 3.7.2 would ensure no net loss of wetland function and ensure the project is in compliance with EO 11990.

3.7.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would expand operations at the existing RPS by installing a second underground powerhouse (800 MW). The second powerhouse would utilize water from the existing upper reservoir, drawing the pool down more deeply than present operation for each cycle. No wetland impacts are anticipated under Alternative D. Minor impacts along the shoreline of Nickajack Reservoir could occur during construction; impacts are shown in Table 3-38.

Table 3-38. Approximate Loss of Open Water by Watershed Within the Racoon Mountain Disturbance Area

Watershed (10-HUC)	NWI Estimated Total Open Water Acres in Watershed*	Delineated Total Open Water Acreage in Disturbance Area			
		L2AB	L1UB	PUB	Total in Disturbance Area
Nickajack Lake-Tennessee River (0602000112)	10,946	0	6.38	0	6.38
Lookout Creek (0602000111)	548	0	0	0	**0**
TOTAL	**11,494**	**0**	**6.38**	**0**	**6.38**

*Source: National Wetland Inventory (USFWS 2023).

Key; 10-HUC = 10-Digit Hydrologic Unit Code; NWI = National Wetlands Inventory; L2AB= Lacustrine, Littoral, Aquatic Bed; L1UB=Lacustrine Limnetic Unconsolidated Bottom; PUB=Palustrine Unconsolidated Bottom.

3.7.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

Studies have suggested that watersheds should contain 3 to 7 percent total wetland cover to provide adequate flood control and water quality values for the landscape (Mitsch and Gosselink 2000). This percentage does not distinguish between wetland habitat types. Wetlands similar to those potentially impacted by the project occur along the banks and floodplain of the Tennessee River and its tributaries throughout the watershed. Based on NWI data, the affected watersheds for the Rorex Creek and Widows Creek study areas contain approximately 2 to 4 percent wetlands. The watershed for the Raccoon Mountain contains less than 1 percent wetlands.

As detailed in Section 3.1.2, Reasonably Foreseeable Future Actions, TVA has not identified any large-scale reasonably foreseeable future actions that are proposed along Guntersville or Nickajack Reservoirs that would contribute to a significant loss of wetland resources within the watershed. Additionally, general trends in wetland impacts resulting from development within the watershed would be subject to CWA, USACE, and State mandates, and these regulatory requirements are in place to ensure wetland impacts do not cause cumulative loss. Therefore, the proposed wetland impacts would be insignificant on a watershed scale due to the avoidance, minimization, and compliance measures in place. In compliance and accordance with the CWA and the directives of USACE and State ensuring no more than minimal adverse effects on the aquatic environment, TVA has incorporated avoidance and mitigation measures into the planning of the proposed action.

3.8 Floodplains

3.8.1 Affected Environment

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the floodplain to ensure that the project is consistent with the requirements of EO 11988, Floodplain Management. Shown in Table 3-39, more conservative elevations were used in this review.

Table 3-39. Tennessee River Flood Elevations by Annual Flood Chance

Annual Chance Flood Type	Frequency	Flood Elevation, NAVD 1988			
		Rorex1	Rorex2	Widows Creek3	Raccoon Mountain4
0.2%	500-year	605.7	604.0	612.1	639.4
1% Plus5	100-year Plus		602.5	609.6	-
1%	100-year	604.2	602.2	609.1	636.8
2%	50-year		601.8	608.5	636.4
4%	25-year		601.5	608.1	-
10%	10-year		601.1	607.6	635.8

- = data not available
1) Conservate elevations used for initial design and in this review.
2) Interpolated from Profile 29P at river mile 390.5; FEMA, 2020
3) Interpolated from Profile 30P at river mile 406; FEMA, 2020
4) Interpolated from Profile 36P at river mile 444.6; FEMA, 2023
5) “plus” refers to the incorporation of average predictive error associated with the regression equation discharge calculation to the discharges used to derive the 1-percent flood elevation.

The National Flood Insurance Program (NFIP) was established by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to offer flood insurance for properties with significant flood risk and to reduce flood risk with floodplain management standards. In furtherance of the NFIP and NEPA, EO 11988 was issued in 1977, which directed federal agencies to reduce flood losses and environmental impacts associated with floodplain loss by avoiding actions that adversely affect floodplains (FEMA 2021a). Jackson County, Alabama and Marion County, Tennessee, participate in the National Flood Insurance Program and have floodplain protection ordinances or resolutions that are administered by a local building official or floodplain administrator (Marion County Tennessee, 2005; Jackson County Alabama 2007).

FEMA administers the NFIP and produces Flood Insurance Rate Maps (FIRMs), which depict the 100-year floodplains, also referred to as Special Flood Hazard Areas, or areas subject to inundation by the one-percent annual chance flood. Within the region, flood maps are differentiated by County. Both the Rorex Creek and Widows Creek study areas are in FIRM 01071C for Jackson County, Alabama. FIRM panels 0429D, 0461D, 0453D, and 0450D cover the Rorex Creek study area, while FIRM panels 0150D, 0120D, 0325D, and 0285D cover the Widows Creek study area. The Raccoon Mountain study area, in Marion County, Tennessee, is within panel 0275C of FIRM 47115C (FEMA 2021b). A summary of the floodplains present within the boundaries of each study area is presented in Table 3-40. Floodplains within the study areas are shown in Figure 3-17 through Figure 3-19.

The Rorex Creek and Widows Creek study areas are located along the Tennessee River on Guntersville Reservoir, in Jackson County, Alabama. The RPS study area is located along the Tennessee River on Nickajack Reservoir, in Marion County, Tennessee. In total, the Tennessee River Basin drains approximately 40,910 square miles, gradually sloping from southwest Virginia to Chattanooga (National Weather Service 2024). The Tennessee River drainage area at the Rorex Creek study area is about 23,300 square miles; the drainage area at the Widows Creek study area is about 22,800 square miles, and the drainage area at the Rorex Creek study area is about 21,900 square miles.

TVA reservoirs have either power storage or flood storage or both. Power Storage is allocated to a range of elevations called the Power Storage Zone and water occupying space in that zone is used to generate electric power through a dam's hydroturbines.

Table 3-40. Quantified Floodplains Presence by FEMA Flood Zone

Floodplain Classification		Rorex Creek (acres)	Widows Creek (acres)	Raccoon Mountain (acres)
Zone A SFHA without base flood elevations (1% Annual Chance Flood; 100-year floodplain)	Disturbance Area Total	49.8	-	-
	Study Area Total	**49.8**	**-**	**-**
Zone AE SFHA with base flood elevation (1% Annual Chance Flood; 100-year floodplain)	Disturbance Area Total	246.3	120.2	3.6
	Study Area Total	**825.8**	**893.3**	**10.5**
Zone AE Regulatory Floodway (1% Annual Chance Flood; 100-year floodplain)	Disturbance Area Total	1.9	-	6.3
	Study Area Total	**1.9**	**-**	**66.0**
Zone X Areas of 0.2% annual chance flood; 500-year floodplain[1]	Disturbance Area Total	1.7	-	3.6
	Study Area Total	**1.7**	**-**	**3.7**
Zone X Areas determined to be outside of the 0.2% annual chance floodplain	Disturbance Area Total	2287.0	816.9	39.0
	Study Area Total	**4041.0**	**3747.0**	**1404.5**

Source: FEMA 2021b

Note: [1] Also includes areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Key: SFHA = Special Flood Hazard Areas; "-" = no associated disturbances or impacts

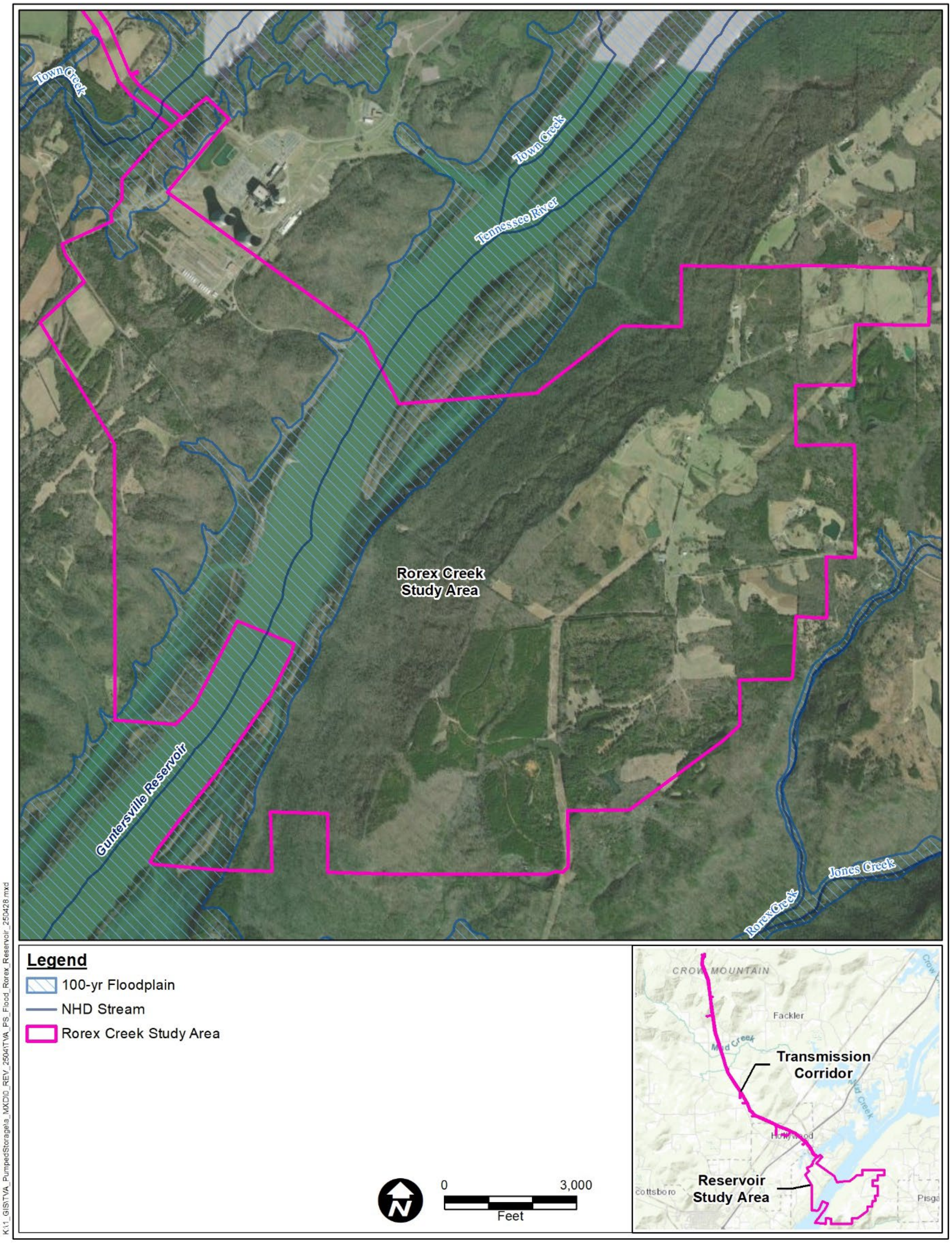


Figure 3-17a. Floodplain within the Rorex Creek Study Area

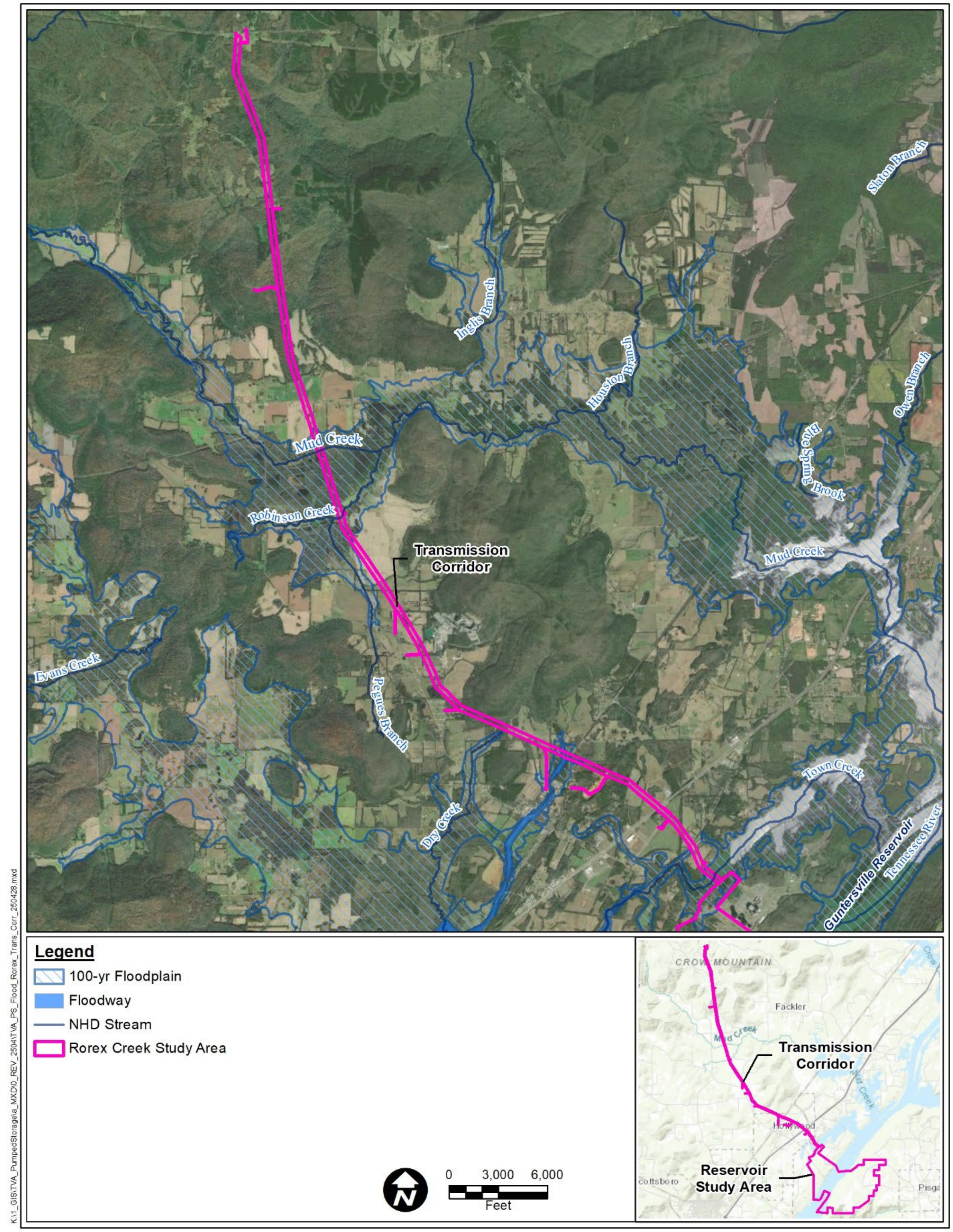


Figure 3-17b. Floodplain within the Rorex Creek Study Area

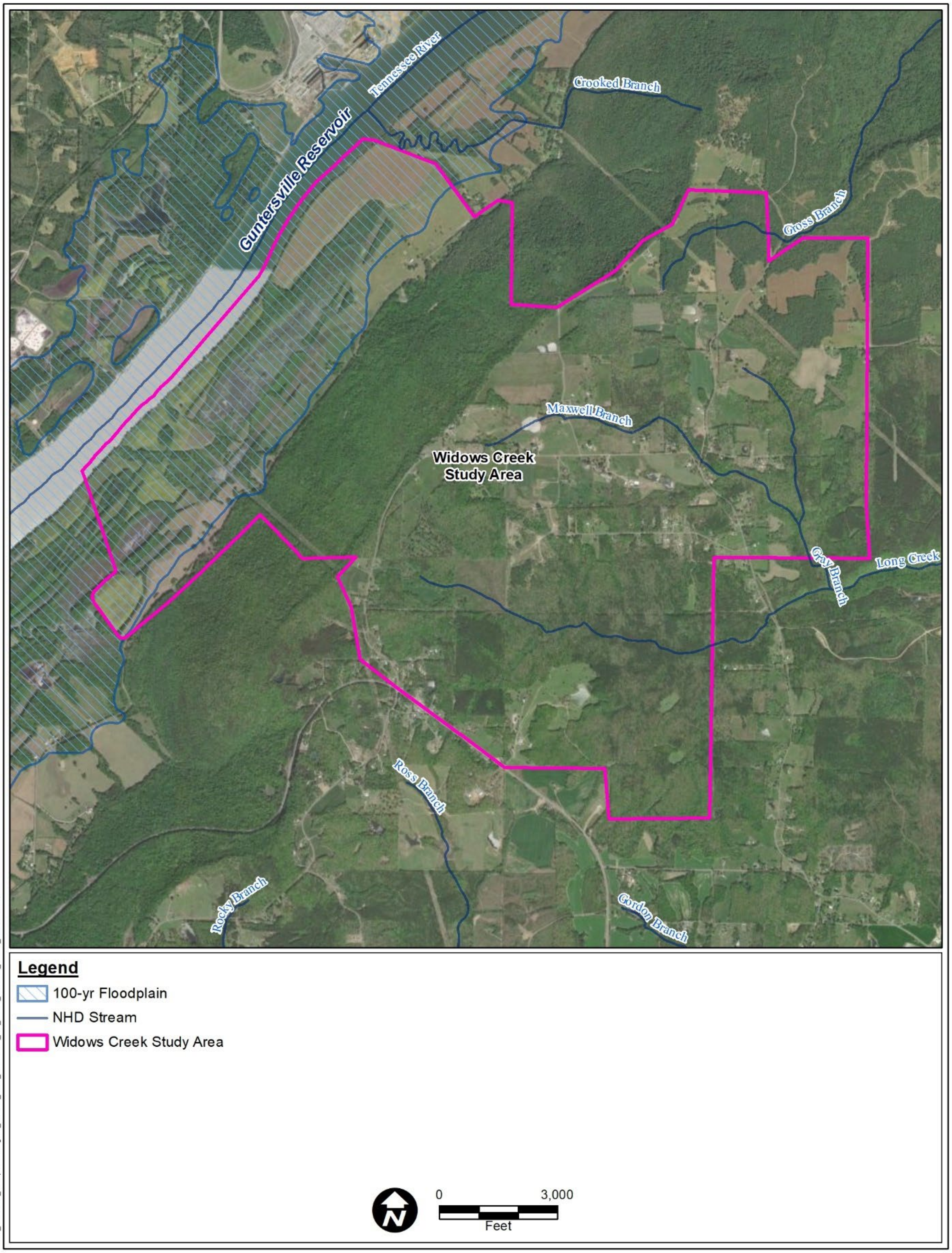


Figure 3-18. Floodplain within the Widows Creek Study Area

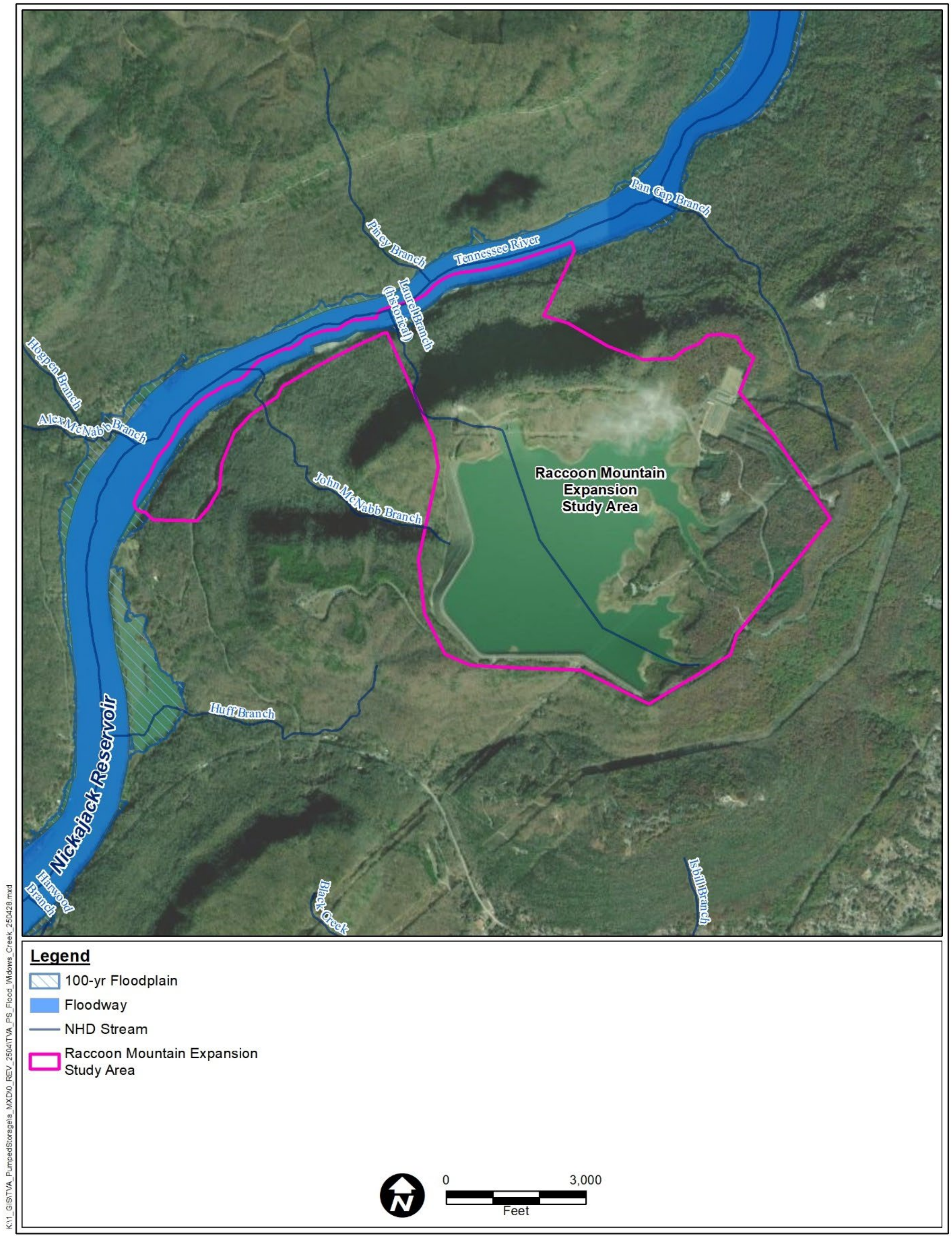


Figure 3-19. Floodplain within the Raccoon Mountain Study Area

3.8.2 Environmental Consequences

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

For certain "critical actions," the minimum floodplain of concern is the 500-year floodplain. The U.S. Water Resources Council defines "critical actions" as "any activity for which even a slight chance of flooding would be too great" (U.S. Water Resources Council 1978). Critical actions can include facilities producing hazardous materials (such as liquefied natural gas terminals), facilities whose occupants may be unable to evacuate quickly (such as schools and nursing homes), and facilities containing or providing essential and irreplaceable records, utilities, and/or emergency services (such as large power-generating facilities, data centers, hospitals, or emergency operations centers).

Portions of the three study areas would be located within 100-year floodplains. Floodplain impacts associated with each of the proposed alternatives is assessed based on activities, structures, and facilities that would be located within the 100-year or 500-year floodplain, and the incorporation of potential design considerations to avoid or minimize potential floodplain impacts.

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, a proposed pumped storage hydropower facility would not be constructed or operated at any of the proposed locations. Existing floodplain conditions would remain, including all existing floodplain values and flood elevations; therefore, no impacts to floodplains are associated with the No Action Alternative.

3.8.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Alternative B would require both excavation and fill to construct an upper reservoir with a dam embankment footprint of approximately 10-17 million cubic yards, including a usable volume of approximately 47,752 acre-feet, surrounded by a dam that would be approximately 100 feet tall. A conservative approach was taken, and higher 100- and 500-year flood elevations were used in the analysis of fill. Those elevations are 604.2 and 605.7 feet, respectively. Up to approximately 1,600 acre-feet of net fill would be placed within the 100-year floodplain, which is that area below the 100-year flood elevation of 604.2 feet. Up to approximately 250 acre-feet of net fill would be placed within the Power Storage Zone, which is that area between elevations 593.0 and 595.0 ft, the range within which TVA normally maintains the water surface elevation of the Guntersville Reservoir. Overall, up to about 2,000 acre-feet of net fill would be placed within the Flood Storage Zone, which is that area between elevations 593.0 and the 500-year flood elevation of 605.7.

Of the facilities, structures and activities proposed, the barge docking area, riprap bank stabilization, support piers for the bridge over the Tennessee River, and intake/outflow portal would be located completely within the Tennessee River 100-year floodplain. Portions of the transmission clearing, the existing transmission line corridor, bridge approach roads, portal construction and fill area would be located within the Tennessee River 100-year floodplain.

Consistent with EO 11988, a barge docking area, riprap bank stabilization, support piers for the bridge over the Tennessee River, transmission line corridor clearing, existing transmission lines, and bridge approach roads are considered repetitive actions in the 100-year floodplain that should result in only minor impacts (TVA 1961).

The intake/outlet portal would be considered a functionally dependent use of the floodplain. There is no practicable alternative to locating the portal in the floodplain because Guntersville Reservoir serves as the lower reservoir for the PSH facility and the intake/outlet structure needs to be in the water.

The net fill placed within the 100-year floodplain and flood storage zone would not be considered a repetitive action in these areas. There is no practicable alternative to placing the material in the floodplain because the land adjacent to Guntersville Reservoir is almost completely within the 100-year floodplain, the Sand Mountain escarpment is too steep to deposit the material and transportation costs to haul the material to areas outside the 100-year floodplain and flood storage zone would be cost prohibitive. Most of the fill would result from excavation of the upper reservoir and penstock tunnels. The material would be placed on the east/left descending bank of the river and would be used for intake/outlet works, parking, roadways, and potential recreation areas. To minimize adverse impacts, the least amount of excavated material would be deposited within the 100-year floodplain and flood storage zone.

Jackson County participates in the NFIP, and any development must be consistent with its regulations. Preliminary designs of proposed site modifications including the lower reservoir inlet/outlet structure, barge facilities, bridge abutments and piers, and other dredging and filling activities were used to develop hydraulic models for the 100-year plus and 500-year floods on the Tennessee River. Hydraulic modeling thus far indicates that the pumped storage facility and the bridge over the Tennessee River would not increase Tennessee River flood elevations more than a few tenths of a foot at most; although, final flood elevation changes cannot be determined until the pumped storage facility and the bridge are nearing design completion. TVA would minimize increases in flood elevations and work with Jackson County floodplain officials to ensure the fill and other project components would comply with local floodplain regulations.

To minimize adverse impacts, the intake/outflow structure would be constructed using the least amount of fill practicable. Additionally, fill within the reservoir would be minimized and new road construction or modifications to existing roads within 100-year floodplains would be designed and constructed such that upstream flood elevations would not increase by more than 1.0 foot. Flood-damageable facilities consist of the transformer yards, 500-kV substation, PSH powerhouse, and construction laydown areas and would either be constructed underground and isolated from floodwaters, or on ground outside 100- or 500-year floodplains and above 100- or 500-year flood elevations. Flood-damageable material and equipment would be stored outside the floodplain or above the 100-year flood elevation as a standard practice.

Given the consideration of floodplain regulations during design, as well as intention to use the least amount of fill practicable, impacts to floodplains and their natural and beneficial values resulting from the construction of Alternative B would be minor to moderate.

As discussed in Section 3.5, Surface Water Resources, inflow and outflow from the proposed pumped storage facility is capable of altering Guntersville Reservoir water elevations, however, any potential fluctuations in pool elevation are expected to be minor. A potential benefit to the Rorex PSH would be to provide incremental flood risk reduction during a flood by pumping water into the upper reservoir to reduce Guntersville flood elevations.

Operation of Alternative B would involve the installation of new roads, a transformer yard, and switchyard facility that would ultimately convert pervious rural land to impermeable surfaces such as asphalt and concrete. Increases in impermeable surfaces can indirectly impact floodplain values through increases in stormwater runoff and changes in existing drainage patterns. Increases in stormwater runoff from the site can increase flooding downstream of the proposed project, compromising a floodplain's ability to convey an increased quantity of water. Increases in flood waters downstream of the project site may increase base flood elevations, leading to increased risk of adverse impacts on public health and safety and economic prosperity. Stormwater detention and retention would be incorporated into detailed site design to ensure that runoff rates and discharge requirements comply with all appropriate state and local requirements, including NPDES permit limits; therefore, potential floodplain impacts from stormwater flow changes would be minor.

Direct and indirect adverse impacts to floodplains would be avoided and minimized through the use of routine and non-routine BMPS.

3.8.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Like Alternative B, the construction and operation of Alternative C would involve development within floodplains, ground disturbing activities, placement of fill, and the introduction of impervious surfaces, which would directly and indirectly impact floodplain values. However, unlike Alternative B, the proposed net cut or fill volume associated with Alternative C within the floodplain has not been determined. Should Alternative C be pursued further, a site-specific assessment of the potential impacts to flood elevations from floodplain development similar to that done for Alternative B would be performed and adjustments would be made to minimize adverse impacts.

Overall, the proposed floodplain surface area intersected by proposed disturbance boundaries can be used to generalize potential direct impacts to floodplains associated with facility development. As shown in Table 3-40, the proposed footprint of Alternative C does not encroach upon a regulatory floodway. The proposed construction footprint of the dam embankment is less than half of the proposed dam embankment footprint of Alternative B and the total surface area of other ancillary facilities is slightly less than that of Alternative B. Additionally, there is some ground outside the floodplain for depositing excavated material, whereas at Alternative B these is virtually none. Thus, floodplain impacts associated with Alternative C are expected to still be minor to moderate but less than those of Alternative B.

3.8.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Like Alternatives B and C, Alternative D includes development within floodplains, ground disturbing activities, and the introduction of impervious surfaces. Although Alternative D involves the expansion of an existing PSH facility and does not require the construction of an upper reservoir or bridge, the Tennessee River has a floodway at the RPS site. The additional intake/outlet works and spoils placed in the Tennessee River floodplain would be modeled and adjustments made to minimize adverse impacts, either by refining design to eliminate any increase in flood and "with floodway" elevations or by updating Tennessee River flood data and maps in the Marion County Flood Insurance Study.

The proposed construction footprint of ancillary facilities associated with Alternative D are less than those of Alternatives B and C because much of the infrastructure needed to operate Alternative D already exists; however, the footprint of Alternative D intersects a regulatory floodway; therefore, potential impacts to floodplains and their boundaries would be greater than the other alternatives.

3.9 Geology and Soils

3.9.1 Affected Environment

The three study areas are located in the Appalachian Plateaus physiographic province of the Appalachian Highlands Division (Fenneman and Johnson 1946). In the contiguous U.S., the Appalachian Plateaus span about 190,000 square miles, beginning in central Alabama where the Gulf of Mexico's coastal plain ends, extending through eastern portions of Tennessee, Kentucky, and Ohio, as well as West Virginia and Pennsylvania; and ending just south of the Adirondack Mountains in Upstate New York. All three study areas are within the Cumberland Plateau Section of the Appalachian Plateaus, underlain by a bedrock of limestone, shale, coal, and sandstone deposited during the Mississippian (360 to 320 million years ago) and Pennsylvanian (320 to 296 million years ago) periods (US Department of the Interior 2024).

3.9.1.1 Regional Geology and Paleontology

Alabama and Tennessee lay beneath marine waters during the Precambrian era (4,650 to 542 million years ago), and the sedimentary rocks that resulted from this environment were later metamorphosed and intruded by molten material during mountain-building; these igneous and metamorphic rocks are currently exposed in the Blue Ridge Mountains. During the Paleozoic Era (542 to 251 million years ago), shallow marine environments dominated. In these seas, vast amounts of sediment produced by the mountain-building process were deposited by westward-flowing rivers. The abundant sediment yielded huge, swampy deltas, which were conducive to the growth of scale trees, horsetail rushes, and other plants that would eventually produce coal deposits. By the time the Permian Era (299 to 251 million years ago) arrived, Alabama and Tennessee were largely above sea level, and erosion outpaced deposition. The nearest well records from the Geological Survey of Alabama (GSA) indicate that surveyors have encountered bedrock in Jackson County Grid N, in the vicinity of the Widows Creek study area at a depth of as much as 80 feet (GSA 2025a). Auger borings at the upper reservoir on the Rorex Creek Site indicate depth to bedrock from between 1 and 30 feet, with soil thinnest along the western portion of the site (HDR 2024c). Well data from TDEC show that wells drilled near the Raccoon Mountain study area encounter bedrock at depths of closer to 20 feet (TDEC 2025a). This region is dominated by sedimentary clastic (mainly shale, sandstone, and mudstone) and sedimentary carbonate (mainly limestone and dolostone) formations of primarily Mississippian and Pennsylvanian periods (359 to 299 million years ago), with some Ordovician and Silurian (485 to 419 million years ago) sedimentary formations as well.

3.9.1.2 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes, seismic activity, and subsidence/sinkholes. USGS data indicate that the Rorex Creek study area straddles an area of low landslide risk and high landslide risk, and the Widows Creek study area spans an area that includes both low landslide risk and moderate landslide risk, with risk increasing with proximity to the Tennessee River. The Raccoon Mountain study area is located in an area of moderate landslide risk (USGS 1982).

Limestone and carbonate rock are conducive to sinkholes. As groundwater circulates through such geology, the rock dissolves, yielding spaces and caverns underground. Aboveground, land usually stays intact for a while until the spaces get too big. If there is not enough support for the land above these spaces, a sudden collapse of land can occur (USGS 2018a). A review of USGS topographic maps indicates the presence of sinkholes and/or topographic depressions at Middlebrook Point, Stogsdill Point, and Stogsdill Sink, in the Rorex Creek study area.

A Preliminary Geology Report (HDR 2022) notes the presence of colluvium on the access road to the lower reservoir and Main Access tunnel to the existing Raccoon Mountain study area. This report also notes the presence of talus directly east of the existing intake structure within the upper reservoir. Additional colluvium and talus were discovered north of the upper reservoir (HDR 2022). Colluvium is a poorly sorted mixture of angular rock fragments and fine-grained materials, while talus is an accumulation of rock fragments that accumulate at the base of a cliff after falling. These are two classic features of landsliding (Turner 1996).

Talus and colluvium are also noted at the Rorex Creek study area, in several areas along Sand Mountain, and on the shoreline of Guntersville Reservoir. Sand Mountain is also in the Widows Creek study area, and it is covered by colluvium at its western flank.

3.9.1.3 Soils

The Rorex Creek study area contains 35 soil types, as well as 7.4 percent water due largely to the presence of Guntersville Reservoir. The most common soil type is limestone rockland rough (18.7 percent), with a parent material of residuum weathered from limestone; a stony, silty, clayey soil profile; and a very low to moderately low ability to transmit water (0.00 to 0.07 inches per hour). Rough stony land and rolling stony land with Muskingum soil material are also well-represented (16.6 percent and 12.0 percent, respectively). These soils are derived from stony residuum weathered from sandstone and contain a typical soil profile of stony sandy loam. These rocky soil series are largely in the portions of the study area with rapid elevation change, especially the portions along Guntersville Reservoir. The central and eastern portions of the study area contain various soil series characterized by fine sandy and silty loams, including Hartsells series whose three soil types in the study area (Hartsells fine sandy loam, 6 to10 percent slopes, moderately eroded; Hartsells fine sandy loam, 6 to10 percent slopes, shallow; and Hartsells fine sandy loam, 2 to 6 percent slopes, shallow) account for a total of over 20 percent of the study area (USDA 2025). While the most well-represented soil profiles of the Rorex Creek study area are stoney, these series generally occur in a contiguous area closest to the Tennessee River; ground disturbance will occur more on the silty, loamy soils—much of them with hydric characteristics—toward the eastern portion of the study area.

The Widows Creek study area contains 49 soil types and 5.0 percent water. As this study area shares a riverbank with the Rorex Creek study area, limestone rockland rough (10.1 percent) is also the predominant soil type. Philo-Atkins silt loams (9.9 percent) are closely behind, bordering the limestone rockland rough swath to the east. Philo-Atkins silt loams are derived from sandstone and shale, and have a moderately high to high ability to transmit water (0.57 to 1.98 inches per hour). The Hartsells-Nauvoo complex, 2 to 6 percent slopes, eroded (8.4 percent) is well represented. This complex is about half Hartsells soils and 45 percent Nauvoo soils, which are derived from loamy residuum weathered from sandstone and hale, characterized by a sandy clayey soil profile, and have a very low to moderately high ability to transmit water (0.0 to 1.13 inches per hour). In addition to the Hartsells-Nauvoo complex, the three soil types in the series comprised exclusively of Hartsells soils discussed above are prevalent in the Widows Creek study area (a total of 18.0 percent) (USDA 2025).

The Raccoon Mountain study area contains 13 soil types. The most common is Ramsey stony fine sandy loam, 25 to 60 percent slopes (22.6 percent), Hartsells fine sandy loam, rolling phase (Lily) (12.3 percent), and Bouldery colluvium, Allen soil material (Bouldin) (12.0 percent). The Ramsey and Hartsells soil types are primarily derived from loamy residuum weathered from sandstone, with sandy and clayey loam soil horizons and very low to moderately high ability to transmit water (0.0 to 0.2 inches per hour). The Bouldery colluvium soil type is also characterized by clay loam, but it is very stony and therefore has a high ability to transmit water (2.0 to 6.0 inches per hour). Its parent material is cobbly and stony colluvium derived from limestone, sandstone, and shale. Note that about a third of the study area (33.9 percent) is comprised of water rather than soil, due largely to the upper reservoir with some from Nickajack Reservoir. The Hartsells and Ramsey types largely surround the reservoir, while the Bouldery colluvium is in a large swath of the study area between these two water bodies (USDA 2025).

Soil maps are provided in the Wetlands Technical Reports for each study area, located in Appendix G.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. Therefore, there would be no impacts on geology or soils resulting from the proposed action under this alternative.

3.9.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Impacts on geology and soils under Alternative B would result from the construction of dams, embankments, and upper reservoir; tunnels, caverns, and shafts; miscellaneous yards and facilities, upper and lower reservoir inlet/outlet structures, roads and access ways, transformer and switchyards, and transmission facilities. Underground excavation will require drilling and blasting.

Approximately 2,587 acres of ground disturbance are expected. An estimated 10 to 17 million cubic yards of material will be required for dam embankment. Whether embankments will be rockfill, roller compacted concrete, seepage barrier, or some other type, will be determined as project design advances. The 2022 Preliminary Geology Report (HDR 2022) notes that the presence of colluvium in the study area, suggesting that it is prone to landslides. Friable sandstone is present as well, which is susceptible to scour when exposed. Construction of the intake/outflow structure on the upper reservoir may require layback depending on the amount of shale, claystone, and/or coal encountered. Also, potentially weak shale beds may lead to toppling or block failures here. There is a high likelihood of encountering cavities, dissolution features, and shale/mudstone during construction of the intake/outflow structure on Guntersville Reservoir. Large amounts of potentially weak shale beds are likely to be encountered during construction of appurtenant features (e.g., tunnels, vertical shafts, and powerhouse), resulting in the potential of compromised structural integrity of geologic features. TVA will implement stability support measures to limit the risk of landslides, stabilize slopes, and control leakage. No major geologic hazards are anticipated with implementation of these measures. TVA's construction contractor will also be responsible for developing site-specific SWPPPs that identify BMPs to minimize potential for erosion during the construction period. Thus, effects of implementation of Alternative B on soils would be minor.

3.9.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under the Widows Creek alternative, TVA would construct a new PSH facility near Widows Creek in Jackson County, Alabama. As with Alternative A, Alternative B will require the construction of dams, embankments, and upper reservoirs; tunnels, caverns, and shafts; miscellaneous yards and facilities, upper and lower reservoir inlet/outlet structures, roads and access ways, transformer and switchyards, and transmission facilities. Underground excavation will require drilling and blasting.

Approximately 937.1 acres of ground disturbance are expected for the development of project facilities and establishment of spoil areas. Additionally, approximately 5.3 million cubic yards of fill will be required for dam embankment. As with Alternative B, the type of material used for embankment is to be determined.

The Widows Creek site is located along the same escarpment as that of the Rorex Creek site. Therefore, it contains the same landslide risks as discussed for Alternative B. For construction on the upper reservoir inlet/outlet structure, slopes may require layback depending on the degree of weathering and amount of shale, claystone, and/or coal encountered. The presence of potentially weak shale beds may compromise the structural integrity of geologic features here as well. It is highly likely that cavities and dissolution features will be encountered during construction activities of the upper reservoir inlet/outlet structure due to the presence of potentially karstic limestone. This is also the case for appurtenant structures (tunnels, vertical shafts, and powerhouse), the construction of which will likely require encountering weak shale beds. TVA will implement stability support measures to limit the risk of landslides, stabilize slopes, and control leakage. TVA's construction contractor will also be responsible for developing site-specific SWPPPs that identify BMPs to minimize the potential for erosion during the construction period. However, due to potential for karst features, BMPs may not be able to fully mitigate risk of stability issues. Thus, effects of the implementation of Alternative B on soils would be moderate.

3.9.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under the Raccoon Mountain alternative, TVA would expand the RPS in Marion County, Tennessee. Approximately 52.5 acres of ground disturbance are expected for expansion activities. No embankment materials will be needed, as this concept would utilize the existing RPS dam structures and reservoirs.

The inlet/outlet structure for the upper reservoir would be excavated within the existing facility through shale and sandstone. Geologic conditions are not expected to result in any construction issues, although the slopes in the shale formation present (Signal Point Shale) may require layback depending on the degree of weathering. For the lower reservoir, excavation would occur in limestone interbedded with thin shale layers. There is the potential for karstic features to require special design elements, should cavities and significant amounts of shale/mudstone be discovered. It is likely that cavities and dissolution features will be found in the limestone during construction, which might be problematic due to leakage under the cofferdam utilized for excavation and structure construction. Construction of appurtenant features (e.g., tunnels, vertical shafts, and underground powerhouse) might also be challenging, as weak shale beds may compromise structural integrity. Countermeasures will be needed for construction activities on the lower reservoir and appurtenant features to prevent leakage and instability; refer to the Geotechnical Report for a thorough discussion of these challenges and countermeasures. TVA's construction contractor will also be responsible for developing site-specific SWPPPs that identify BMPs to minimize potential for erosion during the construction period. Thus, the effects of implementation of Alternative D on soils would be minor.

3.9.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, direct land disturbance including site excavation and grading would be expected. As such, depending on the magnitude of soil disturbed, soil type and erodibility, slope and other factors, there is the potential for such erosion to affect receiving streams and water resources. None of the identified actions by others are adjacent to or geographically intersect with the same lands affected by the proposed project. Potential impacts from those reasonably foreseeable future projects are expected to be localized and minimized through use of BMPs and implementation of other soil erosion control measures. As such, these actions would likely have minimal aggregate impacts on vegetation resources in the area.

3.10 Groundwater

3.10.1 Affected Environment

Groundwater is water within soil and rock pore spaces and rock fractures that underlies the Earth's surface. It originates as precipitation, stormwater, or surface waters that infiltrate into the ground, moving through soils until the water reaches bedrock where it can be stored and transported through openings and cracks depending on bedrock characteristics.

Bedrock or overlying sediments that store or facilitate the movement of groundwater are known as aquifers when they readily transmit water to wells and springs (USGS 2019).

The Rorex Creek and Widows Creek study areas are underlain by the Valley and Ridge aquifer system (Figure 3-20) (USGS 2021). Sedimentary rocks here are mostly limestone, sandstone, and shale, with some dolomite, siltstone, conglomerate, coal, chert, and iron ore (USGS 1995a). Limestone and dolomite contain the most productive aquifers, as they are the most susceptible to dissolution from slightly acidic water, creating openings for water to move downward to the water table and through the aquifer. Recharge in Valley and Ridge aquifers occurs when precipitation falls on outcrop areas, percolating downward through Pennsylvanian rock along steeply inclined fractures. Shale is typically considered to have a very low permeability that impedes vertical flow and causes much of the water to move horizontally through sandstone and conglomerate beds until it emerges in the form of springs. Well records from the GSA within the vicinity of both the Rorex Creek and Widows Creek study areas generally estimate yields of about 10 to 15 gallons per minute (GPM) (GSA 2025b). Valley and Ridge aquifer water quality is generally satisfactory for municipal suppliers and other purposes; however, some groundwater has been found to have iron in higher than safe quantities, and local water contains large amounts of sulfate (USGS 1995a).

The Racoon Mountain study area is underlain by the consolidated Pennsylvanian aquifer system of the Appalachian Plateaus Physiographic Province (Figure 3-20) (USGS 1995b; USGS 2021). In Tennessee, the rock units comprising the Pennsylvanian aquifer system are Middle and Lower Pennsylvanian, consisting mostly of interbedded sandstone, siltstone, shale, and coal, with some conglomerate. Most of these rock units typically have little to no intergranular permeability, and therefore recharge and groundwater flow commonly occurs through secondary features including fractures in sandstones, shales, and some coalbeds, as well as fractures and dissolution features in limestone. Groundwater flow moves from recharge areas, discharging at streams, wells, and coal mines (USGS 1995b). A review of geospatial data from TDEC indicates that wells within the vicinity of the Racoon Mountain study area produce upwards of 100 GPM, although most produce 10 or fewer GPM (TDEC 2025a). Water quality within consolidated rock aquifers of the Appalachian Plateaus Physiographic Province is typically governed by aquifer mineralogy and groundwater residence time (USGS 1995b). In the case of Pennsylvanian aquifers, which are predominantly sandstone, groundwater is generally soft but ranges from soft to hard and contains relatively low concentrations of dissolved solids (56 to 109 milligrams per liter).

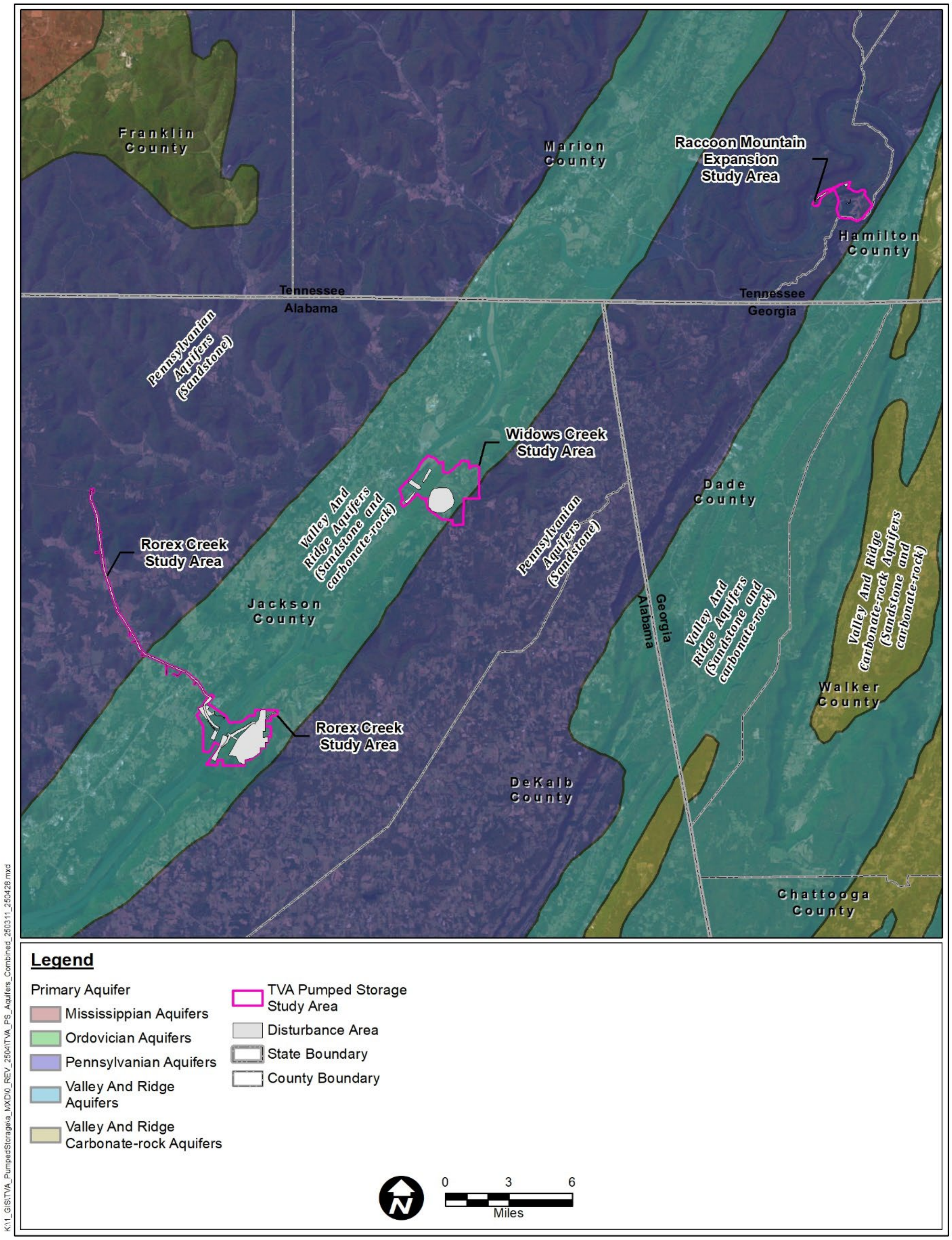


Figure 3-20. Groundwater Aquifers within the Study Areas

The presence of coal mining can affect groundwater in aquifers with economically important amounts of coal (USGS 1995b). Beneath most coalbeds are clayey formations, which impede the flow of water to underlying aquifers, thereby creating multiple perched aquifers. Perched groundwater moves horizontally, not vertically, discharging as springs or seeps at outcrops. Water that comes from coal mining and reclamation activities can experience significant water quality changes, which are more common in the Pennsylvanian aquifers that underlie the Racoon Mountain study area than the Valley and Ridge aquifers under the Rorex Creek and Widows Creek study area.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, a proposed PSH facility would not be constructed or operated at any of the proposed locations. Existing groundwater conditions would remain; therefore, no impacts on groundwater are associated with Alternative A.

3.10.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

The potential for subsurface water migration is likely limited to weathered bedding planes and joint sets within the bedrock which consists of sandstone, conglomerate, shale, and coal laminations. Subsequently, the presence of springs at the base of Sand Mountain indicates a hydraulic connection between the groundwater higher up the mountain. During construction and operation, water within the upper reservoir has the potential to seep into the surrounding rock and soil substrates. As such, seepage can cause groundwater levels to rise locally, and the infiltration of contaminated surface water has the potential to contaminate groundwater. Seepage from the upper reservoir would be prevented using seepage control techniques to be determined as project design progresses, but may include techniques such as grout curtains, localized grouting, or seepage barriers (e.g., liners). Indirect contamination of groundwater from contaminated surface water infiltration would be avoided, minimized, and mitigated through stormwater BMPs and a SPCC plan as discussed in Section 3.5, Surface Water Resources.

If a shallow water table is present during the construction of underground facilities, dewatering may be necessary. Dewatering during the construction of the lower reservoir intake and outlet, water conveyance system, and powerhouse tunnels could create a temporary alteration of existing groundwater flows, creating drawdown areas that divert the natural flow of groundwater toward the dewatered location and creating a temporary and minor reduction in the quantity of groundwater reaching its existing discharge location. TVA would assess the impacts of dewatering on groundwater through the monitoring of groundwater levels surrounding excavation areas. In some cases, fractures and cavities transmitting large amounts of water would be blocked or grouted, as appropriate, to minimize impacts on groundwater because of dewatering. Ultimately, drawdown effects would be temporary and minor, limited to the duration of construction dewatering activities and dissipating at increasing distance from the dewatering location.

Blasting activities used in underground excavation may lead to the release of soluble substances into groundwater from the use of detonators and explosives that are not entirely combusted, potentially resulting in increased levels of nitrate, nitrite, or, to a lesser extent, volatile organic compounds and semi volatile organic compounds at the blasting site. Blasting may also cause disturbances in silt, sand, and rock particles that line fracture surfaces in the subsurface, contributing to higher turbidity in groundwater. Potential water quality impacts associated with blasting would be avoided and minimized using BMPs such as proper drilling, explosive handling, and loading practices aimed at reducing groundwater exposure to contaminants. Additionally, spill prevention plans and measures would be implemented to prevent the release of contaminants onto the ground surface where groundwater could be indirectly impacted from contaminated infiltration. Structurally, blasting can cause new fractures in previously intact rock, dilation of existing joints and discontinuities from high-pressure gases, and the promotion of slip along joints and fracture surfaces, potentially leading to permanent alterations in existing groundwater flow paths. Changes in groundwater flow paths could potentially result in the loss of seeps and springs if groundwater supplies are interrupted or in changes to lower reservoir groundwater levels or recharge due to changes in the vertical movement of groundwater. Changes in groundwater hydrology due to blasting are expected to be minor; however, grouting and seepage prevention measures may be used to minimize or prevent alterations in groundwater transport.

Operation of Alternative B would not alter the quantity of existing groundwater flow as groundwater will not be used to fill the upper reservoir; however, depending on groundwater elevations and site-specific hydrogeologic features with respect to the underground facilities, groundwater flow may be displaced around underground facilities, potentially leading to alterations in groundwater flow paths. Additionally, grouting done to reduce impacts to dewatering may alter existing groundwater flow patterns. The full extent of groundwater conditions within the project site remains unknown. Further investigation of the project site would be performed to identify and evaluate existing hydrogeologic conditions and groundwater conditions within the limits of disturbance. Despite unknown site conditions, impacts on groundwater from Alternative B are expected to be minor because project designs will not use groundwater to fill the upper reservoir and will incorporate measures that prevent seepage. Additionally, construction and dewatering will involve the implementation of BMPs and an SPCC plan that would prevent adverse impacts on groundwater from contaminated infiltration.

3.10.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Similar to Alternative B, the upper reservoir of Alternative C is underlain by the Pottsville Formation, meaning that subsurface water migration is likely to occur within weathered bedding planes and joint sets within the bedrock. It is assumed, for the basis of this analysis, that the seepage potential of the upper reservoir of Alternative C is similar to that of Alternative B even though site-specific groundwater information is more limited with respect to this alternative. It is also expected that construction activities associated with Alternative C, including dewatering, would have similar impacts on groundwater as those associated with Alternative B, such that BMPs and an SPCC plan would be used to avoid, minimize, and mitigate any potential indirect groundwater quality impacts. Furthermore, the full extent of groundwater conditions within the project site remains unknown, and investigations of the project site would be required to identify and evaluate existing hydrogeologic conditions and groundwater conditions within the limits of disturbance and before any dewatering activities. Additionally, this alternative would require use of dredging, underwater excavation, or both to create a water conveyance system, or tailrace, for the lower reservoir inlet and outlet structures across the existing superior quality forested wetland complex in the floodplain adjacent to the Guntersville Reservoir, as discussed in Section 3.7.2.3. These activities could cause disruption to subsurface hydrology.

Ultimately, impacts on groundwater from Alternative B are expected to be minor because project designs will not use groundwater to fill the upper reservoir and will incorporate measures that prevent seepage. Additionally, construction and dewatering will involve the implementation of BMPs and an SPCC plan that will indirectly prevent groundwater contamination from surface water.

3.10.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Unlike Alternative B and C, an upper reservoir already exists at the Raccoon Mountain PSH Facility. Based on subsurface investigations of the existing Raccoon Mountain Pumped Storage Site before its original construction, subsurface water migration was confirmed along weathered bedding planes and joint sets. The use of a grout curtain under the dam of the upper reservoir has made the upper reservoir sufficiently watertight. The expansion of the existing reservoir, incorporating seepage control techniques during later phases of design, is not expected to result in impacts to groundwater resources.

Construction activities associated with Alternative D, including dewatering, would have similar impacts on groundwater as those associated with Alternatives B and C, such that BMPs and an SPCC plan would be used to avoid, minimize, and mitigate any potential indirect groundwater quality impacts. Furthermore, the full extent of groundwater conditions within the project site remains unknown, and investigations of the project site would be required to identify and evaluate existing hydrogeologic conditions and groundwater conditions within the limits of disturbance and prior to any dewatering activities. Ultimately, impacts on groundwater from Alternative D are expected to be minor because project designs will not use groundwater to fill the upper reservoir and will incorporate measures that prevent seepage. Additionally, construction and dewatering will involve the implementation of BMPs and an SPCC plan that will indirectly prevent groundwater contamination from surface water.

3.11 Land Use

3.11.1 Affected Environment

Land use is defined as the way people use and develop land, including undeveloped, agricultural, residential, and institutional uses. Many municipalities and counties develop zoning ordinances and planning documents to control the direction of development and keep similar land uses together. Use of federal lands is generally regulated by the acts establishing the various federal land management agencies as well as other laws. For example, the TVA Act gives TVA the authority to regulate the use of lands it manages as well as development across, along, or in the Tennessee River or any of its tributaries. Various state laws and local ordinances also regulate land use, although most of land in the TVA region is not subject to local zoning ordinances (TVA 2019b).

TVA manages an extensive reservoir system within the Tennessee River, allocating approximately 293,000 acres of public lands surrounding TVA dams and reservoirs for public use. These reservoirs and their associated locks and dams create a series of lakes that form one navigation channel from Knoxville, Tennessee, to Paducah, Kentucky, allowing for regulation of the river for navigation, flood control, power generation, water supply, and recreation. TVA has developed Reservoir Land Management Plans for each major reservoir, allocating public lands under TVA stewardship into broad categories or "zones" used to guide land use approvals and resource management decisions (Table 3-41).

Table 3-41. TVA-Designated Land Use Zones

Zone	Definition
Zone 1 Non-TVA Shoreland	Shoreland located above summer pool elevation that TVA does not own in fee, or land that was never purchased by TVA. TVA does not allocate private or other non-TVA land. This category is provided to assist in any comprehensive evaluation of potential environmental impacts of TVA's allocation decisions.
Zone 2 Project Operations	TVA reservoir land currently used for TVA operations and public works projects. Types of development include: • Land adjacent to established navigation operations: locks, lock operations and maintenance facilities • Land used for TVA power projects operations: generation facilities, switchyards, transmission facilities, and rights-of-way • Dam reservation land: areas used for developed and dispersed recreation, maintenance facilities, watershed team offices, research areas and visitor centers • Navigation safety harbors/landings: areas used for tying off commercial barge tows and recreational boats during adverse weather conditions or equipment malfunctions • Public works projects: includes fire halls, public water intakes, public treatment plants, etc. • Land planned for any of the above uses in the future
Zone 3 Sensitive Resource Management	Land managed for protection and enhancement of sensitive resources protected by state or federal law or executive order, and other land features/natural resources TVA considers important to the area viewscape or natural environment. Recreational natural resource activities may occur in this zone, but the overriding focus is protecting and enhancing sensitive resources. Areas include: • TVA-designated sites with potentially significant archaeological resources • TVA public land with sites/structures listed on or eligible for listing on the National Register of Historic Places • TVA public land (or TVA land fronting land) that is under easement, lease, or license to other agencies/individuals for resource protection • Wetlands • Habitat Protection Areas • Ecological study areas • Small Wild Areas • River corridors containing sensitive resources • Significant scenic areas • Champion Tree sites • Other sensitive ecological areas such as heron rookeries, uncommon plant and animal communities and unique cave or karst formations

Zone	Definition
Zone 4 Natural Resource Conservation	Land managed for the enhancement of natural resources for human use and appreciation. Management of resources is the primary focus of this zone. Activities could include hunting, timber management to promote forest health, wildlife observation, and camping on undeveloped sites. Areas include: • TVA public land under easement, lease, or license to other agencies for wildlife or forest management purposes • TVA public land (or TVA land fronting land owned by other agencies) that is managed for wildlife or forest management projects • Informal recreation areas maintained for passive, dispersed recreation • Shoreline Conservation Areas: narrow riparian strips of vegetation between the water's edge and TVA's back-lying property managed for wildlife, water quality, or visual qualities • Wildlife Observation Areas: TVA Natural Areas with unique concentrations of easily observed wildlife • River corridor without sensitive resources present: linear green space managed for light boat access, riverside trails and interpretive activities • Islands of 10 acres or less
Zone 5 Industrial	Land managed for economic development, including distribution-processing-assembly and light manufacturing. Areas include: • TVA land (or TVA land fronting land) that is under easement, lease, or license to other agencies/individuals/entities for industrial purposes • Sites planned for future use supporting sustainable development Types of development include: • Business parks (does not include retail or service-based businesses) • Industrial access: access to the waterfront by back-lying property owners for water intakes, wastewater discharge, or conveyance of commodities • Barge terminal sites: public or private facilities used for the transfer, loading, and unloading of commodities • Fleeting areas: sites used to switch barges between tows or barge terminals that have both offshore and onshore facilities • Minor commercial landing: temporary or intermittent activity that takes place without permanent improvements to the property
Zone 6 Developed Recreation	Land managed for concentrated, active recreation that require capital improvement and maintenance of developed infrastructure, including: • TVA public land developed for recreational purposes, such as campgrounds, day use areas, etc. • TVA public land (or TVA land fronting land) that is under easement, lease, or license to other agencies/individuals/entities for developed recreational purposes • Land planned for any of the above uses in the future. Types of development that can occur on this land include: • Water access: launching ramps, courtesy piers, canoe access, etc. • Public recreation: publicly owned recreation with facilities developed by a public agency and providing amenities open to the general public • Commercial recreation: recreation amenities provided for a fee to the public intending to produce a profit for the owner/operator • Greenways: linear parks or developed trails

Zone	Definition
Zone 7 Shoreline Access	TVA-owned land where private waterfront facility applications and other land use approvals for shoreline alterations are considered. Types of development/management that can occur on this land are: • Water use facilities: docks, piers, launching ramps/driveways, marine railways, boathouses, enclosed storage space, and non-potable water intakes • Access corridors: pathways, wooden steps, walkways, or mulched paths. • Shoreline stabilization areas and shoreline vegetation management • Conservation easements for shoreline protection • Other activities, e.g., fill, excavation, grading, etc.

Source: TVA 2025c

3.11.1.1 Rorex Creek Study Area

The Rorex Creek study area is located in Jackson County, west of Pisgah, Alabama, spanning both sides of Guntersville Reservoir along the Tennessee River, at River Mile 388. The study area contains all or portions of 79 parcels, 16 of which are owned by TVA. The remaining 63 parcels represent land owned by private individuals or entities.

As described in Section 3.2, Vegetation, most of the study area is comprised of deciduous forest (40 percent) and hay/pasture lands (14 percent). The escarpment along the east side of the reservoir is rocky, forested terrain with an elevation change of approximately 800 feet from the reservoir to the top of the escarpment. The plateau at the top of the escarpment is primarily composed of rural residential land with pastures, agricultural fields, loblolly pine plantations, shallow abandoned mine pit ponds and wetlands, and transmission line easements. On the west side of the reservoir, the study area includes a portion of the Bellefonte Nuclear Power Plant property in addition to a 300-foot-wide transmission line corridor that extends approximately 14.7 miles northwest from the Bellefonte property to Crow Mountain. The transmission line corridor crosses forested areas, pastures, agricultural fields, residential properties, and roadways. Several islands along both banks of the reservoir are also included in the Rorex Creek study area.

TVA-owned portions of the study area are managed pursuant to the Guntersville Reservoir Land Management Plan (GRLMP), and are not subject to county or local zoning regulations. Additionally, Jackson County does not have zoning laws, nor are building permits required, in areas outside the jurisdiction of a municipality (Jackson County Commission 2024). The GRLMP allocates roughly 40,000 acres to different land use types, or zones, the majority of which fall into Zone 4 – Natural Resource Conservation (22,321 acres), Zone 3 – Sensitive Resource Management (10,260 acres), and Zone 2 –TVA Project Operations (5,079 acres). Together, the land in these three zones accounts for approximately 94 percent of land use designations within Guntersville Reservoir (TVA 2001).

The study area and associated transmission line corridor intersect four parcels adjacent to the shoreline that are managed under the GRLMP. Two parcels are allocated to Zone 3 – Sensitive Resource Management, for the protection of cultural, visual, wetland, navigation, and wildlife/plant resources associated with the Raccoon Gulf Small Wild Area (SWA), which serves as a flyway for federally listed endangered mammals, and the proposed

Bellefonte Island SWA, which supports a naturally occurring community of mature tupelo-gum, providing habitat for numerous species of waterfowl while simultaneously providing a recreational opportunity for the public. One parcel is allocated to Zone 4 – Natural Resource Conservation, for management of important wildlife habitat and shoreline vegetation. One small island parcel within the Guntersville Reservoir is allocated to Zone 5 – Industrial/Commercial Development and has been used for a barge terminal by Baker Sand and Gravel (TVA 2001).

3.11.1.2 Widows Creek Study Area

The Widows Creek study area would intersect 258 parcels, five of which are owned by TVA. The remaining 253 parcels represent land owned by private individuals or entities.

The Widows Creek study area is located within Jackson County, Alabama, in the unincorporated community of Long Island near Fabius, Alabama, on the east side of the Tennessee River. As described in Section 3.2, Vegetation, the 4,640-acre study area is dominated by deciduous forest (43 percent) and hay/pasture lands (20 percent). As described above, Jackson County does not have zoning laws, nor do they require building permits in areas outside the jurisdiction of a municipality (Jackson County Commission 2024). The area is primarily owned by private landowners, with some TVA property on the mountainside and adjacent to the Guntersville Reservoir.

The study area intersects one parcel designated under the GRLMP, which is allocated to Zone 4 – Natural Resource Conservation, for the management of important wildlife habitat and shoreline vegetation in association with the Raccoon Creek Wildlife Management Area (WMA) (TVA 2001).

3.11.1.3 Raccoon Mountain Study Area

The existing RPS is located above Nickajack Reservoir on the Tennessee River, Mile 444, six miles west of Chattanooga, Tennessee. The plant consists of an artificial reservoir on the mountain top and a hydroelectric generating plant located in chambers and tunnels inside the mountain. As described in Section 3.2, Vegetation, the study area consists primarily of deciduous forest (38 percent) and open water (36 percent). All of the land within the study area is owned by TVA; there are no privately owned parcels in the study area. Private lands surrounding the RPS consist primarily of minimally developed, forested areas, which serve as a buffer for the nearest residential areas to the east and south.

TVA public lands along the Nickajack Reservoir fall under the jurisdiction of the Nickajack Reservoir Land Management Plan (NRLMP) (TVA 2017b). The majority of the 3,605 acres allocated under the NRLMP fall into Zone 3 – Sensitive Resource Management (1,357 acres), Zone 2 – TVA Project Operations (1,187 acres), and Zone 4 – Natural Resource Conservation (822 acres) (TVA 2017b). However, as a power generator, the RPS is managed as a power asset and is outside the jurisdiction of the NRLMP, and is also not subject to county or local zoning regulations. Land use in the Raccoon Mountain study area has been specifically designated by TVA for power generation, though the area also supports recreation and wildlife habitat.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the RPS facility. Therefore, there would be no changes to land use within the study areas.

3.11.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, construction activities associated with the development of the PSH facility would occur within a 2,521-acre disturbance area (Figures 3-1a through 3-1e). These activities would require acquisition of privately owned land by TVA and the conversion of up to approximately 2,077 acres of residential, agricultural, and forested lands on the east side of Guntersville Reservoir to industrial or mixed land uses associated with a PSH facility and developed recreation. It is anticipated that recreation facilities would be similar to existing facilities at the RPS, and would likely include hiking and biking trails, boat ramps, picnic areas, and overlooks.

Proposed development on the west side of the Guntersville Reservoir would consist of infrastructure improvements, including bridge and access road development, transmission line improvements, and associated construction support areas. Land use conversions on this side of the reservoir would be minimal, as much of the disturbance area is located either on the industrial Bellefonte Nuclear Power Plant property or along existing ROW.

Construction activities would also result in short-term land use impacts associated with the temporary conversion of land to laydown areas to support various construction-related activities. These short-term impacts would include the use of construction parking lots, laydown and stockpile areas, and temporary crew trailers and offices. Upon completion of construction activities, it is anticipated that this area would be restored to a natural, vegetated state. Therefore, land use impacts in temporary use and laydown areas are anticipated to be temporary and minor.

As described above, some TVA-owned parcels within the study area are included in the GRLMP. These lands would be removed from the GRLMP. As the study area acreages are relatively small compared to the total land allocated to Zones 3 and 4 under the GRLMP, this would not significantly impact the goals and objectives for sensitive resource management and natural resource conservation outlined in the GRLMP. Changes in land use would be minor.

3.11.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, construction activities would convert approximately 937 acres of existing residential, agricultural, and forested lands within the identified disturbance area (Figure 3-2) to industrial or mixed land uses, resulting in similar land use impacts as described under Alternative B. While the impacted acreage is less, as stated in Section 2.4.2, the design, location, and requirements are based on preliminary designs, and thus some potential future actions such as transmission and infrastructure improvements, and temporary use and laydown areas, are not evaluated in this EIS. Additionally, Alternative C would have larger land acquisition impacts, as there are a greater number of parcels owned by private individuals or entities.

3.11.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would expand operations at the existing RPS by installing a second underground powerhouse, which would use water from the existing upper reservoir. Land use designations within the 1,400-acre study area would not change as a result of construction or operation activities under this Alternative. The proposed expansion facility would occupy lands designated for existing RPS operations. There would be no impacts to NRLMP allocated land, nor would there be any acquisition of property from private individuals or entities study area. Therefore, there would be no impacts to land use as a result of the potential action under this Alternative.

3.12 Prime Farmland

3.12.1 Affected Environment

The 1981 Farmland Protection Policy Act (FPPA) (7 CFR Part 658) requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air, not excessively erodible or saturated for extended periods, and are protected from frequent flooding. Prime farmland does not include land already in or committed to urban development, roads, or water storage. Prime farmland soils within the study areas were identified using the USDA Natural Resource Conservation Service (NRCS) web soil service mapper (USDA 2025).

3.12.1.1 Rorex Creek Study Area

Soil types found within the Rorex Creek study area are detailed in Section 3.9, Geology and Soils. Based on information obtained from USDA NRCS, summarized in Table 3-42, approximately 2,238 acres of the study area and associated off-site transmission line corridor have soil types that are considered prime farmland, farmland of statewide importance, or prime farmland if drained. This represents approximately 46 percent of the total area within the Rorex Creek study area and transmission line corridor (Table 3-42). Prime farmland soils within these areas are primarily Wynnville-Nauvoo fine sandy loams and Hartsells fine sandy loam.

Prime farmland is not a unique feature in the vicinity, with over 53 percent of soils in a 5-mile radius of the Rorex Creek study area being considered prime farmland, farmland of statewide importance, or prime farmland if drained (Table 3-42).

Table 3-42. Prime Farmland Soils in the Rorex Creek Study Area and Vicinity

Prime Farmland	Study Area		Project Vicinity	
	Area (acres)	Percent (%)	Area (acres)	Percent (%)
Not Prime Farmland	2,610	53.8	79,479	46.5
Prime Farmland Classifications				
All Areas are Prime Farmland	1,126	22.9	46,828	27.4
Farmland of Statewide Importance	1,046	21.9	42,016	24.6
Prime Farmland if Drained	67	1.4	2,511	1.5
Total Prime Farmland (all Classifications)	2,238	46.2	91,355	53.5
Total	**4,848**	**100.0**	**170,834**	**100.0**

Source: USDA 2025

3.12.1.2 Widows Creek Study Area

Soil types found within the Widows Creek study area are detailed in Section 3.9, Geology and Soils. Based on information obtained from USDA NRCS and summarized in Table 3-43, approximately 2,729 acres of the Widows Creek study area consist of soil types that are considered prime farmland, farmland of statewide importance, or prime farmland if drained. This represents approximately 59 percent of the total area within the study area (Table 3-43). Prime farmland within these areas primarily consists of Hartsells-Nauvoo Complex and Hartsells fine sandy loams.

Prime farmland is not a unique feature in the project vicinity, with approximately 49 percent of soils in a 5-mile radius of the Widows Creek study area being considered prime farmland, farmland of statewide importance, or prime farmland if drained (Table 3-43). Overall, prime farmland soils within the study area comprise approximately 6 percent of the total prime farmland soils within a 5-mile radius of the study area.

Table 3-43. Prime Farmland Soils in the Widows Creek Study Area and Vicinity

Prime Farmland	Study Area		Project Vicinity	
	Area (acres)	Percent (%)	Area (acres)	Percent (%)
Not Prime Farmland	1,912	41.2	47,487	51.3
Prime Farmland Classifications				
All Areas are Prime Farmland	1,588	34.2	22,621	24.4
Farmland of Statewide Importance	700	15.1	20,258	21.9
Prime Farmland if Drained	441	9.5	2,242	2.4
Total Prime Farmland (all Classifications)	2,729	58.8	45,120	48.7
Total	**4,640**	**100.0**	**92,607**	**100.0**

Source: USDA 2025

3.12.1.3 Raccoon Mountain Study Area

Soil types found within the Raccoon Mountain study area are detailed in Section 3.9, Geology and Soils. Based on information obtained from USDA NRCS, summarized in Table 3-44, approximately 60 acres, or 4 percent of the study area, have soil types that are considered prime farmland. Overall, prime farmland soils within the study area comprise approximately 1 percent of the total prime farmland soils within a 5-mile radius of the study area.

Although some of the soils within the study area have the physical characteristics of prime farmland, the site has been designated for power generation, thereby removing it from the prime farmland category under the FPPA and its implementing regulations.

Table 3-44. Prime Farmland Soils in the Raccoon Mountain Study Area and Vicinity

Prime Farmland	Study Area		Project Vicinity	
	Area (acres)	Percent (%)	Area (acres)	Percent (%)
Not Prime Farmland	1,423	96.0	69,880	93.1
Prime Farmland Classifications				
All Areas are Prime Farmland	60	4.0	4,460	5.9
Farmland of Statewide Importance	-	-	746	1.0
Prime Farmland if Drained	-	-	-	-
Total Prime Farmland (all Classifications)	60	4.0	5,206	6.9
Total	**1,482**	**100**	**75,086**	**100.0**

Source: USDA 2025

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the RPS. Existing prime farmland characteristics in the study areas and vicinity would remain unchanged.

3.12.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, direct impacts to prime farmland soils would occur as a result of construction activities. Approximately 2,521 acres of the 4,848-acre study area would be disturbed during the construction of the proposed PSH facility and associated infrastructure improvements. Of this disturbance area, approximately 65 percent (1,639 acres) is comprised of soil types that are considered prime farmland, farmland of statewide importance, or prime farmland if drained (Table 3-45). Therefore, implementation of Alternative B may permanently convert up to 1,639 acres of prime farmland to utility uses.

Table 3-45. Disturbance of Prime Farmland Soils in the Rorex Creek Study Area

Prime Farmland	Off-Site Transmission Corridor		Total Disturbance Area	
	Area (acres)	Percent (%)	Area (acres)	Percent (%)
Prime Farmland Classifications				
All Areas are Prime Farmland	154.6	34.8	833.3	33.1
Farmland of Statewide Importance	173.7	39.1	744.0	29.5
Prime Farmland if Drained	-	-	61.3	2.4
Total Prime Farmland (all Classifications)	**328.3**	**74.0**	**1,638.5**	**64.8**

Source: USDA 2025

However, on the western side of Guntersville Reservoir, a portion of the disturbance area is located on TVA's Bellefonte Nuclear Power Plant property. This property has been designated for industrial uses, thereby removing this land from the prime farmland category under the FPPA and its implementing regulations. Additionally, approximately 444 acres of disturbance area, 328 acres of which are considered prime farmland soils, are located within the off-site transmission line corridor on existing ROW. While farmland located within the transmission line corridor may be temporarily impacted by construction activities while the line is cleared and upgraded, it would typically be able to remain in production in the long term.

In accordance with FPPA evaluation procedures, a USDA Farmland Conversion Impact Rating (Form AD-1006) was completed for the Rorex Creek and Widows Creek study areas with input from the USDA NRCS (Appendix H). Form AD-1006 quantifies the potential impacts to prime farmland. The impact rating considers the acreage of prime farmland to be converted, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban environments, percentage of area currently being farmed, and compatibility with existing agricultural use. This form assigns a numerical rating between zero and 260 based on the area of prime farmland to be disturbed, the total area of farmland in the affected county, and other criteria. Per the FPPA, construction within an existing ROW purchased on or before August 4, 1984 is not subject to provisions of FPPA (USDA 2003). As the existing transmission line was erected before August 4, 1984, the land within the existing off-site transmission line corridor at Rorex was not included in this consultation. The impact rating score for the Rorex Creek study area was 160.4 (Appendix H, Site A), just over the threshold of 160 which the NRCS considers to have a greater potential to adversely affect prime farmland. As the project score exceeds 160, but is under 220, the NRCS requires evaluation of alternative site locations or demonstration that there are overriding reasons for the current location. Section 2.6, Comparison of Alternatives, summarizes the evaluation of the alternative sites considered and Section 2.7, TVA's Preferred Alternative, list the primary reasons that Alternative B was selected as the preferred alternative. Since consultation with USDA NRCS was completed, the project footprint has been slightly reduced, resulting in a smaller overall disturbance area than originally proposed on Form AD-1006. Given that the updated disturbance area would lessen overall impacts to prime farmland soils, and the proposed location and land use context would not change, WSP concluded that no additional consultation with USDA NRCS is required.

Approximately 91,000 acres (53 percent) of the area within five miles have soils classified as prime farmland. The minor loss of on-site soils with prime farmland characteristics due to the development of the proposed PSH is minor when compared to the amount of land designated as prime farmland within the surrounding region. Therefore, impacts to prime farmland soils associated with Alternative B would be minor and would not notably impact regional agriculture or crop production.

3.12.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, impacts to prime farmland soils would be similar to those under Alternative B. Approximately 937 acres of the 4,640-acre study area have been identified for permanent impacts, approximately 593 of which are comprised of soil types that are considered prime farmland, farmland of statewide importance, or prime farmland if drained (Table 3-46). While this acreage is less than Alternative B, as stated in Section 2.4.2, the design, location, and requirements are based on preliminary designs, and thus some potential future actions such as transmission and infrastructure improvements, and temporary use and laydown areas, are not evaluated in this EIS.

Table 3-46. Disturbance of Prime Farmland Soils in the Widows Creek Study Area

Prime Farmland	Total Disturbance Area	
	Area (acres)	**Percent (%)**
Prime Farmland Classifications		
All Areas are Prime Farmland	281.9	30.1
Farmland of Statewide Importance	189.4	20.2
Prime Farmland if Drained	122.1	13.0
Total Prime Farmland (all Classifications)	**593.3**	**63.3**

Source: USDA 2025

As described under Alternative B, TVA completed Form AD-1006 for the Rorex Creek and Widows Creek study areas in accordance with FPPA evaluation procedures. The impact rating score for the Widows Creek study area was 165.5 (Appendix H, Site B), slightly higher than that for Alternative B.

As approximately 45,000 acres (49 percent) of the area within five miles have soils classified as prime farmland, the minor loss of on-site soils with prime farmland characteristics under Alternative C would also be minor and would not notably impact regional agriculture or crop production.

3.12.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, approximately 52.5 acres have been identified for permanent impacts, approximately 32 of which are classified as prime farmland (Table 3-47). However, as these areas have been heavily disturbed by the previous cut and fill associated with construction of the RPS, soils may no longer exhibit prime farmland characteristics. Additionally, as stated in Section 2.4.3, the design, location, and requirements are based on preliminary designs, and thus some potential future actions such as transmission and infrastructure improvements, and temporary use and laydown areas, are not evaluated in this EIS.

Alternative D was not included on the Form AD-1006 as projects on land already in urban development or used for water storage are not subject to the provisions of FPPA (USDA 2003).

Table 3-47. Disturbance of Prime Farmland Soils in the Raccoon Mountain Study Area

Prime Farmland	Total Disturbance Area Area (acres)	Total Disturbance Area Percent (%)
Prime Farmland Classifications		
All Areas are Prime Farmland	32.4	61.7
Farmland of Statewide Importance	-	-
Prime Farmland if Drained	-	-
Total Prime Farmland (all Classifications)	**32.4**	**61.7**

Source: USDA 2025

Under Alternative D, impacts to prime farmland would be negligible, and less than those associated with Alternatives B and C, as the area is already in use as a PSH facility.

3.13 Navigation

3.13.1 Affected Environment

Water flow in the Tennessee River is managed by TVA for flood control, navigation, power generation, water quality, water supply, and recreation (TVA 2020). The Tennessee River Waterway Management Plan provides guidance for marine operations and transportation on the Tennessee River to facilitate safe and orderly movement of barge traffic during navigational crises (TVA 2020b). The Tennessee River is the only navigable water present within the study areas.

Navigation can be impacted by flow and water level. Occurrences of high water can result in impacts to navigation from swift currents, heavy loads of debris, and degradation or loss of aids to navigation. Occurrences of low water can further result in impacts to navigation through reduced channel widths and draft limitations (TVA 2020b).

3.13.1.1 Guntersville Reservoir

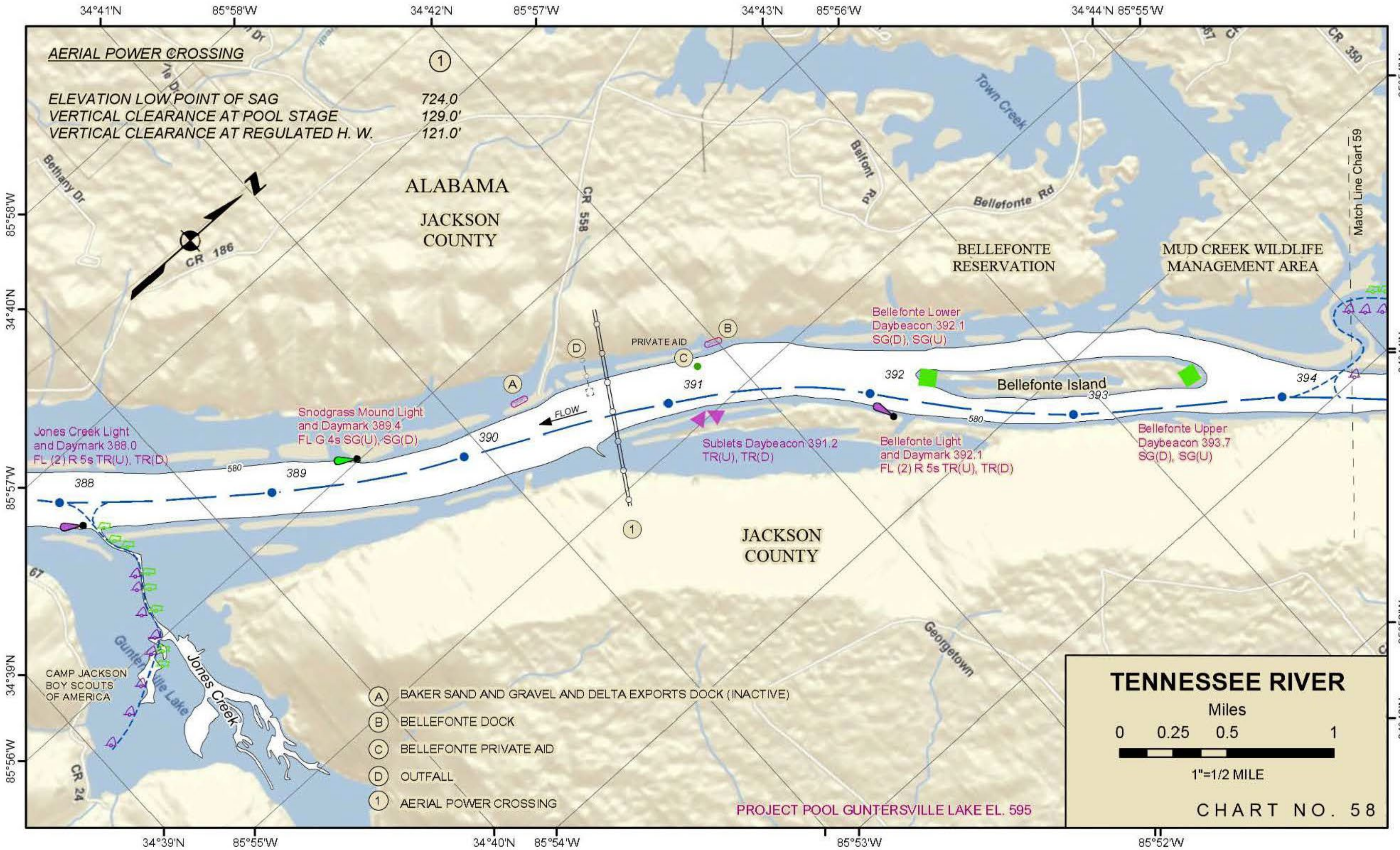
The USACE Nashville District provides navigational maps for the Tennessee River. Navigational charts for the Rorex Creek study area, Widows Creek study area, and nearby areas are shown on Figure 3-21 through Figure 3-24. Two bridges are present in this reach of the Tennessee River, the CSX Railroad Bridge at TRM 414.4 and the Captain John Snodgrass Highway Bridge (State Highway 117) at TRM 403.1. The vertical clearance of the CSX Railroad Bridge at regulated high water is 59.7 feet in the raised position, and the vertical clearance of the Captain John Snodgrass Highway Bridge at regulated high water is 51.1 feet. There are a total of 10 aerial power crossings in this section of the Tennessee River, the lowest of which has a vertical elevation at regulated high water at 78 feet (USACE 2024).

Flow and pool elevation in Guntersville Reservoir are managed by TVA. The target summer pool level is about elevation 595 feet and the target winter pool elevation is around 593 to 593.5 feet (TVA 2023c). Presently, the typical daily fluctuations in the Guntersville reservoir pool level are on the order of about 0.5 feet per day (TVA 2023c).

3.13.1.2 Nickajack Reservoir

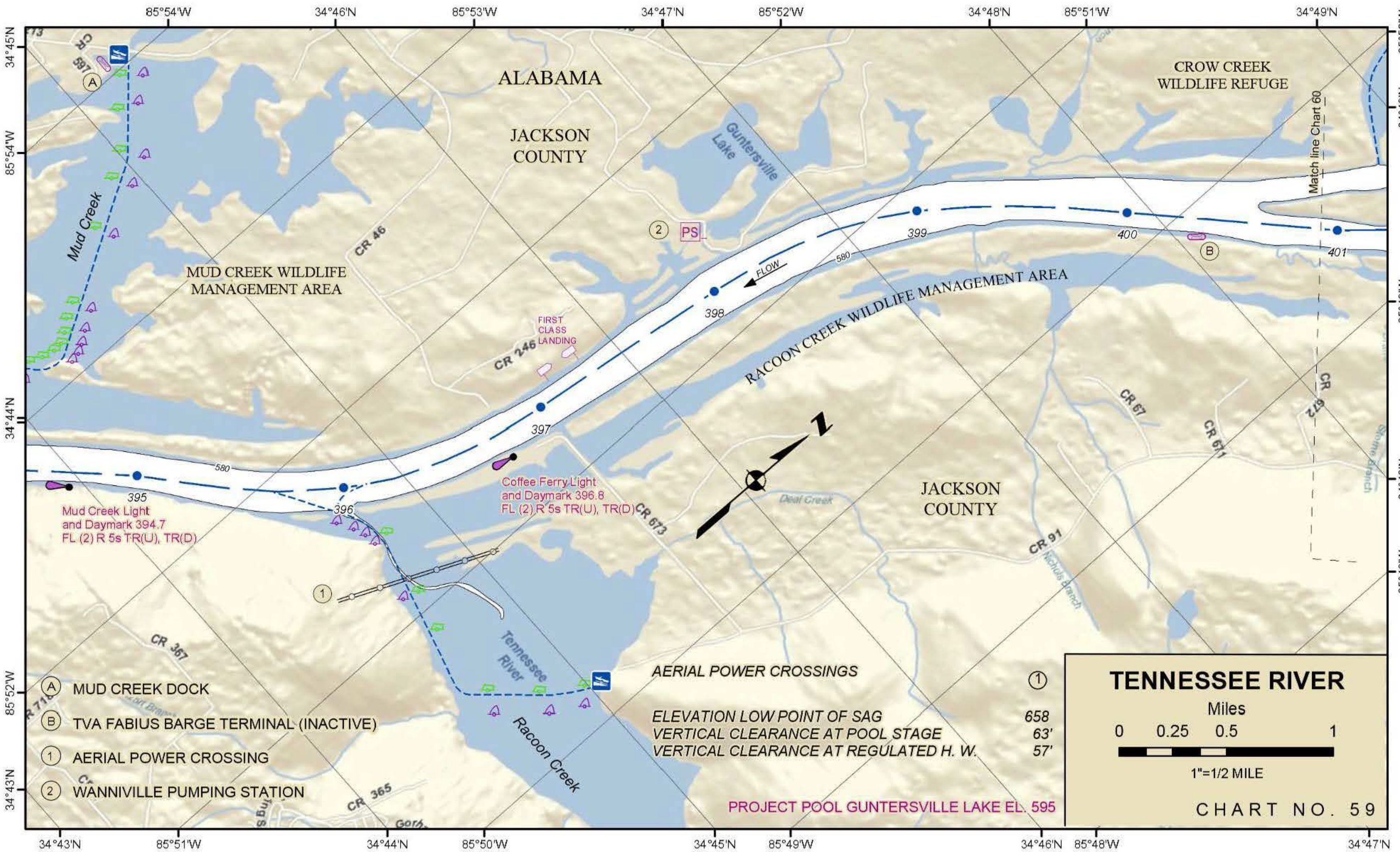
Navigational charts for the Raccoon Mountain study area and nearby areas are shown on Figure 3-25 through Figure 3-27. There are a total of three aerial power crossings in this section of the Tennessee River, the lowest of which has a vertical elevation at regulated high water at 78 feet. There are no bridge crossings of the Tennessee River in this reach (USACE 2024).

Water levels in Nickajack Reservoir are managed by TVA. The pool elevation target for Nickajack Reservoir is constant year-round, as Nickajack Reservoir does not provide flood storage capacity and does not undergo winter drawdown. Water levels in the Nickajack Reservoir are subject to variability in flow and pool level as a result of the existing TVA RPS facility (TVA 2023c). Detailed description of typical pool elevation fluctuation in Nickajack Reservoir can be found in Section 3.5, Surface Water Resources.



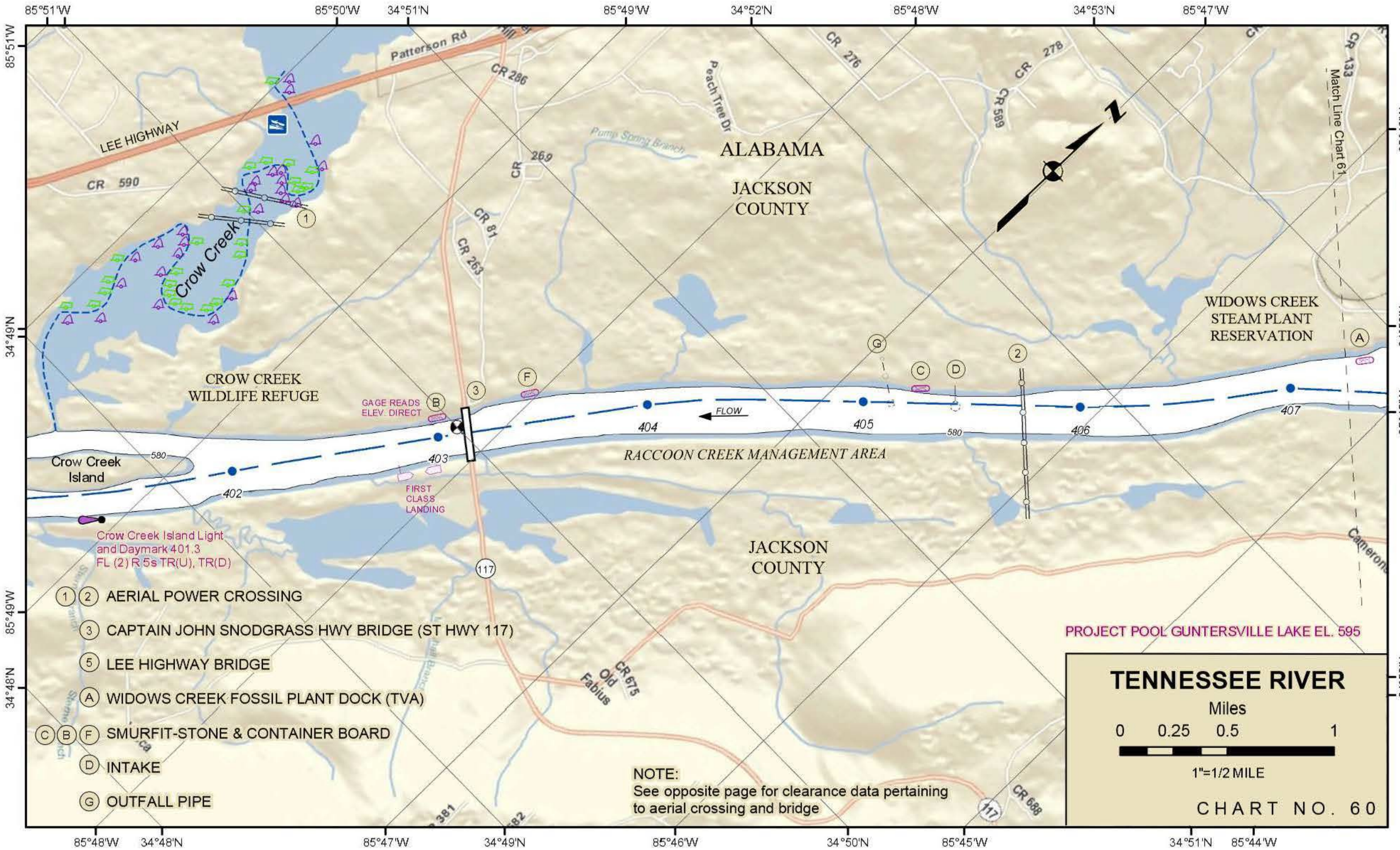
Source: USACE 2024

Figure 3-21. USACE Navigation Chart for Bellefonte Island



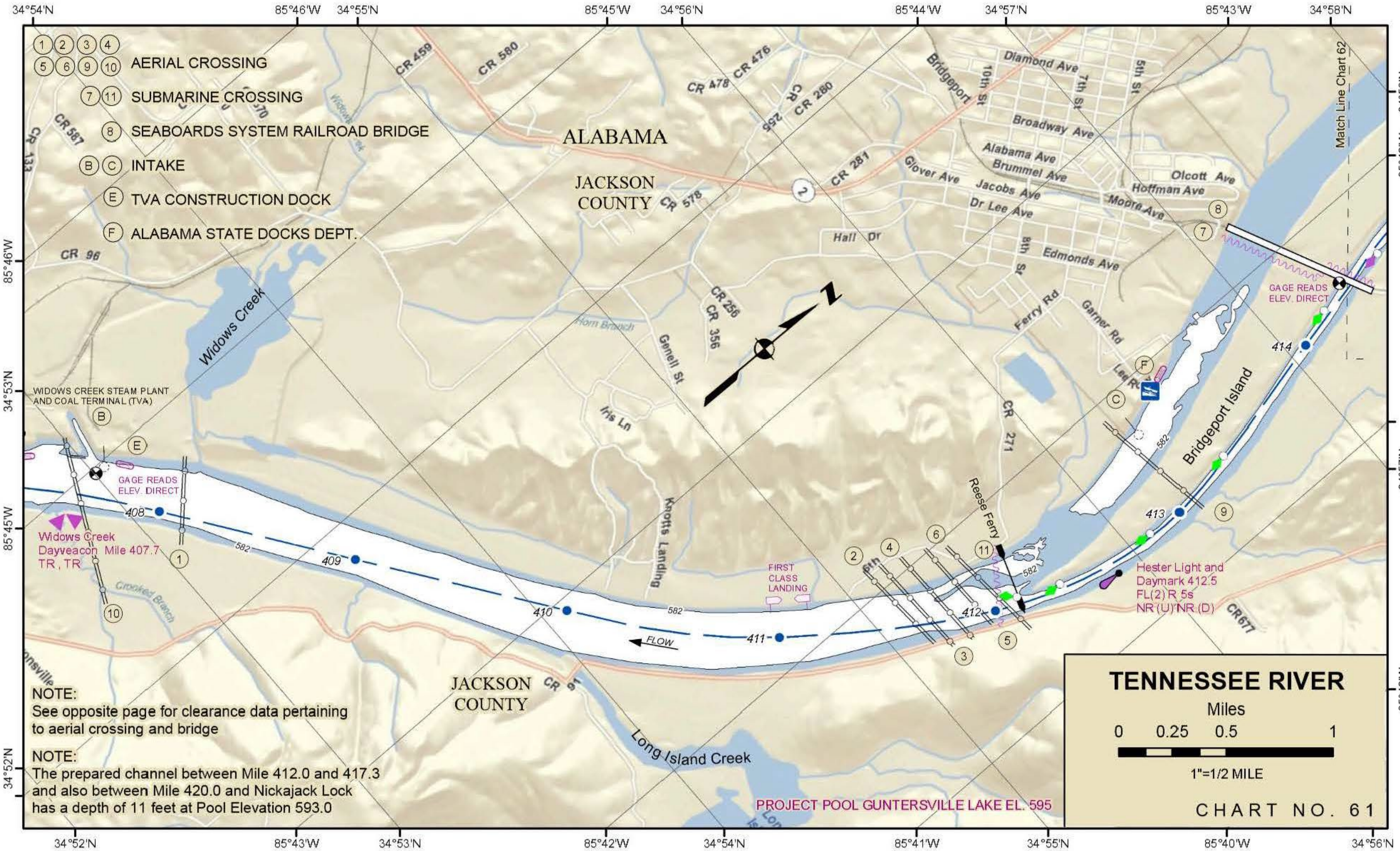
Source: USACE 2024

Figure 3-22. USACE Navigational Chart for Raccoon Creek



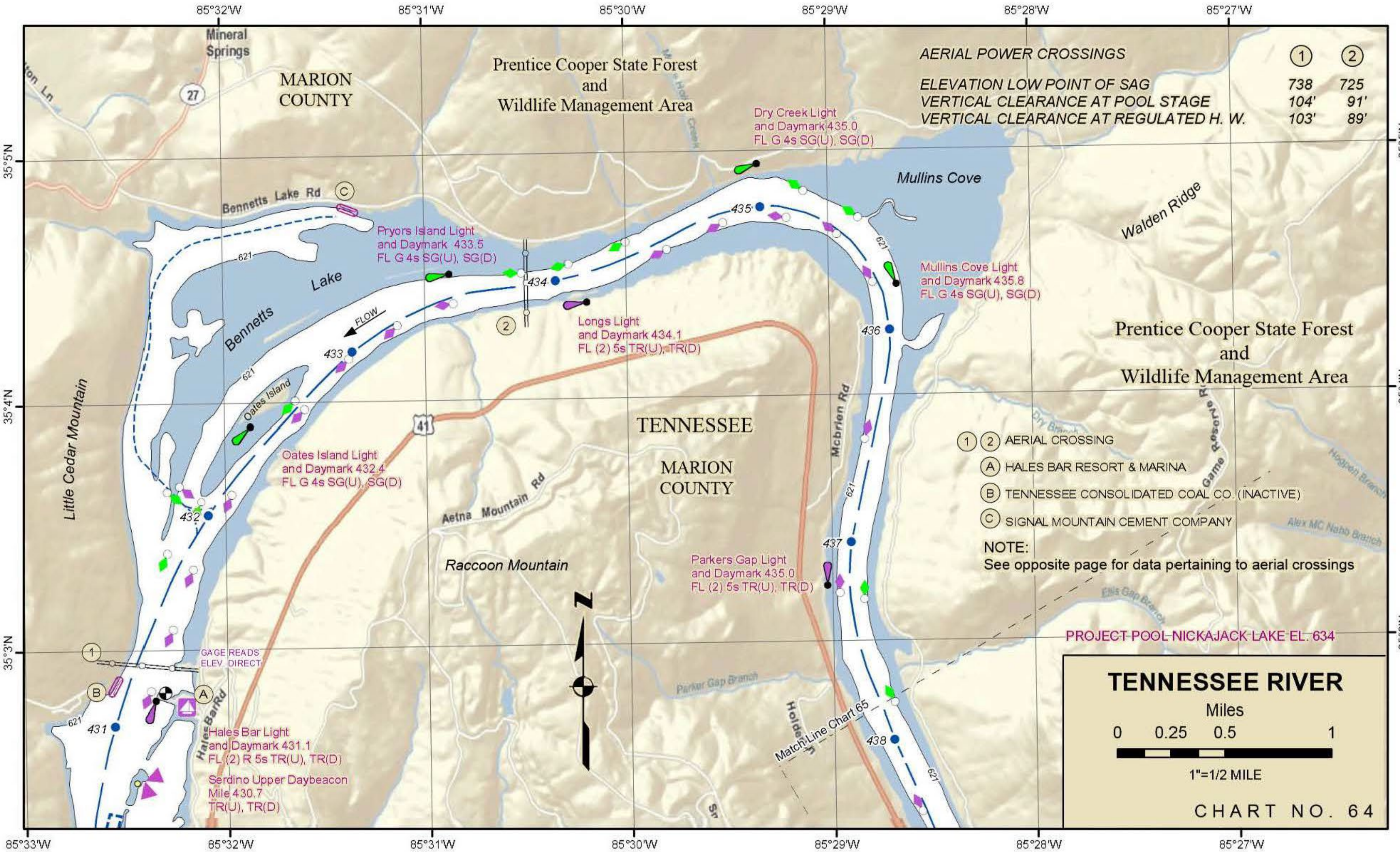
Source: USACE 2024

Figure 3-23. USACE Navigational Chart for Crow Creek Island



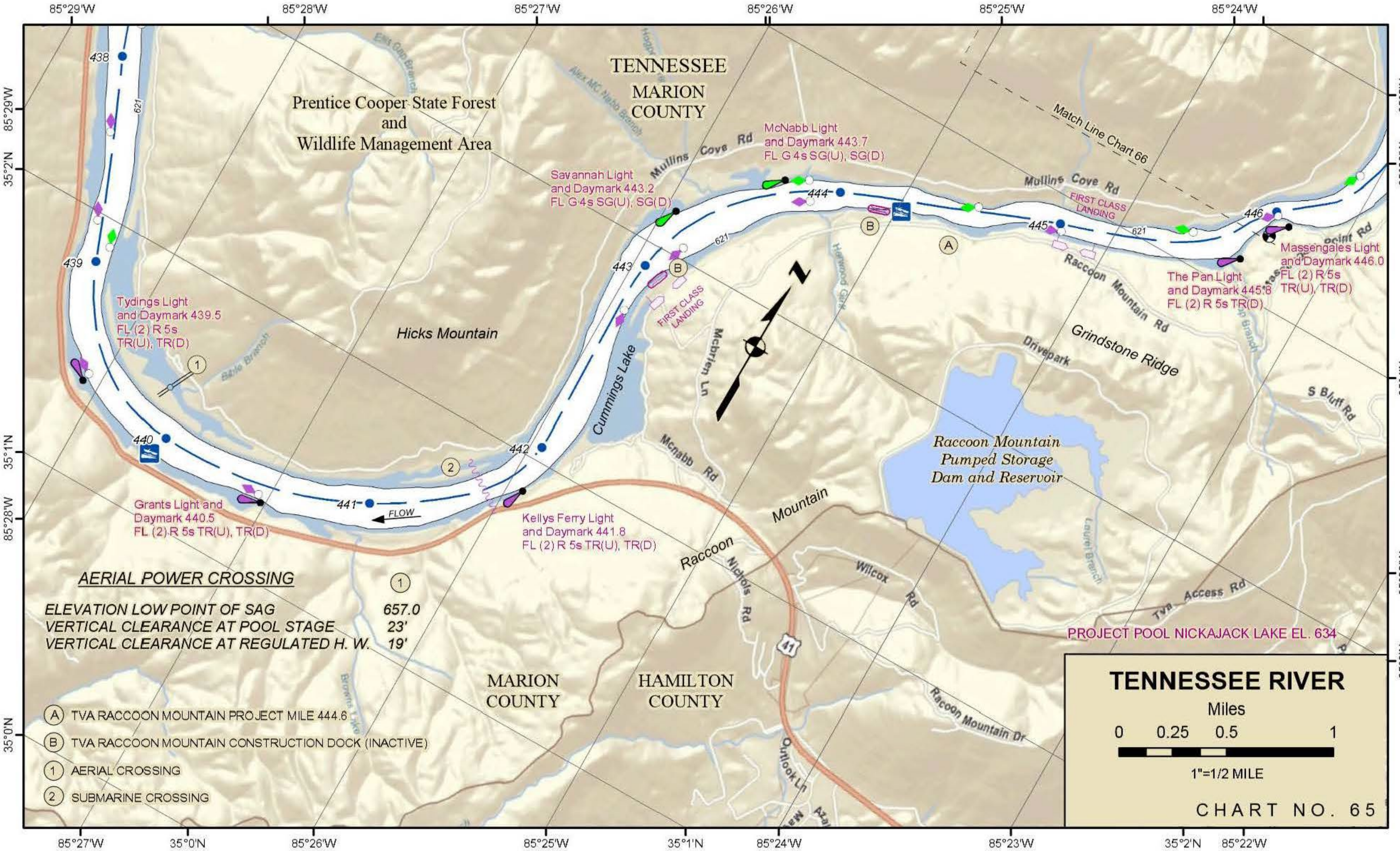
Source: USACE 2024

Figure 3-24. USACE Navigational Chart for Long Island Creek and Bridgeport, Alabama



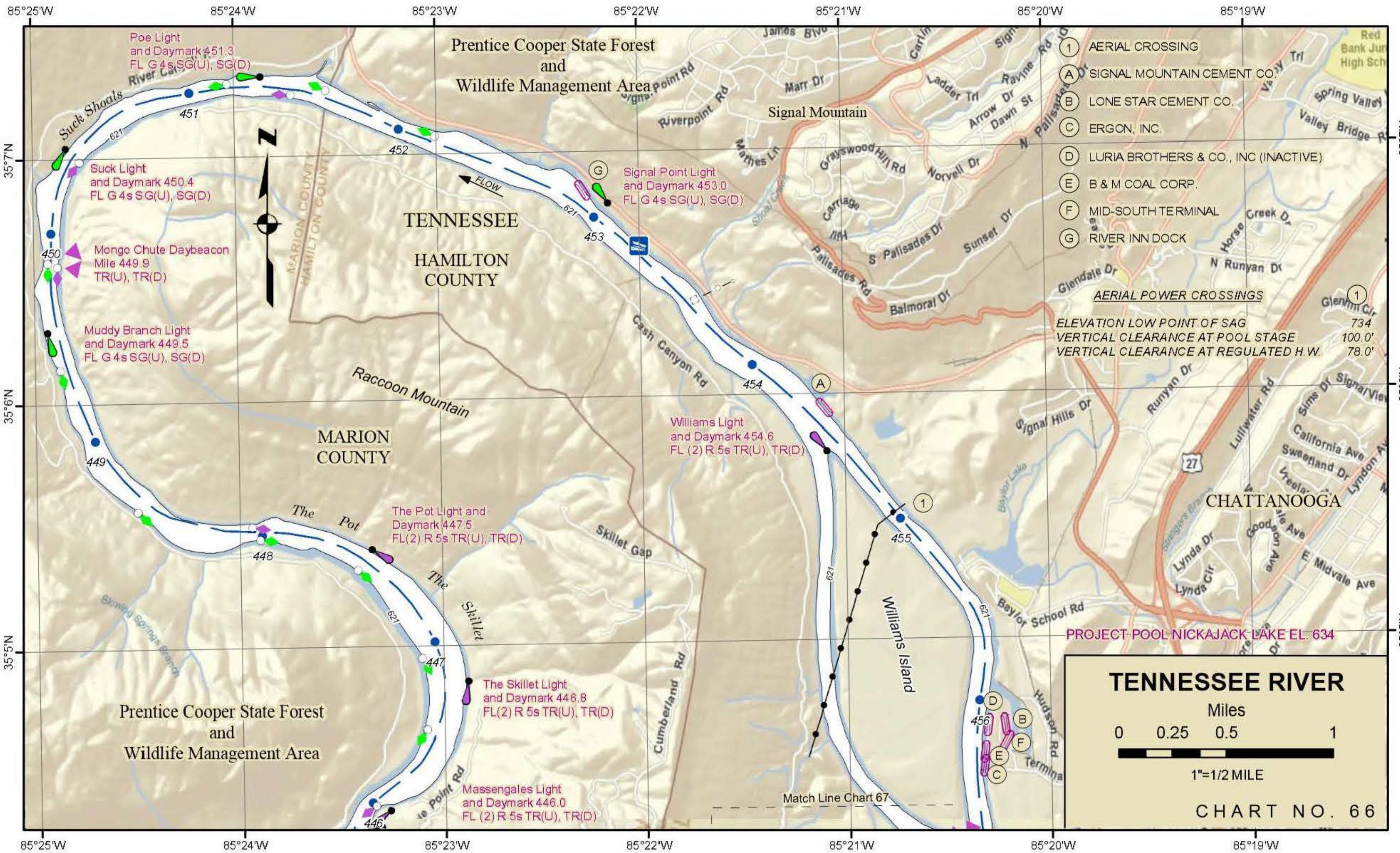
Source: USACE 2024

Figure 3-25. USACE Navigational Chart for Mullins Cove



Source: USACE 2024

Figure 3-26. USACE Navigational Chart for Prentice Cooper State Forest and Wildlife Management Area



Source: USACE 2024

Figure 3-27. USACE Navigational Chart for Williams Island

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. Therefore, there would be no impacts to navigation within the Tennessee River resulting from the proposed action under this alternative.

3.13.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Physical impacts of construction of a new PSH facility on navigation are related to potential dredging or channel modifications. Other impacts may be related to habitat alterations such as thermal discharge and shoreline alterations, floodplain impacts, and construction disruptions. Construction of an intake/outflow structure in Guntersville Reservoir at TRM 390.5 will require the use of a cofferdam or other means of conducting instream construction work. Construction impacts include an increase in river traffic, particularly in the area of the new barge facilities. Decrease in the width of the navigable channel is expected to occur temporarily during construction activities associated with bridge construction and the installation of the cofferdam used during construction of the intake/outflow structure. Operational impacts may include increased traffic, the presence of a new bridge, and changes to pool elevation and flow.

Construction of a bridge downstream of the proposed intake is expected to occur. The lowest projected elevation of the bridge adjacent to the Tennessee River is 616 msl. Dynamic fluid modeling for the bridge and related sediment transport was conducted by HDR in 2025. Navigational width of the proposed bridge is expected to be 363 feet with a vertical clearance of a minimum of 49 feet (HDR 2024a). In the spring of 2025, HDR and Seamans Church Institute worked with the USACE and U.S. Coast Guard to model post-project flows and currents associated with project operations and bridge construction. In late March 2025, river barge pilots participated in conducting live simulations in which barges were navigated through the proposed bridge pylon locations under various flow levels. TVA will use the results of these studies to inform further development of the bridge.

Currently, Guntersville Reservoir pool has typical daily fluctuations of up to about 0.5 feet in a day. Under Alternative B, increased variability in inflows and outflows to Guntersville Reservoir would occur, however, two-dimensional modeling by TVA indicates that there would be little change in the overall pool elevation (TVA 2023c). As discussed in Section 3.5, Surface Water Resources, maximum predicted Guntersville Reservoir pool water level elevation changes for the proposed PSH facility range from about 0.25-0.5 feet greater than and up to 0.25 feet less than current Guntersville pool water levels. These changes would have negligible effects on navigation.

Slight alterations to flow are expected in the tailrace of the outlet channel, which may have impacts on navigation in the channel. Flow dynamics were modeled by HDR to determine the overall impact of changes in flow. Energy dissipation structures and navigational aids, such as blinking lights, will be used in the lower reservoir around the intake/outflow structure to mitigate potential effects on navigation. Therefore, the effects of construction of the project under Alternative B on navigation would be minor, and temporary. Effects of operation would be minor and localized near the intake/outflow structure.

3.13.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, a new PSH facility will be constructed near Widows Creek. Impacts to navigation in Guntersville Reservoir will be as described under Alternative B. Impacts of construction of a new PSH facility near Widows Creek would be similar to those impacts described in Alternative B. Building activities would include the construction of an intake structure on the Tennessee River in Guntersville Reservoir at TRM 408. No bridge construction would occur under this alternative. Therefore, the effects of construction of the project under Alternative B on navigation would be minor and temporary. Effects of operation would be minor and localized near the intake/outflow structure.

3.13.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, the existing RPS would be expanded. Construction and operational impacts would be similar to those under Alternatives B and C, except that impacts would occur in Nickajack Reservoir, upstream of the existing RPS. Physical impacts of expansion of the existing PSH facility on navigation are related to potential dredging or channel modifications. Other impacts may be related to habitat alterations, floodplain impacts, and construction disruptions. Construction of an additional intake upstream of the existing intake in Nickajack Reservoir at TRM 444.6 may require the use of a cofferdam or other means of conducting instream construction work. No bridge construction would occur under this alternative.

Impacts of operational activities related to an expanded PSH facility on navigation are related to channel and flow modifications in the Tennessee River. Changes to flow as a result of operation of the expanded pump storage facility are described in Section 3.5, Surface Water Resources. Water level fluctuations are expected to increase under operation, with anticipated fluctuations of approximately 2 to 4 feet, and occasionally greater, within a day (TVA 2023c). Impacts to navigation from increased water level fluctuations will be minimized through reservoir management under the Tennessee River Waterway Management Plan. Increased expected fluctuations of water levels within Nickajack Reservoir are not expected to significantly alter the navigation channel within the reservoir, therefore impacts of operation would be minor.

3.14 Natural and Managed Areas, Parks, and Recreation

3.14.1 Affected Environment

Managed and natural areas are lands held in public ownership that are managed by an entity (e.g., TVA, USDA, U.S. Forest Service, State of Tennessee, State of Alabama) to protect and maintain certain ecological or recreational features, or both, that are known to contain sensitive features or resources and include ecologically significant sites, national or state forests, wilderness areas, scenic areas, WMAs, greenways, trails, National Rivers Inventory streams, and wild and scenic rivers. These lands are also managed for the enhancement of natural resources for human use and appreciation. Recreational activities (e.g., hunting, wildlife observation, and camping) on undeveloped sites may occur in these areas, but the overriding focus is protection and enhancement of sensitive resources (TVA 2011).

Parks and developed recreation facilities include open areas, boat ramps, community centers, playgrounds, swimming pools, and other public recreation areas.

Natural and managed areas and conservation easements include sites typically managed or used, or both, for one or more of the following objectives:

- Recreation – Examples include national, state and local parks and recreation areas; reservoirs (TVA and others); picnic and camping areas; birdwatching, trails and greenways; and TVA SWAs, day use areas, and stream access sites.
- Species/Habitat Protection – Places with endangered or threatened plants or animals, unique natural habitats, or habitats for valued fish or wildlife populations. Examples include national and state wildlife refuges, mussel sanctuaries, TVA habitat protection areas (HPAs), and nature preserves.
- Resource Production/Harvest – Lands managed for production of forest products, hunting and fishing. Examples include national and state forests, state game lands and WMAs, and national and state fish hatcheries.
- Scientific/Educational Resources – Lands protected for scientific research and education. Examples include biosphere reserves, research natural areas, environmental education areas, TVA ecological study areas, and federal research parks.
- Scenic Resources – Areas with exceptional scenic qualities or views. Examples include national and state scenic trails, scenic areas, wild and scenic rivers, and wilderness areas.

This section addresses managed and natural areas, conservation easements, and parks and recreation facilities that are on, in the immediate vicinity (within a 0.5-mile radius) of, or within the region (within a 5-mile radius) of the Rorex Creek, Widows Creek and Raccoon Mountain study areas, as well as those that are in the immediate vicinity of associated off-site actions such as transmission line upgrades.

3.14.1.1 Rorex Creek Study Area

Managed and natural areas, conservation easements, and parks within a 5-mile radius of the Rorex Creek study area and associated off-site transmission line corridor are listed in Table 3-48 and illustrated on Figure 3-28.

Table 3-48. Managed and Natural Areas and Parks within a 5-Mile Radius of the Rorex Creek Study Area

Managed and Natural Areas, Conservation Easements, or Parks	Acres	Approximate Distance from the Study Area	Approximate Distance from the Off-Site Transmission Right of Way
Managed and Natural Areas			
James D. Martin/Skyline State Wildlife Management Area	60,806.4	--	Adjacent N, E
Bellefonte TVA Small Wild Area	105.1	1.1 miles NE	1.3 miles SE
Mud Creek State Wildlife Management Area	8,196.1	1.9 miles N	1.4 miles E
Raccoon Creek State Wildlife Management Area	4,714.2	4.1 miles NE	4.5 miles SE
Robinson Spring Potential National Natural Landmark	120.9	--	1.2 miles W
Section Bluff TVA Small Wild Area	509.9	1.3 miles SW	2.5 miles S
Coon Gulf TVA Small Wild Area	2,389.1	2.3 miles E	2.7 miles SE
Dry Creek TVA Habitat Protection Area	33.6	4.7 miles W	--
Conservation Easements			
Southeastern Cave Conservancy (3 parcels)	196.6	--	0.7 – 2.4 miles
Land planned for any of the above uses in the future			
Jackson County Park	74.5	5.0 miles W	--
Total	**77,146.4**	**--**	**--**

Key: E = east N = north; NE = northeast; W = west; S = south; SE = southeast; SW = southwest.

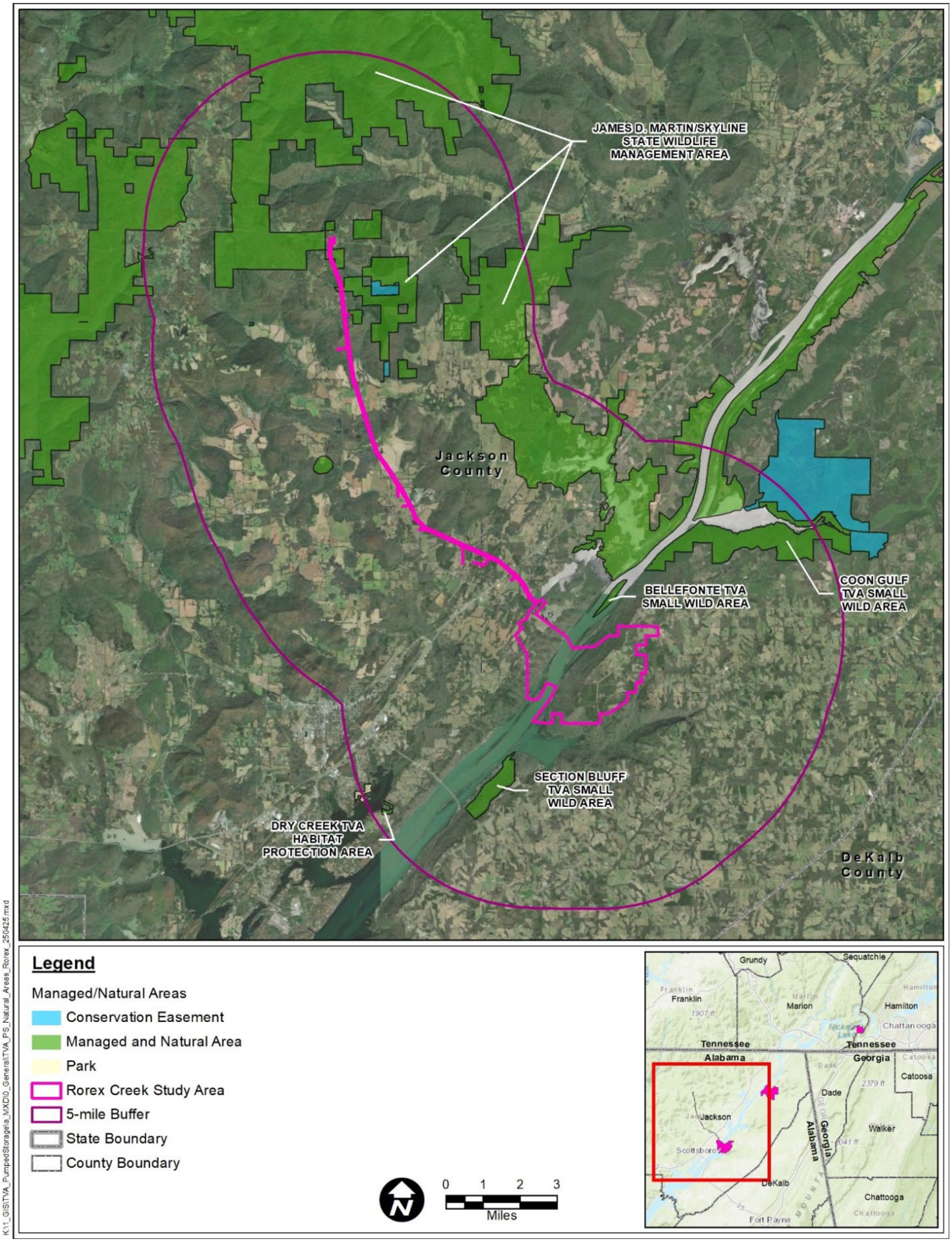


Figure 3-28. Managed and Natural Areas and Parks in a 5-mile Radius of the Rorex Creek Study Area

Based on a review of TVA's RNHD and the ADCNR mapping application (ADCNR 2025), there are no managed or natural areas, conservation easements, or parks located on or within the immediate vicinity (within 0.5 mile) of the proposed upper reservoir and inflow/outflow structure. However, the northernmost portion of the associated transmission line corridor, which extends northwest from the existing TVA Bellefonte Property, crosses portions of the Post Oak Flat Tract and Crow Mountain Addition of the James D. Martin/Skyline State WMA. Comprised of over 60,000 acres, the WMA is managed by the ADCNR for waterfowl and small-game hunting. The Forever Wild Land Trust (FWLT), in cooperation with the ADCNR, manages several tracts within this WMA – two of which are located within the footprint of the transmission line corridor (ADCNR 2025) (Figure 3-28). The Post Oak Flat Tract is comprised of mountainous and wooded terrain, hosting caves, springs, rocky bluffs and portions of the headwaters of the Big Coon Creek and Mud Creek watersheds (Alabama Wildlife Federation 2009). The Crow Mountain Addition features wide plateaus and steep bluffs within a sandstone and limestone geology, supporting mixed pine and hardwood forest (FWLT 2025). Both tracts are managed as a nature preserve, recreation area, and community hunting area within James D. Martin/Skyline State WMA (FWLT 2023).

Additional managed and natural areas, conservation easements, and parks within 0.5 and five miles of the study area include Raccoon Creek and Mud Creek State WMAs, Dry Creek HPA, Bellefonte Island, Section Bluff and Coon Gulf SWAs, Robinson Spring Potential National Natural Landmark, and three tracts under conservation easements managed by the Southeastern Cave Conservancy (Table 3-48).

HPAs are established to protect populations of species identified as threatened or endangered by the USFWS or that are rare in the state in which they occur. Unusual or exemplary biological communities or unique geological features may also be designated as HPAs. They normally have little to no development to accommodate public use. (TVA 2011). Dry Creek HPA contains approximately 34 acres of forested wetlands along tributary creeks and large embayments, providing essential summer, winter, and maternity roosting and foraging habitat for numerous protected and common wildlife, including waterfowl, songbirds, raptors, small and large mammals, and amphibians (TVA 2001).

SWAs possess exceptional natural, scenic, or aesthetic qualities suitable for low-impact public use and may include some form of development to facilitate public access to these areas (e.g., foot trails, signs, parking areas, and backcountry campsites). SWAs are managed by TVA or in cooperation with other public agencies or private conservation organizations (TVA 2011). The following SWAs are in the project study area: Bellefonte Island, Section Bluff, and Coon Gulf.

Bellefonte Island is comprised of approximately 100 acres and supports a naturally occurring mature stand of tupelo-gum. This regionally uncommon, native community type can provide habitat for numerous species of waterfowl while providing wildlife observation opportunities. Section Bluff SWA is characterized by steep forested slopes comprised of various hardwoods and a highly diverse and intact understory in most portions of the parcel. Numerous sandstone bluffs and outcrops provide habitat for woodland amphibians including an Alabama state-listed salamander and numerous rare plant species. This SWA encompasses approximately 510 acres and includes portions of Sand Mountain. Coon Gulf SWA is comprised of approximately 2,389 acres of forested cove, serving as a flyway for the federally endangered gray bat (TVA 2001).

In Alabama, some natural areas and conservation easements occur on or adjacent to TVA lands and are managed by other agencies under contractual agreements. These non-TVA-managed areas are Robinson Spring Potential National Natural Landmark and Jackson County Park.

Apart from developed recreational facilities, there are also opportunities for dispersed recreation on Guntersville Reservoir. Dispersed recreation occurs in an undeveloped setting and includes informal activities such as hiking, nature observation, primitive camping, backpacking, horseback riding, cycling, boating, canoeing, fishing, rock climbing, off-road all-terrain vehicle use, and driving for pleasure.

3.14.1.2 Widows Creek Study Area

Natural areas, parks, and developed recreation areas within a 5-mile radius of the Widows Creek study area are listed in Table 3-49 and illustrated on Figure 3-29.

Table 3-49. Managed and Natural Areas and Parks in a 5-Mile Radius of the Widows Creek Study Area

Managed and Natural Areas, Conservation Easements, or Parks	Acres	Approximate Distance from the Study Area
Managed and Natural Areas		
Raccoon Creek State Wildlife Management Area	4,716.2	adjacent
Crow Creek State Wildlife Management Area and Refuge	3,432.8	2.0 miles W
Conservation Easements		
Georgia Alabama Land Trust – Conservation Easement (three parcels)	855.8	0.1 – 4.7 miles W
NRCS-Agricultural Conservation Easement	39.4	4.1 miles NW
Coon Gulf Tract – Forever Wild Alabama	3,923.1	4.3 miles SW
Parks		
Stevenson Municipal Park	48.3	3.0 miles W
Total	**13,015.6**	

Key: NRCS = Natural Resources Conservation Service; NW = northwest; SW = southwest; W = west

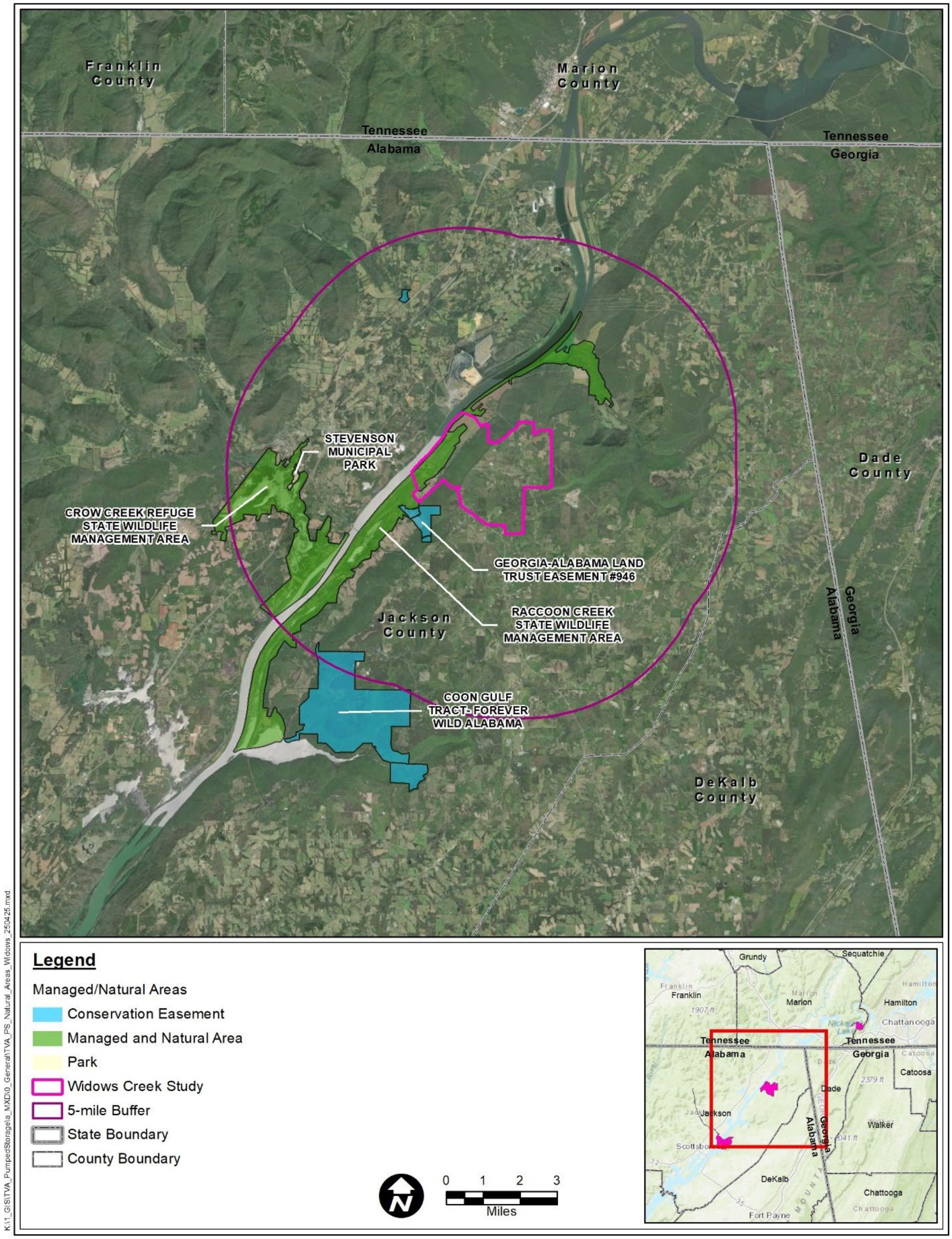


Figure 3-29. Managed and Natural Areas and Parks in a 5-mile Radius of the Widows Creek Study Area

Based on a review of TVA's RNHD and the ADCNR mapping application (ADCNR 2025), the northwestern portion of the study area, adjacent to the reservoir is located within the Raccoon Creek State WMA (Figure 3-29). This 4,716-acre WMA is managed by the ADCNR for waterfowl and small game hunting. Additionally, the Georgia-Alabama Land Trust manages approximately 856 acres abutting Raccoon Creek State WMA, located 0.1 mile west of the study area at its closest point.

Managed and natural areas, conservation easements, and parks within 0.5 to five miles of the study area include Crow Creek State WMA, Coon Gulf tract, one NRCS-agricultural conservation easement, and Stevenson Municipal Park (Table 3-50).

Crow Creek State WMA and Refuge is a significant conservation and recreational area approximately two miles west of the study area. The area is primarily designated for waterfowl and small-game hunting. Stevenson Municipal Park is a popular birding area located approximately three miles west of the study area, on the east side of Crow Creek State WMA and Refuge (Alabama Birding Trails 2025).

The Coon Gulf Tract adjoins the Raccoon Creek State WMA and includes hunting, fishing, boating, and wildlife observation (FWLT 2020). The USDA manages an additional approximately 40 acres for the Agricultural Conservation Easement Program, located roughly four miles north of the study area.

3.14.1.3 Raccoon Mountain Study Area

Managed and natural areas, conservation easements, and parks within the region of the Raccoon Mountain study area are listed in Table 3-50 and illustrated on Figure 3-30.

Table 3-50. Managed and Natural Areas and Parks in a 5-Mile Radius of the Raccoon Mountain Study Area

Natural Areas, Conservation Easements, or Parks	Acres	Approximate Distance from the Study Area at its Closest Location
Managed and Natural Areas		
Tennessee River Gorge	29,407.9	Adjacent
Raccoon Mountain Pumped Storage State Wildlife Obs.	646.8	Adjacent
Prentice Cooper State Forest	24,607.5	0.05 mile N
Piney Branch Bottomland	26.7	0.05 mile N
Pan Gap Slopes	433.6	0.1 mile NE
Bill McNabb Gulf (in Prentice Cooper State Forest)	354.8	0.2 mile NW
Hicks Gap Designated State Natural Area	343.1	0.4 mile W
Huff Branch TVA Habitat Protection Area	20.7	1.1 miles W
Ritchie Hollow	369.6	1.4 miles N

Natural Areas, Conservation Easements, or Parks	Acres	Approximate Distance from the Study Area at its Closest Location
Bluff Point/Hicks Mountain	225.3	1.7 miles W
Ellis Spring	116.6	2.3 miles W
Williams Island State Archaeological Area	462.7	2.3 miles NE
Raccoon Mountain Caves	20.4	2.5 miles NE
Mullens Cove Slopes	128.9	2.6 miles NE
Cummings Cove Wildlife Management Area	1,200.4	3.0 miles SW
Parker Gap Cove	265.4	3.2 miles W
Dry Creek Ravine	866.1	3.3 miles NW
Signal Mountain	114.7	4.0 miles NE
Signal Point State Wildlife Observation Area	3.0	4.1 miles NE
Edwards Point Sandstone Outcrops	51.7	4.1 miles NE
Maclellan Island Audubon Society Wildlife Refuge	28.9	4.3 miles SE
Highway 41 Scenic Area	0.7	4.5 miles W
Conservation Easements		
Tennessee River Gorge Trust – Cummings Lake	277.2	Adjacent W
TVA McNab Slopes (Memorandum of Understanding with Tennessee River Gorge Trust)	565.9	Adjacent NW
Kelly’s Ferry Slopes Tennessee River Gorge Trust	215.2	0.4 mile W
Tennessee River Gorge Trust – Pot Point Trace	410.1	0.4 mile N
Shortleaf Pine Flat Protection Planning Site	94.6	0.6 mile N
Tennessee River Gorge Trust – Grant Tract	912.6	0.7 mile SW
Tennessee River Gorge Trust Easements (eight parcels)	1,656.8	0.8 – 4.5 miles
Lassiter Property	5.2	1.1 miles NE
Blowing Springs Branch/Chestnut Bridge Hollow Woods Protection Planning Site	179.1	1.3 miles N
Alexander Property	44.8	1.7 miles NE
Tennessee River Gorge Trust – Rymer Property	67.8	2.3 miles N
Aetna Slopes Property Tennessee River Gorge Trust	1,640.3	2.8 miles SW
Tennessee River Gorge Trust – Cash Property	108.7	2.8 miles NE

Natural Areas, Conservation Easements, or Parks	Acres	Approximate Distance from the Study Area at its Closest Location
Renfro Property	103.5	2.8 miles SW
Lookout Cave Protection Planning Site	9.4	3.1 miles SE
Tennessee River Gorge Trust - Rutledge Property	151.6	3.1 miles N
Tennessee River Gorge Trust - Baxtor Property	21.4	3.3 miles NE
Conservation Easement – Tennessee River Gorge Trust – Ritchie Dump	26.5	3.8 miles N
The Land Trust for Tennessee – 422_Jones	14.5	3.9 miles NE
Mile 434 Oaks-Tennessee River Gorge	122.7	4.1 miles W
Sulphur Branch Protection Planning Site	368.8	4.2 miles N
Tennessee River Gorge Trust - Edwards Point	491.9	4.3 miles N
Atlantic Coast Conservancy/Pelican Coast Conservancy Conservation Easement E201507A	51.7	4.6 miles SE
Atlantic Coast Conservancy/Pelican Coast Conservancy Conservation Easement D201401A	31.0	4.8 miles NE
Parks		
Chickamauga and Chattanooga National Military Park	8,230.3	1.8 miles S
Reflection Riding/Tennessee Wildlife Center	208.6	2.4 miles S
Tennessee Wildlife Center	147.1	2.6 miles S
Stringers Ridge Park	123.7	3.9 miles E
Ross Landing City Park	19.9	3.5 miles E
University of Tennessee Chattanooga Campus	337.9	4.1 miles E
Total	**76,334.3**	--

Key: E = east N = north; NE = northeast; NW = northwest; S = south; SE = southeast; SW = southwest; TVA = Tennessee Valley Authority; W = west.

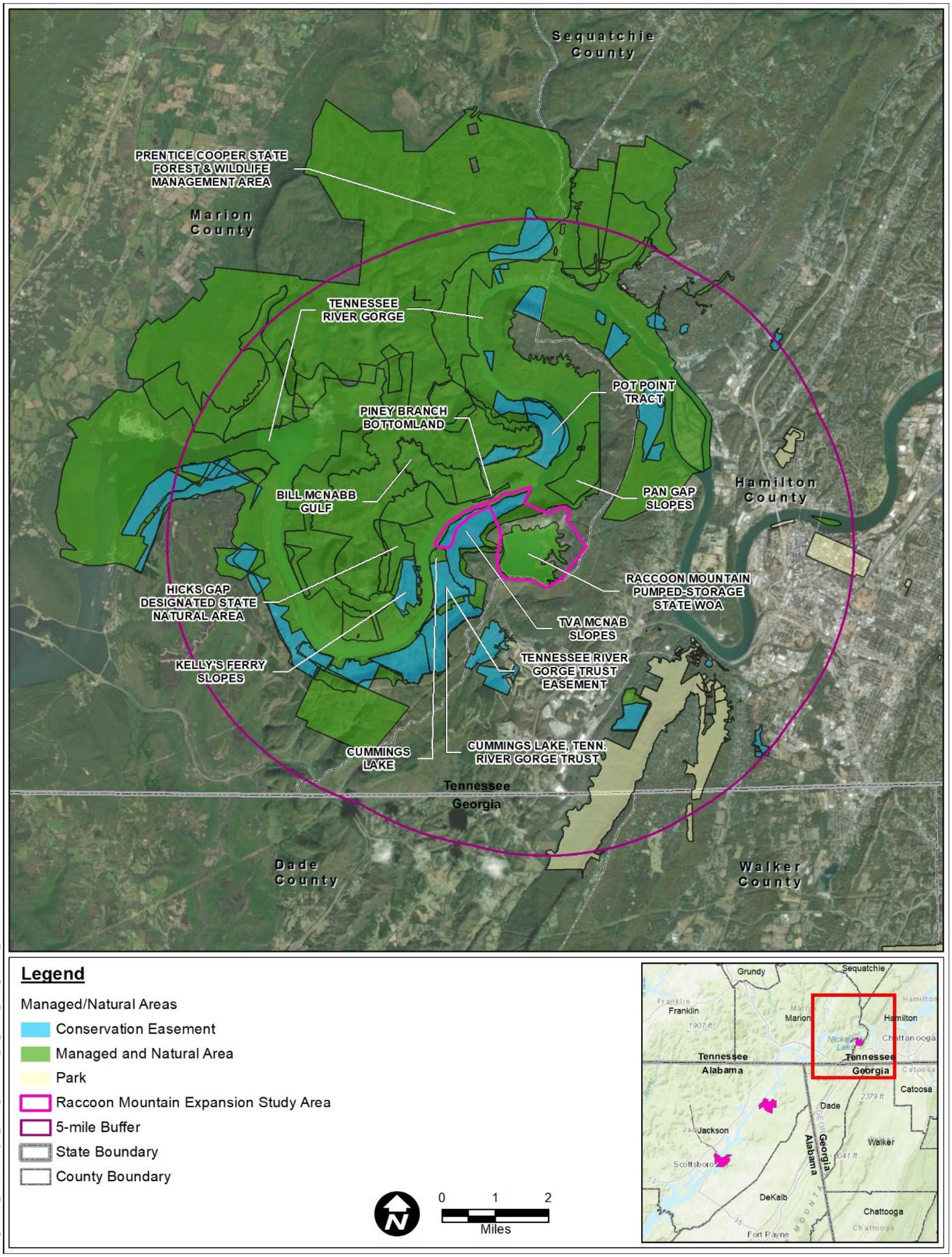


Figure 3-30. Managed and Natural Areas and Parks within a 5-mile Radius of the Raccoon Mountain Study Area

A review of TVA's Natural Heritage database indicated that the study area footprint encompasses Raccoon Mountain Pumped Storage State Wildlife Observation Area and intersects portions of the Tennessee River Gorge (Figure 3-30). The land surrounding the existing Raccoon Mountain PSH facility is a designated WOA, providing over 28 miles of hiking/biking trails (TVA 2025d). Wildlife Observation Areas have concentrations of watchable wildlife (e.g., shorebirds, songbirds, and waterfowl) and typically are found in drawdown zones, dam reservations, urban wetlands, and bluffs. They are typically established in cooperation with the Tennessee Wildlife Resources Agency's Watchable Wildlife Program (TVA 2011). The Tennessee River Gorge spans over 29,000 acres, beginning near downtown Chattanooga and continuing 27 miles downstream toward Nickajack Reservoir (Tennessee River Valley 2024).

Seven additional managed and natural areas and conservation easements are located within the immediate vicinity (approximately 0.5 mile) of the study area, and an additional 44 managed and natural areas, conservation easements, and parks were identified within a 5-mile radius (Table 3-50).

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the RPS. Therefore, there would be no impacts on managed and natural areas, conservation easements, or parks resulting from the proposed action under this alternative. Similarly, there would be no creation of new recreational areas or managed natural areas in the project area.

3.14.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, there would be direct impacts on the James D. Martin/Skyline WMA, as construction and intermittent vegetation management activities within the off-site transmission line corridor could temporarily result in decreased attraction to game-managed wildlife. While construction activities would occur primarily within the existing corridor, portions of the WMA closest to construction activities and equipment would experience temporary increases in noise, air emissions, and fugitive dust. However, these impacts would be minimized using standard BMPs, and construction schedules in this area would be coordinated with the ADCNR and the FWLT to minimize impacts on hunting activities. While TVA has an easement within the ROW, the fee simple ownership of the adjacent land would remain with ALDCNR and the FWLT, and many activities and land uses, such as wildlife management and hunting, could continue to occur on the property. Additionally, the James D. Martin/Skyline WMA covers over 60,000 acres throughout northeast Alabama, most of which would remain unaffected by project activities. Due to the implementation of proper BMPs and the minimal amount of disturbance within the James D. Martin/Skyline WMA, impacts from project construction are expected to be minor.

Construction activities would be visible, and likely audible, from the surface of Guntersville Reservoir. Boaters in the immediate area of the intake/outflow structure are likely to observe stockpiles of material on the eastern bank of the reservoir and view construction activity at the base of the escarpment during construction of the power tunnel. Noise from excavation of the upper reservoir may also be apparent but would be shielded by the edge of the escarpment, dissipating sound and vibration. These effects would be short-term, localized and minor. During project operations, recreational boaters would may see water flowing through the project tailrace. However, energy dissipation structures would prevent these currents from affecting boating safety. These effects would only occur when the project is either pumping or generating, and they would be minor.

Ten managed and natural areas, conservation easements, and parks are within five miles of the study area. The construction of the pumped storage facility may impact managed and natural areas due to noise associated with construction and vehicle noise associated with trucks hauling materials on-site. Because of their distances from the site (0.5 to 5.0 miles), and with the implementation of BMPs, (e.g., fugitive dust control measures and soil erosion prevention measures), no direct impacts on these areas are anticipated.

If managed or natural areas are along the haul routes to potential off-site locations, they could be affected by increased traffic on nearby roadways. However, these impacts are considered minor due to traffic dispersion after trucks reach major highways along the haul routes. Therefore, impacts on managed and natural areas due to Alternative B are anticipated to be minor.

As described in Section 3.21, Noise, noise levels associated with the operation of the proposed PSH facility are not expected to have a noticeable effect at any sensitive noise receptors, and operational noise would be imperceptible at residences or any other sensitive receptors due to distance. Therefore, operational impacts on managed and natural areas, conservation easements, and parks due to noise would not have a cumulative impact on these resources.

As a component of the project, TVA will develop recreational amenities in the project vicinity. These amenities are anticipated to include features like parks, hiking, biking, and nature trails, picnic areas, and public boat launch on Guntersville Reservoir, a fishing pier, and a cross-country running course. TVA plans to consult with the local community during further development and design of these resources. Thus, project operation is expected to have a significant long-term beneficial effect on recreation opportunities in the project area.

3.14.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, some of the proposed construction activities associated with the placement of spoils from reservoir excavation would occur within the Raccoon Creek State WMA. Similar to Alternative B, the construction of the pumped storage facility may impact managed and natural areas due to noise associated with construction and vehicle noise associated with trucks hauling materials on-site. However, these impacts would be minimized using standard BMPs.

Additionally, the Georgia-Alabama Land Trust conservation easements abutting the Raccoon Creek State WMA adjacent to the west side of the study area may experience increased noise during the approximately 5.5-year construction period. These impacts would be similar to those under Alternative B and are likely to interfere with use or enjoyment of these facilities. Further, the Raccoon Creek State WMA and abutting Georgia-Alabama Land Trust conservation easements encompass a combined approximately 5,570 acres on the eastern shoreline of Guntersville Reservoir, most of which would remain unaffected by project activities (Figure 3-30). Due to the implementation of proper BMPs and the minimal amount of disturbance within the State WMA and associated Georgia-

Alabama Land Trust conservation easements, impacts from project construction are expected to be moderate.

Five managed and natural areas, conservation easements, and parks are within five miles of the study area. Similar to Alternative B, because of their distances from the site (0.5 to 5.0 miles), and with the implementation of BMPs, (e.g., fugitive dust control measures and soil erosion prevention measures), no direct impacts to these areas are anticipated.

Operational impacts are anticipated to be similar to those under Alternative B and, therefore, minor.

3.14.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, some of the proposed construction activities associated with reservoir expansion and transmission upgrades would occur within portions of the Tennessee River Gorge. Additionally, the Raccoon Mountain Pumped Storage State Wildlife Observation Area and other recreational facilities such as mountain biking trails would be closed to the public for the duration of construction.

While construction activities would occur primarily within the existing pumped storage facility, portions of the managed and natural areas and conservation easements closest to construction activities and equipment would experience temporary increases in noise, air emissions, and fugitive dust. However, these impacts would be minimized using standard BMPs, and construction schedules in this area would be coordinated with local management authorities to minimize impacts.

As with Alternatives B and C, operational impacts under Alternative D are anticipated to be minor.

3.15 Cultural and Historic Resources

This section describes the existing cultural resources in the project area and the potential impacts on resources associated with the No Action and proposed action alternatives. Existing conditions for cultural resources are presented for the vicinity of the Project Site locations where Project effects on cultural resources could occur. The components of cultural resources analyzed include archaeological and architectural properties.

3.15.1 Affected Environment

Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities and/or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts. Section 106 of the NHPA, as amended (54 USC § 300101 et seq.), addresses the effects of federal or federally funded projects, or both, on tangible cultural resources (i.e., physical properties) of historic value. The NHPA provides for a national program to support public and private efforts to identify, evaluate, and protect the nation’s important cultural resources. Once identified, these resources are evaluated for inclusion in the NRHP maintained by the National Park Service (National Park Service 2008). Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases), found to embody one or more of four different values, or criteria, and possess sufficient integrity to convey their historic significance, in accordance with 36 CFR § 60.4.

Cultural resources that are listed or considered eligible for listing in the NRHP are called "historic properties." The NHPA requires federal agencies to consider the possible effects of their undertakings on historic properties and take measures to avoid, minimize, or mitigate any adverse effects, in consultation with the State Historic Preservation Officer (SHPO), federally recognized Indian tribes, and sometimes, other consulting parties. NEPA requires federal agencies to consider how their undertakings may affect the quality of the human environment, including both cultural resources and those defined as historic properties, so that the nation may "preserve important historic, cultural, and natural aspects of our national heritage." "Undertaking" includes any project, activity, or program that has the potential to affect a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency.

A project may have effects on a historic property that are not adverse. However, if the agency determines that the undertaking's effect on a historic property within the area of potential effect (APE) would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR § 60.4), the effect is said to be adverse. Examples of adverse effects would be ground-disturbing activity at an archaeological site or erecting tall buildings or structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting and its ability to convey its historic and/or architectural significance. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesigning a project to lessen the effects or installing visual screenings), or mitigation. Adverse effects on archaeological sites are typically mitigated by using excavation to recover the important scientific information contained within the site. The mitigation of adverse effects on historic buildings and structures sometimes involves thorough documentation of the resource by compiling historic records, studies, and photographs. Agencies are required to consult with the appropriate SHPOs, federally recognized Indian tribes that have an interest in the undertaking throughout the process, and any other party with a vested interest in the undertaking. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA reviews to improve efficiency and allow for more informed decisions.

Generally, these considerations, as well as those of NRHP-eligible traditional cultural resources (also called traditional cultural properties; see Parker and King [1998]) are accomplished through consultation with parties having a vested interest in the undertaking, as described above.

3.15.1.1 Cultural Resources APE and Survey Coverage

The APE is the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties. This would include the areas where ground-disturbing activities would cause physical effects, herein referred to as the project footprint, and areas within a 0.5-mile radius of the project footprint. The area examined for archaeological resources corresponds with the project footprint. In all three alternative project areas, surveys for historic architectural resources were completed before TVA had completed a general layout and project design. Thus, the historic architectural surveys encompassed the entire 0.5-half mile radius surrounding each of the three project sites, and not just within the actual APE (which would be more limited due to the effects of terrain, vegetation, and built environment in blocking views toward the project sites). Survey area is used to refer to the project footprint and 0.5-mile radius. For the proposed bridge and transmission line in the portion of the Rorex Creek site north of the Guntersville Reservoir, TVA used GIS-based viewshed analyses taking terrain, vegetation, the built environment, and the proposed bridge and transmission line design into consideration to build a more refined model of the viewshed and define the cultural resources APE in those areas and then completed a review of historic architectural resources within that viewshed.

The Rorex Creek APE encompasses a total of 6,138 acres (Figure 3-31). A total of 1,170 acres within the Rorex Creek APE were not surveyed due to denied landowner access. An additional area comprising 710 acres previously surveyed for archaeological resources was excluded from the survey of the project footprint on the north side of the Guntersville Reservoir (Deter-Wolf 2007; Dorland et al. 2019; Gaffin 2012; Hunter et al. 2016).

The historic architectural survey in the portion of the Rorex Creek project located to the south of the Guntersville Reservoir covered the entire project footprint and 0.5-mile radius based on the footprint on the south side of the reservoir. The bridge footprint and transmission line structures on the north side of the reservoir expanded the Rorex Creek project APE to include areas within a 0.5-mile buffer and direct line-of-sight of these project components and were assessed during a desktop review.

The Widows Creek APE encompasses 4,650 acres (Figure 3-32). Of the 4,650-acre project footprint, a total of 2,921.2 acres of denied landowner access parcels were not able to be surveyed for archaeological sites. The historic architectural survey was completed within the entire Widows Creek project footprint and its 0.5-mile radius.

The Raccoon Mountain APE encompasses 1,389 acres (Figure 3-33). Approximately 493 acres of the APE was inundated by the existing reservoir or was inaccessible (approximately 20 acres) due to infrastructure and inundated and was excluded from the archaeological survey. The historic architectural survey was completed within the entire Raccoon Mountain project footprint and its 0.5-mile radius.

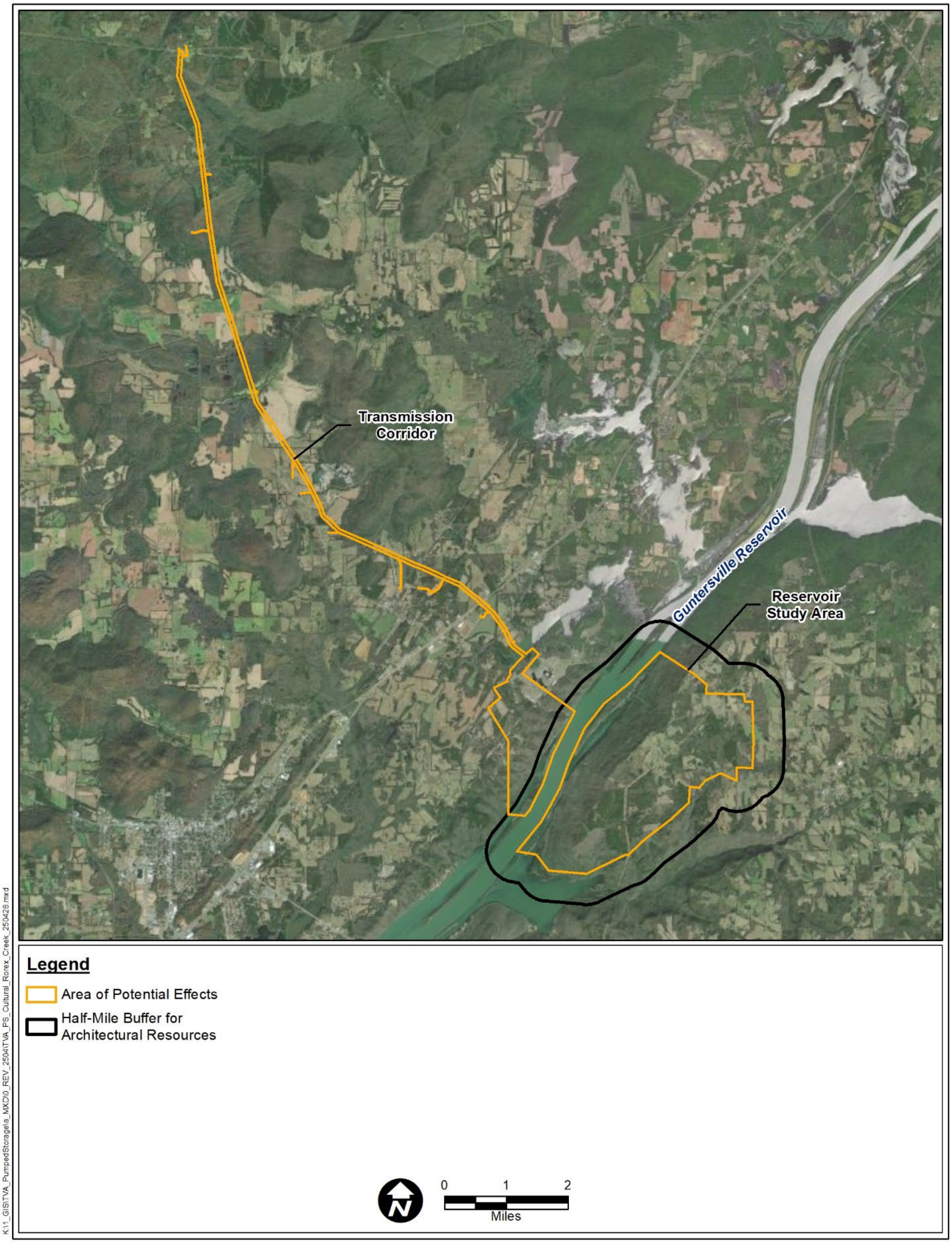


Figure 3-31. Rorex Creek Area of Potential Effects Cultural Resource Survey Area

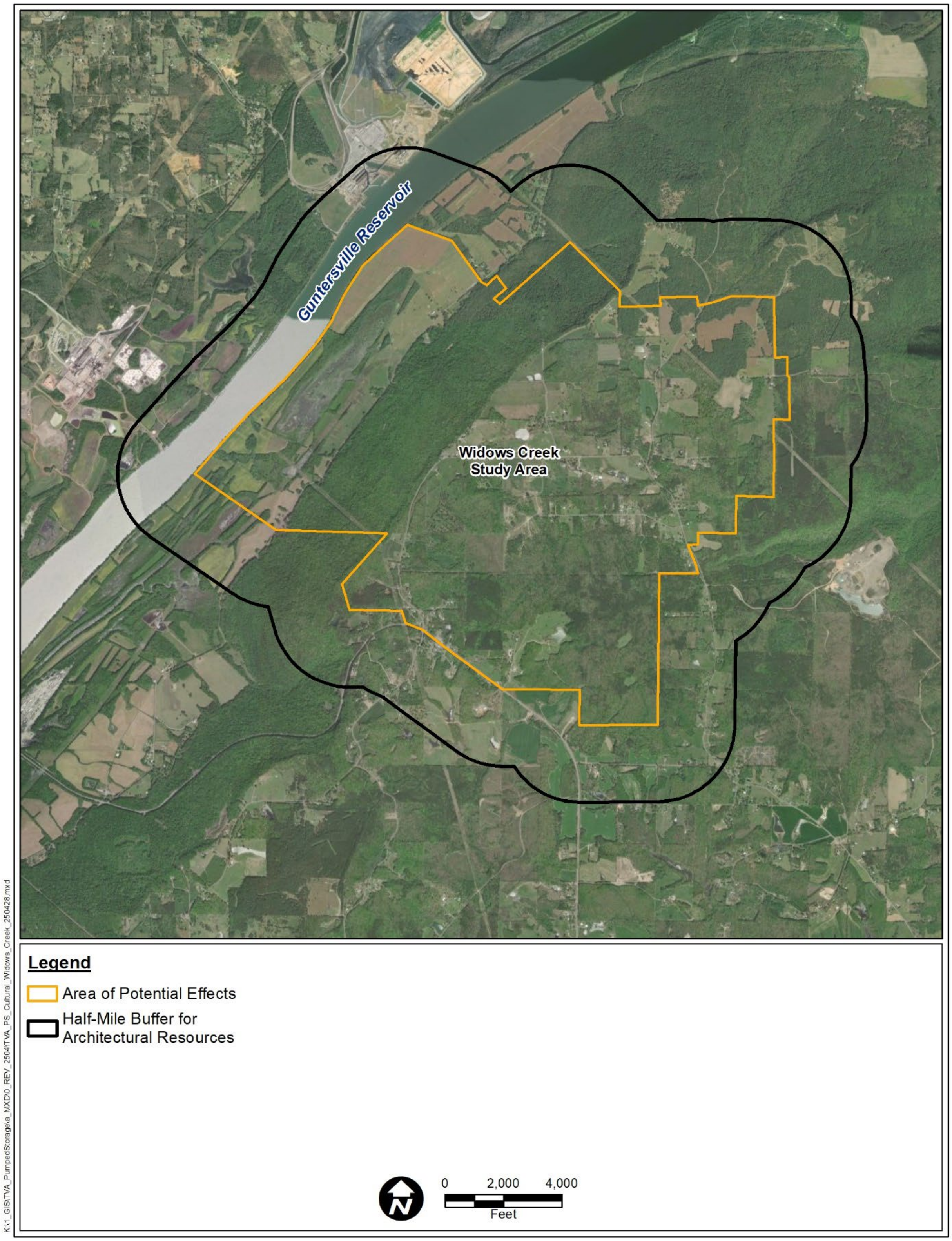


Figure 3-32. Widows Creek Area of Potential Effects Cultural Resource Survey Area

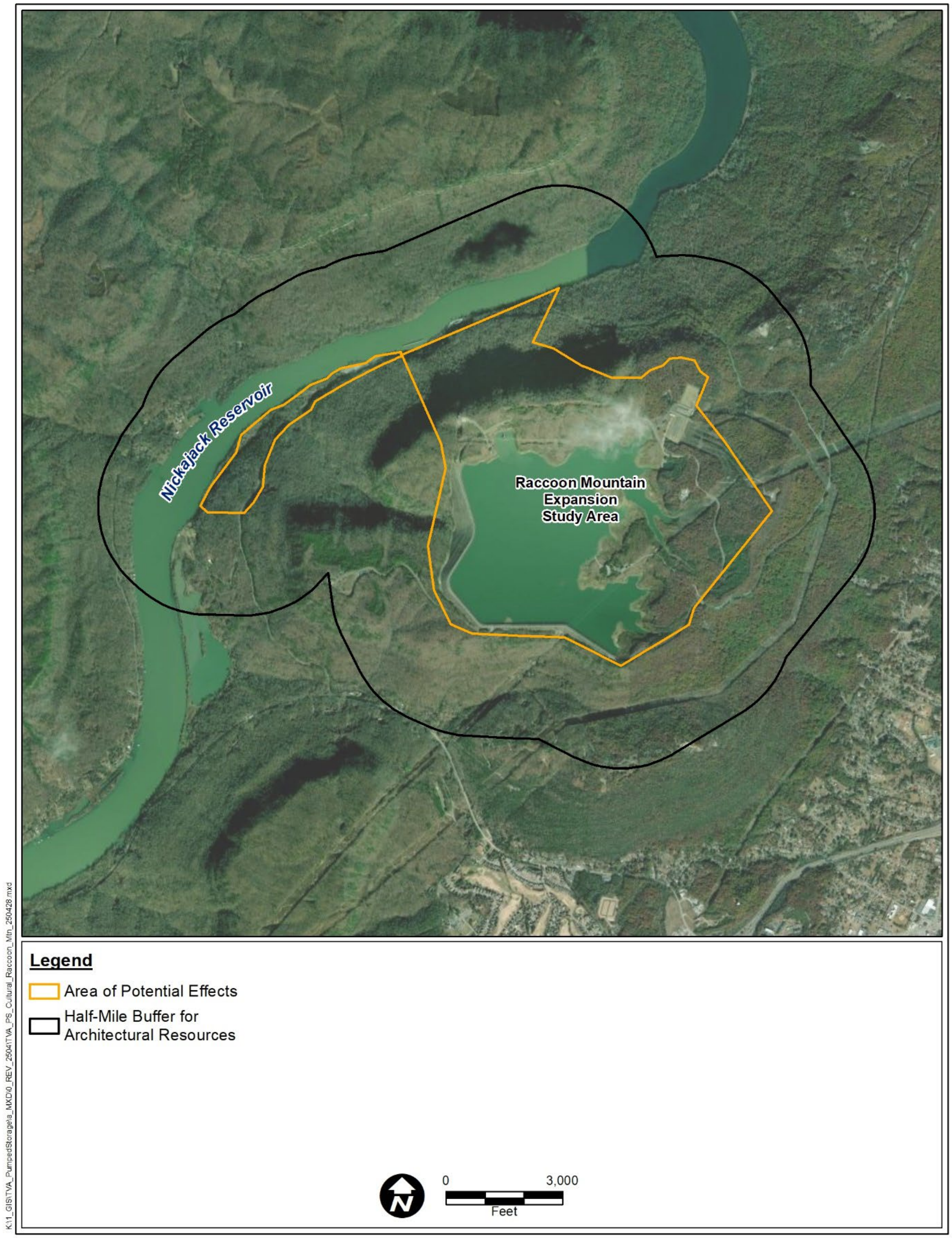


Figure 3-33. Raccoon Mountain Area of Potential Effects Cultural Resource Survey Area

3.15.1.2 Identification Survey and Field Findings Summary

The project area, which comprises all three alternatives, was partitioned into five different surveys for logistical reasons. TVA contracted with TRC Environmental Corporation (TRC), Tennessee Valley Archaeological Research (TVAR), and WSP USA Inc. (WSP) to conduct Phase I cultural resource surveys for the Widows Creek and Raccoon Mountain project areas, and the portion of Rorex Creek to the south of the Guntersville Reservoir (Dison et al 2024; Hunter et al. 2025; Myers-Rhinehart et al 2024; Stephens et al. 2024). TVA contracted TRC to conduct a Phase I archaeological survey on the portion of the Rorex Creek site to the north of the Guntersville Reservoir (Stephens and Bean 2025).

Cultural resources identification consisted of background research and architectural and archaeological field studies; the associated reports provide preliminary NRHP evaluations and a results summary (Barrett and Karpynec 2010; Deter-Wolf 2007; Dison et al. 2024; Dorland et al. 2019; Gaffin 2012; Hunter et al. 2016, 2025; Myers-Rhinehart et al. 2024; Stephens et al. 2024; Stephens and Bean 2025).

3.15.1.2.1 Rorex Creek Survey Area

The Rorex Creek surveys were conducted by TRC and resulted in the recordation of a total of 30 previously recorded archaeological sites, 30 new archaeological sites, and 16 isolated finds within the project footprint (Stephens et al. 2024; Stephens and Bean 2025). Of these, 11 sites are recommended as eligible for listing in the NRHP. The NRHP eligibility recommendations for three sites within the APE remain unassessed since they were not able to be fully investigated. Two of the unassessed sites were not able to be fully delineated and contain the potential to yield important information on precontact lifeways. No excavations took place at the third unassessed site since it consists of a stone mound of undetermined age. The remaining sites and isolated finds investigated are recommended ineligible for the NRHP.

An additional five previously recorded archaeological sites occur within the Rorex Creek APE in areas that were covered by previous archaeological surveys (Deter-Wolf 2007; Dorland et al. 2019; Gaffin 2012; Hunter et al. 2016). These five archaeological sites were not revisited during the fieldwork for the current undertaking. All five sites were previously determined, in consultation, as ineligible for listing in the NRHP.

Two Native American Removal Routes (NARRs), the Water Route and the Drane Route, are mapped in the vicinity of the Rorex Creek project footprint. In 1838, approximately 16,000 Cherokees, organized into 17 different detachments, were forcibly removed west to Oklahoma. This massive, forced migration took over three months and is believed to have cost the lives of roughly 4,000 Cherokees (Nance 2001). The Water Route started at Ross's Landing in Chattanooga, Tennessee and followed the Tennessee River through northern Alabama. The use of this Route began earlier in March 1837 with the removal of the first detachment from Ross’s Landing of 466 Cherokees and five Creeks on flatboats (Marshall et al. 2009). The Drane Route, also known as the Overland Water Route, departed with a party of 1,070 persons from Ross’s Landing in June of 1838. The overland section of this route in Alabama traversed areas north of the Tennessee River until it reached Waterloo, where it intersected the Water Route. The town of Bellefonte, just outside of the Rorex Creek project footprint, was the site of a depot and a camp associated with the Drane Route (Marshall et al. 2009). A 500-foot buffer of the overland NARR was shovel tested at 15-meter intervals within the project footprint in effort to document features or sites in association with the route. No features or sites directly associated with the NARRs were located during the archaeological survey of the Rorex Creek project footprint.

A total of 27 architectural resources dating to 45 years or older and 44 resources under 45 years were recorded within the APE and 0.5-mile historic architectural survey radius for the portion of the Rorex Creek project to the south of the Guntersville Reservoir. The 71 surveyed resources lack historic significance and/or have poor integrity and all are recommended as ineligible for listing in the NRHP.

Two above-ground features, a bridge and a transmission line, are proposed in the portion of the Rorex Creek project footprint to the north of the Guntersville Reservoir. TVA conducted a viewshed analysis and desktop review to assess the potential for these above-ground features to impact historic properties. The majority of the 0.5-mile radius of the bridge footprint and transmission line structures have been covered by previous inventories (Dorland et al. 2019; Jenkins 2008). The bridge was found to have no extant historic architectural resources located within a 0.5-mile radius of its footprint. The viewshed within the 0.5-mile radius for the transmission line was found to have one NRHP-eligible property, the Bellefonte Historic Archaeological District, and two unassessed historic architectural resources within it. However, all three of the resources were found to be located within the current viewshed for the existing transmission line structures that are part of the current landscape. Therefore, the transmission line will not represent a new intrusion into the viewshed of the NRHP-eligible or unassessed properties within this portion of the cultural resources APE.

TVA consulted with the Alabama SHPO and federally recognized Indian tribes regarding the findings in the portion of the survey area to the south of the Guntersville Reservoir in July of 2024. The Alabama SHPO concurred with the eligibility recommendations for this portion of the survey area, which comprises the 71 historic architectural sites and 39 of the 60 archaeological sites within the total Rorex Creek project area. None of the consulted federally recognized Indian tribes objected or identified resources of concern. The consultation for the portion of the Rorex Creek survey area to the north of the reservoir is currently in progress.

3.15.1.2.2 Widows Creek Survey Area

A total of 46 archaeological sites, 32 isolated finds, and two historic non-site stone features were documented during WSP's and TVAR's archaeological investigations of Widows Creek (Dison et al 2024; Hunter et al. 2025). The archaeological sites included 19 previously recorded sites and 27 newly identified sites. Of these, 13 sites are recommended as potentially eligible or eligible for the NRHP. Seven sites were not able to be fully investigated and/or delineated or revisited due to denied landowner access and are unassessed for their NRHP eligibility. The recorded portions of three of the partially delineated sites are recommended as non-contributing to their overall potential eligibility. The remaining sites, isolated finds, and historic non-site stone features are recommended as ineligible for listing in the NRHP.

The Water Route NARR follows the Tennessee River within the Guntersville Reservoir just north of the Widows Creek project footprint. No sites or features associated with the NARR were located during the archaeological survey of the Widows Creek project footprint.

A total of 41 architectural resources were identified within the Widows Creek survey area; however, all identified architectural resources were recommended as ineligible for listing in the NRHP due to their lack of historic significance and integrity (Dison et al 2024; Hunter et al. 2025). Consultation with the Alabama SHPO and federally recognized Indian tribes on eligibility determinations for the Widows Creek survey area is currently in progress.

3.15.1.2.3 Raccoon Mountain Survey Area

WSP's cultural resource survey of Raccoon Mountain resulted in the identification of six newly identified archaeological sites and three isolated finds within the project footprint (Myers-Rhinehart et al. 2024). Of these, two are rock shelter sites with the potential for undisturbed subsurface cultural deposits that were recommended as eligible for listing in the NRHP. The remaining four sites and three isolated finds are recommended as ineligible.

A total of eight architectural resources were identified within the Raccoon Mountain survey area. Of these, seven are recommended as ineligible for the NRHP. The remaining resource, the Raccoon Mountain Pumped Storage Facility District, was previously surveyed by Cultural Resource Analysts, Inc., who recommended the resource eligible for listing in the NRHP under Criteria A and C for its association with community planning, engineering, architecture, as well as a property that has achieved exceptional importance in the last 50 years (Criterion G) (Reynolds 2021). The Raccoon Mountain Pumped Storage Facility District was previously determined as eligible, through consultation, for listing in the NRHP. WSP noted minimal physical change to the facility during their 2024 cultural resource investigation and found that it retained its integrity of design, material, workmanship, setting, feeling, and association.

TVA consulted with the Tennessee SHPO and federally recognized Indian tribes regarding the survey results and eligibility determinations in June of 2024. The Tennessee SHPO concurred, and none of the consulted Indian tribes objected or identified resources of concern.

A total of 466 acres within the Raccoon Mountain project footprint was previously covered by a cultural resources survey conducted by TRC in 2010 (Barrett and Karpynec 2010). As such, this acreage was omitted from WSP's 2024 surveys. This previous survey documented five additional archaeological sites. Of these five sites, two are rockshelter sites determined to be eligible, through consultation, for listing in the NRHP. The remaining three sites were determined to be ineligible. No historic architectural resources were recorded as part of this previous survey.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action Alternative

Under the No Action alternative, the proposed project would not be implemented and no impacts on cultural or historic resources would be anticipated. Therefore, there would be no direct, indirect, or cumulative impacts on archaeological sites or historic architectural properties listed in, or eligible for listing in, the NRHP.

3.15.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

This proposed alternative has the potential to impact NRHP-listed or -eligible archaeological sites within the Rorex Creek project footprint. A total of 14 sites are recommended as eligible or require additional work to evaluate their NRHP eligibility. These unassessed and recommended NRHP-eligible sites are recommended for avoidance. If avoidance is not feasible, TVA would seek (in consultation) ways to minimize the effects. If TVA failed to identify avoidance or minimization that could be effective, TVA would consult with the Alabama SHPO and federally recognized Indian tribes regarding ways to mitigate the effects. The remaining 46 sites were recommended as ineligible for the NRHP.

Based on the current design of the proposed action, there is only one archaeological site that is unassessed for its NRHP eligibility that falls within the limits of disturbance. This site is capped by gravel road and was unable to be evaluated during TRC's 2024 archaeological survey (Stephens and Bean 2025). In order to ensure that there are no impacts to this site, TVA will avoid this site within the proposed project by restricting project activities to the existing roadbed. If the roadbed requires widening, fabric will be laid down across the portions of the site outside of the roadbed and gravel will be placed atop the fabric. Adherence to these avoidance measures will ensure there are no significant impacts should this site be found to be eligible during future investigations. If the site cannot be avoided, additional investigations would be necessary, and mitigation of adverse effects may be required. No additional archaeological sites that are unassessed for their NRHP eligibility, or are recommended/determined eligible or potentially eligible, fall within the limits of disturbance for the proposed Rorex Creek facility. TVA has not obtained permission to enter 10 small landowner parcels within the disturbance area, all located in the southern portion of the Rorex Creek project footprint on Sand Mountain. If TVA obtains permission to enter, an addendum archaeological survey will be conducted. TVA will continue to consult with the Alabama SHPO and federally recognized Indian tribes to avoid, minimize, or mitigate any possible effects.

The proposed project construction within the Rorex Creek footprint on the south side of the reservoir would have no impact to eligible or listed historic architectural resources, as there are none in this portion of the cultural resources APE. The proposed project construction on the north side of the reservoir may result in minor changes to the setting and/or feeling of historic properties or unassessed historic architectural properties. However, any such effect would be minor compared with the existing effect from the existing transmission lines and other existing non-historic infrastructure in the viewshed. Therefore, this new construction would not significantly impact any historic properties.

3.15.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

This proposed alternative has the potential to impact NRHP-listed or -eligible archaeological sites within the Widows Creek project footprint. Two sites recommended potentially eligible and three unassessed sites are within the preliminary limits of disturbance. In addition, several landowner parcels that have not been surveyed for archaeological sites overlap the preliminary disturbance areas. The unassessed sites and potentially eligible sites are recommended for avoidance. If avoidance is not feasible, TVA would seek (in consultation) ways to minimize the effect. No further management of the ineligible sites is recommended. If this alternative is selected for future development, addendum archaeological surveys would be conducted to cover the land parcels that have not been surveyed, and TVA would continue to consult with the Alabama SHPO and federally recognized Indian tribes to identify historic properties and avoid, minimize, or mitigate possible impacts on NRHP-listed or –eligible resources. This alternative would have no impacts on listed or eligible historic architectural resources, as none were identified in this portion of the cultural resources APE.

3.15.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Based on the current design of the expansion, no historic properties would be adversely affected by Alternative D. The four archaeological sites determined to be eligible, through consultation, would be avoided and the development of this alternative would not include changes to the NRHP-eligible Raccoon Mountain Pumped Storage Facility infrastructure that is recommended eligible. New construction would occur within the upper reservoir, but the new powerhouse and tunnel would be located to the north of the existing facilities, and there would be no changes to the dam. Therefore, Alternative D as currently proposed would have no significant impacts on historic properties.

3.16 Visual Resources

3.16.1 Affected Environment

This subsection reviews and classifies visual attributes of existing scenery and the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA (U.S. Forest Service 1995).

Physical, biological, and man-made features form the visual landscape of an area. This combination of features influences both landscape identifiability and uniqueness. The scenic value of a particular landscape is evaluated based on several factors, including scenic attractiveness, scenic integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic attractiveness is expressed as one of the following three categories: distinctive, common, or minimal. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The scenic integrity of a site is classified as high, moderate, low, or very low. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed.

Views of the landscape are described in terms of what is seen in the foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, objects may be distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with an action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment includes the Rorex Creek, Widows Creek, and Raccoon Mountain study areas that encompass both permanent and temporary impact areas and the proposed off-site improvements associated with the construction of the PSH facility at each site.

3.16.1.1 Rorex Creek Study Area

The study area landscape is characterized by ridges running in a general southwest to northeast direction. The area along the reservoir is gently rolling with an average elevation of 600 ft. Moving to the east, the elevation rises to a rolling plateau up to an elevation of 1,400 feet. The higher terrain areas are more heavily forested than the lower elevations along the river valley and are mostly marshland.

Land use is predominantly rural with single-family residences and county roads sparsely located throughout open fields of agricultural land and forested areas. Transmission lines and utility structures are located within the foreground of the study area. Additionally, the Bellefonte Nuclear Power Plant property is on the western side of the reservoir. Several residences, campgrounds, recreation areas, and a church are located within the study area and within the foreground. Viewers in the foreground of the Rorex Creek study area would predominantly consist of residents, recreationists, and boaters on the Tennessee River.

Based on the above characteristics, the scenic attractiveness of the affected environment at the Rorex Creek study area is considered to be common to minimal, whereas the scenic integrity is considered to be moderate. The rating for scenic attractiveness is based on the ordinary or common visual quality of the landscape, which is often reduced to low in the foreground due to the absence of natural features in the industrial setting. The forms, colors, and textures in the affected environment are not considered to have distinctive visual quality. The scenic integrity is considered moderate due to noticeable human alteration, including agricultural, industrial, and residential uses. The scenic value class of a landscape is determined by combining levels of scenic attractiveness, scenic integrity, and visibility and can be excellent, good, fair, or poor. Based on the criteria used for this analysis, the overall scenic class for the affected environment is considered to be fair.

3.16.1.2 Widows Creek Study Area

The study area landscape is similar to that of the Rorex Creek study area and is characterized by ridges running in a general southwest to northeast direction; the higher terrain areas are more heavily forested than the lower elevations along the river valley.

Like the Rorex Creek study area, land use is predominantly rural with single-family residences. Approximately 0.6 mile west of the study area, across the Guntersville Reservoir, is a large paper mill. Additionally, a quarry is located approximately 0.5 mile east of the study area. Viewers in the foreground of the Widows Creek study area would predominantly consist of residents who live in the area and boaters on the reservoir.

Based on the above characteristics, the scenic attractiveness of the affected environment at the Widows Creek study area is considered to be common to minimal, whereas the scenic integrity is considered to be moderate. The forms, colors, and textures in the affected environment are not considered to have distinctive visual quality. The scenic integrity is considered moderate due to noticeable human alteration, including residential and agricultural uses as well as industrial uses within the vicinity. Based on the criteria used for this analysis, the overall scenic class for the affected environment is considered fair.

3.16.1.3 Raccoon Mountain Study Area

The study area landscape is characterized as mountainous terrain in the Cumberland Plateau rising to an approximate elevation of 1,850 feet above mean sea level. The area along the river is gently rolling with an average elevation of 800 feet rising to 1,800 feet toward the reservoir.

The existing pumped storage dam, reservoir, and transmission lines are the dominant features of the landscape within the foreground. Changes in pool levels affect visual resources associated with the reservoir. Typically, longer durations of pool levels at the higher elevations would be more desirable for maintaining the scenic values of the reservoirs. When the pool levels are low, a “bathtub ring” occurs immediately around the shoreline, and reservoir bottoms and flats are exposed as reservoir levels are drawn down.

The Raccoon Mountain bike trail is within the foreground of the study area. Viewers in the foreground of the Raccoon Mountain study area would predominantly consist of recreationists on the mountain bike trail and at the Raccoon Mountain Chattanooga Overlook, employees and visitors to the pumped storage facility, and boaters on the Nickajack Reservoir.

Based on the above characteristics, the scenic attractiveness of the affected environment at the Raccoon Mountain study area is considered common to minimal, whereas the scenic integrity is considered moderate. The composition and patterns of vegetation are the prominent natural features of the landscape within the study area. The vegetation within the study area consists of brush and trees, which are predominantly deciduous. The forms, colors, and textures of the natural features of the study area are typical of southern Tennessee and are not considered to have distinctive visual quality. Therefore, the scenic attractiveness of the study area is considered common due to the ordinary or common visual quality in the foreground, middleground, and background. The scenic integrity is considered moderate due to the existing pumped storage facility and transmission lines. Based on the criteria used for this analysis, the overall scenic value class for the study area is fair.

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop or expand PSH facilities at any of the project sites. Therefore, the existing visual landscape would not change. The landscape character and integrity would remain in their current state; therefore, there would be no project-related impacts on aesthetics and visual resources.

3.16.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Alternative B would result in temporary visual impacts associated with construction activities. During the approximately 5.5-year construction period, there would be increased visual discord due to an increase in personnel and heavy construction equipment such as large trucks and cranes coupled with disturbances of clearing and grading, extensive rock excavation, and laydown and staging areas. However, this would be contained within the immediate vicinity of the construction activities and would only last until all project activities have been completed. Additionally, the disturbed areas would be seeded and restored according to TVA's standard BMPs (TVA 2022c).

Long-term impacts resulting from the construction of the Rorex Creek PSH would include visible alterations to the existing landscape associated with the upper and lower reservoirs, dam structures, and bridge, as well as the proposed 500-kV switchyard and the new transmission structures and overhead wires associated with the new reconfigured 500-kV transmission lines.

These features would add elements to the viewshed that adversely contrast with the natural environment. Changes would be visible from the residences and church, and by recreators within the foreground. However, for recreators on Guntersville Reservoir, the only visible elements would be the shoreline park and the intake/outflow structure because the upper reservoir would be obscured by escarpment.

These new project elements would be visually similar to the Bellefonte Nuclear Power Plant in the current landscape. Visitors to local campground and recreational facilities may also have views of these facilities at middleground distances, thus, changes in the viewshed would be less perceptible. Other visual receptors such as schools and cemeteries are located at distances of 1 mile or more and would not have views of the Rorex Creek PSH facility due to topography and intervening vegetation.

During the construction period of the transmission line upgrades, there may be some visual discord due to increased personnel and equipment coupled with disturbances of the current site characteristics. However, this would be contained within the immediate vicinity of the transmission line and would only last until all project activities have been completed and the disturbed areas have been seeded and restored per TVA's standard BMPs (TVA 2022c). There would be no long-term visual effects of the project transmission line extending north from the Bellefonte Nuclear Plant location because the corridor has been occupied by similar structures for over a decade and are part of the existing viewshed. Other long-term impacts consist of vegetation clearing, however, these activities would be completed within the existing ROW, which is often obscured from view by the adjacent forest. Therefore, vegetation maintenance would have a minor impact on sensitive receptors and scenic quality.

The industrial elements from the Bellefonte Nuclear Power Plant and utility structures already in place within the study area currently contribute visual discord with the landscape, contributing to the landscape's ability to absorb negative visual change. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be somewhat affected by the construction of the Rorex Creek PSH facility, it would still remain common to minimal. Scenic integrity would remain low as visually disruptive elements and human alterations would continue to dominate the landscape. Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed construction would remain fair. While the construction and operation of the Rorex Creek PSH facility changes the undeveloped nature of the study area, the majority of project related structures would be underground and the upper reservoir would have limited industrial features. To visual receptors on the plateau, the only feature of the upper reservoir that would be visible is the dam encircling the reservoir. Local topography providing views over the top of the dam and into the reservoir would be limited. For most visual receptors, the upper reservoir would appear to be a grassy knoll and would not change scenic integrity. Therefore, overall visual impacts resulting from the implementation of the Alternative B would be moderate.

3.16.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Impacts to visual resources would be similar to those discussed under Alternative B because the construction activities, timeline, and on-site components and specifications for the proposed Widows Creek PSH facility would be similar to that described for Rorex Creek, with the exception of the 500-kV transmission line. The site elevation and landscape characterization are similar to those in the Rorex Creek study area, resulting in similar profile and visibility. Similar to the Rorex Creek study area, there is an industrial facility located on the western side of Guntersville Reservoir. The proposed facility may also be visible in the foreground to residents and recreators on Guntersville Reservoir. However, like Alternative B, the upper reservoir would blend into the existing landscape and would not change the scenic integrity.

Alternative C would require construction of a new 500-kV transmission line within a new transmission line corridor. This new line would be a significant addition to the existing landscape. While the specific design of the transmission line for this alternative has not been developed, the new line would either: (1) tie into the Widows Creek – Bellefonte 500 kV transmission line that runs along the base of the escarpment, (2) tie into a substation on the west side of Guntersville Reservoir, or (3) tie into a substation on the eastern plateau. Connecting to the existing 500 kV line would likely include two or three new 500-kV lines from the top of the escarpment to the base and include clearing of vegetation on the escarpment visible to recreators on Guntersville Reservoir and visual receptors on the west bank of the reservoir. Connecting to a substation on the west side of Guntersville would require a new 500-kV transmission line spanning the reservoir and developing a new transmission corridor on the west side of the reservoir. This option would also be visible to recreators on Guntersville Reservoir and visual receptors on the west bank of the reservoir, likely including views from local residences. Connecting to a substation on the eastern plateau would require creation of a new transmission line corridor and construction of a new 500 kV line that would be visible to receptors on the plateau, likely including views from local residences. Thus, while the impacts of the upper reservoir associated with Alternative C are anticipated to be similar to that of Alternative B, there would be additional impacts associated with the transmission line, resulting in overall significant impacts to visual resources.

3.16.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Similar to Alternatives B and C, implementation of Alternative D would result in temporary visual impacts associated with construction activities in the study area impacted by the proposed on- and off-site actions. Alternative D also has a 5.5-year construction period and there would be increased visual discord due to an increase in personnel and heavy construction equipment such as large trucks and cranes coupled with disturbances of clearing and grading, extensive rock excavation, and laydown and staging areas.

The expansion of the RPS would be visible primarily to on-site workers, recreators on Raccoon Mountain, and recreators on the Tennessee River; however, the existing Raccoon Mountain PHS facility already in place within the study area currently contributes visual discord within the landscape. Therefore, while the forms, colors, and textures of the landscape that make up the scenic attractiveness would be somewhat affected by the expansion of the facility, it would still remain common to minimal. Scenic integrity would remain low as visually disruptive human alterations would continue to dominate the landscape. Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed expansion would remain fair. While the expansion of the Raccoon Mountain PSH facility would contribute to minor differences in the visual environment, it would not change the overall scenic value class as the industrial character of the study area would remain consistent. Therefore, overall visual impacts resulting from the implementation of the Alternative D would be minor.

3.17 Public Health and Safety

3.17.1 Affected Environment

Workplace health and safety regulations and laws are designed to eliminate personal injuries and illnesses from the workplace. These laws may comprise both federal and state statutes. The Occupational Safety and Health Act of 1970 is the main statute protecting the health and safety of workers in the workplace by protecting workers from hazardous work environments, including risk of injury or illness. The Tennessee Emergency Management Agency maintains protection of the public through regulations for hazardous wastes and materials. In Alabama, the Alabama Emergency Management Agency is charged with responding to disasters and hazard mitigation.

TVA is focused on awareness and understanding of workplace hazards, prevention, intervention, and integration of BMPs to avoid or minimize hazards. Activities at TVA facilities or on TVA-owned land are consistent with Occupational Safety and Health Administration (OSHA) regulations, state standards and requirements, and specific TVA guidance. TVA manages operations to reduce or eliminate occupational hazards through implementing safety practices, training, and control measures. TVA’s Safety Standard Programs and Processes would be strictly adhered to during the proposed actions. The safety programs and processes are designed to identify actions required to control hazards in all activities, operations, and programs.

Worker health and safety hazards potentially associated with pumped storage projects include electric shock, drowning, injury resulting from mechanical equipment failure, and accidental spills or releases of hazardous materials. Principle public health concerns are associated with potential property damage or loss of life following the failure of a dam or personal safety within the downstream channel during large increases in discharge below a dam. An emergency response plan developed to address these potential discharges would be discussed with local emergency management agencies. Additionally, existing waste generation can pose a health hazard. These waste streams are managed in accordance with applicable state and federal laws and all applicable permit requirements.

Transmission lines generate both electric and magnetic fields. The voltage on the conductors of a transmission line generates an electric field that encompasses spaces between conductors and other conducting objects. The magnetic field generated by the current in the conductors and most of the energy dissipates on the transmission line. TVA has taken measures to minimize the potential for shocks by maintaining clearance between the lines and objects on the ground. TVA would ground other objects that have the potential to be conductors, such as metal fences, guardrails, and pipelines, to avoid any electrical shocks to workers or others.

3.17.1.1 Public Health Facilities

3.17.1.1.1 Rorex Creek Study Area

Police service in the area is provided by the Pisgah Polic Department, as well as the Jackson County Sheriff's Office. The Pisgah Fire Department is located approximately two miles east of the Rorex Creek study area and provides fire protection to Pisgah and the surrounding area. Highlands Medical Center, an Adult Level III trauma center, is approximately 20 miles west of the study area in Scottsboro.

3.17.1.1.2 Widows Creek Study Area

The Jackson County Sheriff's Office provides police service in the area. The Tri-County Fire Department's Higdon and Flat Rock stations provide fire protection in the area and are approximately four miles to the east and southeast of the Widows Creek study area. The closest medical center is Highlands Medical Center in Scottsboro, approximately 27 miles west of the study area.

3.17.1.1.3 Raccoon Mountain Expansion Study Area

The Raccoon Creek Expansion study area is owned by TVA, which has its own police force and emergency management service. TVA Police and Emergency Management is a federal law enforcement agency that protects TVA's critical infrastructure, employees, and assets, and provides law enforcement, physical security, and emergency management across the entirety of TVA's 293,000 acres (TVA 2025e).

The vast majority of the study area is in unincorporated Marion County, where the Marion County Sheriff's Office provides police service. Although the majority of the Raccoon Mountain Expansion study area is in unincorporated Marion County—just outside of Chattanooga city limits—fire protection, technical rescue, and hazardous material response services are provided by the Chattanooga Fire Department, as authorized by Chattanooga Resolution 28287 on June 23, 2015 (City of Chattanooga 2015). Various healthcare facilities, hospitals, and clinics are located in nearby Chattanooga, within approximately five miles of the study area.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop or expand PSH facilities at any of the project sites. TVA would continue to operate the existing RPS, and there would be no change to public health and safety.

3.17.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, TVA would construct and operate a new PSH facility with a generation capacity of 1,600 MW near TRM 388 near Pisgah, Alabama. Although construction work has known hazards, it is TVA's policy that contractors establish and maintain site-specific health and safety plans in compliance with OSHA regulations, which minimize risks to health and safety. The contractor site-specific health and safety plans address hazards and controls, as well as coordination for various construction tasks. The implementation of proper engineering and equipment design, maintenance, and administrative controls, including employee training and compliance with regulatory requirements related to health and safety, help ensure that the risks associated with work at TVA facilities remain low. These mitigative measures are used to ensure protection of human health which includes the workplace, public, and the environment. TVA would emphasize BMPs for site safety management to minimize potential risks to workers. These BMPs could include employee safety orientations, work procedures and programs for on-site activities, personal protective equipment, emergency shut-down procedures, lockout procedures, protective equipment guards, site housekeeping, regular safety inspections, and preventive plans and procedures to mitigate hazards.

Public health and safety hazards could result from increased roadway traffic during construction. Residential and public use areas along roadways used by the construction workforce to access the study area may experience delays due to increased traffic. To minimize the adverse impact of traffic, traffic procedures would be established to minimize potential safety concerns and addressed in the health and safety plans followed by construction contractor(s).

TVA would develop a site-specific SPCC plan, which would minimize the potential of a spill during the drainage and disposal of oil and fluids and to instruct on-site workers on how to contain and clean up any potential spills. General public health and safety would not be at risk in the event of an accidental spill on-site.

Using explosives for construction activities would be conducted under tight security; the danger to the public from this activity would likely be very low. Explosives would be managed under the direction of a state-licensed blaster. Several security measures would be implemented to minimize public health or safety threats. Once the explosives arrive on-site, detailed security plans would be developed and coordinated with area emergency response agencies. Security details, including any information about the transport and storage of explosives, would be limited to authorized personnel only. Site security on days when explosives are used would be strictly enforced, and trespassing would not be tolerated. Notifications to the public would be issued before explosives are used. Health and safety hazards could result from premature detonation if explosives are used. These risks are reduced if mechanical demolition is used, though precautions would still be implemented.

Through TVA guidance and regulations, the operation of the PSH facility would adhere to standards established by OSHA and applicable state requirements. TVA’s commitment to implementing health and safety practices would reduce occupational and public health hazards. TVA fosters safety-mindedness, ensuring safety measures and programs are adhered to and limiting the impacts of public health and safety concerns.

Existing transmission lines create an electromagnetic field and are a potential hazard to occupational and public health and safety. Public exposure to such electromagnetic fields would be minimal as the transmission line used already exists, and the ROW is restricted from public use. Thus, worker exposure would not deviate from existing conditions. TVA’s Standardized Programs and Processes related to maintaining safety would be strictly adhered to during the operation of the proposed action. The overall impacts of Alternative B on public health and safety would be minor.

Construction and operation of the upper reservoir would include construction and maintenance of a dam to contain the water pumped from Guntersville Reservoir. All dams contain some level of risk to public safety associated with the potential for dam breaches. The effects of a breach would depend on local topography at the site of the breach but could result in flooding and erosion. At its existing dams, TVA implements dam safety policies and procedures, and inspection requirements to ensure any risks of breaching are addressed and minimized. These same policies and procedures would be implemented for the PSH project. TVA owns and operates 49 dams in the Tennessee River basin and has never had a dam breach. Thus, while the effects of a breach would be major, TVA's policies and procedures would reduce the potential for a breach and mitigate this risk.

3.17.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, TVA would construct and operate the new PSH facility near TRM 408, near Fabius, Alabama, similar to that described for Alternative B. All construction and operation activities would adhere to standards established by OSHA and applicable state requirements. TVA's guidance and regulations ensure commitment to health and safety practices and a reduction in occupational and public health hazards. As such, the impacts on public health and safety under Alternative C are minor.

3.17.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

TVA would install and operate a second underground powerhouse at TVA's existing RPS facility near Chattanooga, Tennessee. Construction activities under Alternative D are similar to but less than those described in Alternative B, due to the presence of existing infrastructure and support systems at the existing RPS facility. However, all construction and operational activities would adhere to standards established by OSHA and applicable state requirements. TVA's guidance and regulations ensure commitment to health and safety practices that would reduce occupational and public health hazards. As such, the impacts on public health and safety under Alternative D are minor.

3.18 Solid and Hazardous Waste

3.18.1 Affected Environment

3.18.1.1 Regulatory Overview

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated environmental media, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (i.e., solid, liquid, or contained gaseous substances). Solid waste is regulated by the EPA and the Resource Conservation and Recovery Act (RCRA). Each state is required to ensure the federal regulations for solid waste are met and may implement more stringent requirements (USEPA 2024a).

Special waste refers to six waste categories waste that are currently excluded from hazardous waste regulations under RCRA. These wastes typically are generated in large volumes and may possess less risk to human health and the environment than waste identified as hazardous waste (USEPA 2024b). There are also some special wastes that are exempt from special waste requirements. The RCRA Subtitle C explains that these wastes must be logged in a registry and that special attention should be paid to these hazardous materials. All special waste, if generated, must be disposed of as required by state and federal laws and regulations.

Hazardous waste is any unwanted by product that may have the potential to be harmful to human health or the environment. This can be because of several different factors, including the concentration of the material, its potential to have infectious properties, and certain physical and chemical characteristics. Due to these potentially harmful impacts, hazardous waste is regulated by several federal laws and agencies, including: OSHA standards, Emergency Planning and Community Right to Know Act, the RCRA, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the Toxic Substances Control Act.

Regulations implementing the requirements of the Emergency Planning and Community Right to Know Act are codified in 40 CFR 355, 40 CFR 370, and 40 CFR 372. Under 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity are required to provide reporting information to the State Emergency Response Commission, Local Emergency Planning Committees, and local fire departments. Inventory reporting to emergency response parties is required for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA-regulated hazardous material. The Emergency Planning and Community Right to Know Act also requires inventory reporting for all releases and discharges of certain toxic chemicals (USEPA 2024c).

RCRA regulations define what constitutes a hazardous waste and establish a “cradle to grave” system for hazardous waste management, tracking, and disposal. Subtitle C of RCRA includes separate, less stringent regulations for certain potentially hazardous wastes. Used oil, for example, is regulated as hazardous waste if it is disposed of, but it is separately regulated if it is recycled. Specific requirements are provided under RCRA for generators, transporters, processors, and burners of used oil that are recycled (USEPA 2024d). Universal wastes are a subset of widely generated hazardous wastes. Universal wastes include batteries, pesticides, mercury-containing equipment, lamps, and aerosol cans. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions (USEPA 2024e).

3.18.1.2 Study Areas

All of the project's alternative sites are located on relatively undisturbed greenfield sites, The following describes the online databases reviewed to determine potential or existing environmental contamination. The EPA’s Enforcement and Compliance History Online (ECHO) database was also consulted to identify EPA-regulated facilities related to the CAA, CWA, RCRA, and Safe Drinking Water Act.

3.18.1.2.1 Rorex Creek Study Area

ADEM data were reviewed to identify Brownfields/Voluntary Cleanup Program sites in the Rorex Creek study area. These are sites for which any real estate activities such as development, redevelopment, expansion, or reuse could be complicated by the presence of a hazardous substance. No such sites are in the Rorex Creek study area (ADEM 2025). No underground storage tanks or ECHO sites are located in the study area, per EPA data (USEPA 2023a, US2023b).

3.18.1.2.2 Widows Creek Study Area

No Brownfields or Voluntary Cleanup Program sites, underground storage tanks, or ECHO sites were identified in the Widows Creek study area (ADEM 2025; USEPA 2023a, US2023b).

3.18.1.2.3 Raccoon Mountain Expansion Study Area

TDEC data were reviewed to identify sites on the TDEC Division of Remediation Database, permitted Tennessee landfill sites, solid waste processors, and transfer or convenience centers in the Raccoon Mountain study area. No such sites are present (TDEC 2025b, 2025c). No underground storage tanks are present, per the EPA's database (USEPA 2023a).

The RPS is identified on the ECHO database as a minor no-violation air facility and as a major multiprogram facility of unknown compliance status inspected within the last five years (USEPA 2023b).

3.18.2 Environmental Consequences

3.18.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop or expand PSH facilities at any of the project sites. Therefore, no new solid or hazardous waste would be generated. TVA would continue to generate solid and hazardous waste at the existing RPS as part of its continued operations. These wastes would continue to be managed in accordance with current TVA procedures and federal and state laws and regulations. As such, there would be no additional impacts on solid and hazardous waste generation.

3.18.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, TVA would construct a new PSH facility near Rorex Creek in Jackson County, Alabama. The proposed preconstruction and construction activities would result in increases in the generation of solid and hazardous wastes. Materials generated through earth-moving activities would be used in project activities; vegetation stripping would be utilized on site, and tunnel spoils would be used as fill to create the work areas at the portal.

Construction activities may produce various hazardous wastes, such as waste paints, coating and adhesive wastes, and spent solvents. These wastes would be temporarily stored in properly managed hazardous waste storage areas on site. Appropriate spill prevention, containment, and disposal requirements for hazardous waste would be implemented to prevent and contain accidental spills of any material and to ensure that inadvertent spills of fuels, lubricants, coolants, or solvents are contained, cleaned up, and disposed of appropriately. These preventive measures ensure protection to workers, the public, and the environment. A permitted hazardous waste disposal facility would be used for the ultimate disposal of the waste.

Motorized heavy equipment used during pre-construction and construction include dredging equipment, barges, track and backhoes, cranes, and work boats as well as trucks for hauling people and materials. This equipment requires fuels and lubricants, which are potentially hazardous wastes. Equipment refueling and maintenance operations would be carried out at designated locations using applicable BMPs. Oily wastes generated during the servicing of heavy equipment would be managed using appropriate self-contained used oil reservoirs. It is expected that all vehicles and construction equipment would be properly maintained, which would reduce risk of hazardous wastes produced on site. However, appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented to protect construction workers, the public, and the environment in accordance with applicable state and federal regulations. Therefore, no significant impacts associated with the use of fuels, oils, lubricants, or other hazardous materials would be expected.

Dredged sediments from the inlet and outlet structures, associated infrastructure, and dams could potentially contain hazardous wastes. Dredged materials would be sampled before removal to identify potential constituents of concern. For example, PCBs, dioxins, and pesticides are toxic substances that may be present in reservoir sediments in the Guntersville Reservoir and Nickajack Reservoir (see Section 3.5, Surface Water Resources). Toxicity Characteristic Leaching Procedure testing would determine the mobility of both organic and inorganic analytes present in dredged sediments. Dredging removes a slurry of sediments and water, which would be dewatered on-site. Dredged sediment samples must indicate Toxicity Characteristic Leaching Procedure concentrations below the EPA allowable limits for disposal as non-hazardous waste to be disposed of on-site. Dredged sediments classified as hazardous wastes would be disposed of in approved hazardous waste landfills as appropriate, in accordance with all applicable laws and regulations. Any regulated hazardous waste associated with dredged material would be managed in accordance with RCRA requirements.

Small quantities of solid and hazardous waste are expected to be generated during normal operations. Solid and hazardous wastes generated during the operation of the PSH facility would be properly contained, transported, and disposed of in accordance with established procedures and applicable federal, state, and local laws and regulations. Additionally, the proposed PSH facility would comply with measures identified in TVA's spill prevention and response procedures to prevent and contain accidental spills of any material; and ensure that inadvertent spills are contained, cleaned up, and disposed of appropriately. As such, impacts associated with the generation of solid and hazardous wastes from Alternative B would be minor.

3.18.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, TVA would construct a new PSH facility near Widows Creek in Jackson County, Alabama. Alternative C would require very similar pre-construction and construction activities as Alternative B. As such, solid and hazardous waste generation and associated management practices, and impacts during construction and operation under Alternative C, would be the same as those discussed for Alternative B. TVA would manage solid and hazardous wastes in accordance with all applicable federal, state, and local requirements and standards and apply recycling and waste minimization practices. As such, impacts from solid and hazardous waste generation under Alternative C would be minor.

3.18.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would expand the RPS in Marion County, Tennessee. Pre-construction and construction activities under Alternative D, would be similar but less than those compared to Alternatives B and C, as the existing RPS has infrastructure in place and can be used for the proposed expansion. Accordingly, waste generation and associated management practices and impacts during construction and operation would be very similar but the overall generation of solid and hazardous wastes would likely less than those discussed for Alternative B. TVA would manage solid and hazardous wastes in accordance with all applicable federal, state, and local requirements and standards and apply recycling and waste minimization practices. As such, impacts from solid and hazardous waste generation under Alternative D would be minor.

3.18.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, generation of solid and hazardous wastes may occur. Potential impacts from those reasonably foreseeable future actions are expected to be minimized through adherence to federal, state, and local requirements. As such, these actions would likely have minimal aggregate impacts on solid and hazardous waste in the area.

3.19 Transportation

3.19.1 Affected Environment

The primary modes of transport to the Rorex Creek, Widows Creek, and Raccoon Mountain study areas are via waterway and roadway networks. The three sites are each located along the Tennessee River system. Along with flood control and hydropower generation, navigation of the Tennessee River is one of the main objectives of TVA. Over 28,000 barges carry 45 to 50 million tons of goods up and down the Tennessee River annually (TVA 2025f).

Interstate 59 (I-59) is the primary thoroughfare for much of the region, extending northeast from Birmingham, Alabama, to Chattanooga, Tennessee, where it intersects Interstate 24 (I-24) approximately five miles south of the Raccoon Mountain study area. I-59 is located approximately 10 to 15 miles east of the Rorex Creek and Widows Creek study areas. A characterization of the localized transportation network in the vicinity of each site is provided below.

3.19.1.1 Rorex Creek Study Area

3.19.1.1.1 Roadways and Traffic Volumes

The Rorex Creek study area is directly accessible from the east via CR 88, which, near the study area is a paved one-lane road lacking pavement markings or shoulders. In the town of Pisgah, CR 88 turns into a two-lane, undivided road. CR 88’s nearest connection to a state or national highway is Alabama State Route (SR) 71, approximately three miles east of the study area and approximately 1.5 miles past Pisgah. U.S. Route (US) 72 is the primary arterial roadway on the west side of Guntersville Reservoir. Access to the

Bellefonte Nuclear Power Plant property and the western portion of the study area is provided from US 72 via CR 588, which currently dead-ends at the Reservoir. The most direct route from US 72 to the eastern portion of the study area is via the SR 35 bridge near Scottsboro, approximately four miles south of the study area, then utilizing SR 40 to reach SR 71. SR 40 also provides access to SR 71 from I-59 to the west.

Table 3-51 provides roadway characteristics and average annual daily traffic (AADT) flow for the roadways serving the Rorex Creek study area. Data is not available for local roads, but traffic levels are assumed to be low as these roads provide access to residential properties and local destinations, not supporting through traffic.

Table 3-51. Characteristics of Roadways Serving the Rorex Creek Study Area

Roadway	Location	Highway Functional Classification	AADT (2023)
County Road 88	Vicinity of study area; west of Pisgah	Local	NA
	East of Pisgah	Major Collector	885
SR 71	Between SR 40 and CR 88	Major Collector	3,554
	Between SR 40 and CR 88	Major Collector	2,038
SR 40	Between SR 71 and SR 35 bridge	Minor Arterial	5,027
SR 35	Bridge across Guntersville Reservoir	Principal Arterial	17,485
US 72	Near Bellefonte property	Principal Arterial	16,285
	Near Scottsboro; north of SR 35	Principal Arterial	19,366
County Road 558	Western portion of study area; southwest of Bellefonte property	Local	NA

Source: ALDOT 2013, 2023.

Key: NA = Data not available.

3.19.1.1.2 Waterways

The study area is located on Guntersville Reservoir, part of the Tennessee River system. A detailed description of transportation and navigation conditions for Guntersville Reservoir is provided in Section 3.13, Navigation. Within the study area, on the west side of the reservoir, there is an existing barge slip south of the Bellefonte Nuclear Plant, though it would require improvements to be functional.

3.19.1.1.3 Rail and Air Traffic

The Rorex Creek study area is not directly accessible by rail. The nearest rail line, operated by Norfolk Southern, is located on the western side of Guntersville Reservoir, approximately 2.5 miles northwest of the Bellefonte Nuclear Power Plant property (ALDOT 2014). There is a rail spur off this main line that previously served the Bellefonte property, however, it is not currently maintained or functional. The nearest commercial airport is the Chattanooga Metropolitan Airport, approximately 45 miles northeast of the study area.

3.19.1.2 Widows Creek Study Area

3.19.1.2.1 Roadways and Traffic Volumes

While there are a number of local roads within the Widows Creek study area, the primary access is from SR 117, a two-lane undivided road which borders the study area to the south. SR 117 extends south from the study area, intersecting SR 71 approximately five miles to the south, and continues on to I-59. SR 117 also extends generally west from the study area, crossing the Guntersville Reservoir at a bridge approximately two miles southwest of the study area and connecting to US 72. Table 3-52 provides roadway characteristics and AADT for the roadways serving the Widows Creek study area.

Table 3-52. Characteristics of Roadways Serving the Widows Creek Study Area

Roadway	Location	Highway Functional Classification	AADT (2023)
SR 117	West of study area, before bridge	Minor Arterial	2,684
	South of study area, before SR 71	Minor Arterial	2,301
SR 71	North of SR 117	Major Collector	2,148
US 72	North of SR 117, near Stevenson	Principal Arterial	14,544

Source: ALDOT 2013, 2023

3.19.1.2.2 Waterways

Like the Rorex Creek study area, the Widows Creek study area is located adjacent to Guntersville Reservoir, detailed in Section 3.13, Navigation. There is no existing barge access within the study area.

3.19.1.2.3 Rail and Air Traffic

The Widows Creek study area is not directly accessible by rail. The nearest rail line, operated by CSX Transportation, is located on the western side of Guntersville Reservoir, approximately three miles northwest of study area (ALDOT 2014). There is a rail spur off this main line that serves a paper mill as well as the former TVA Widows Creek Fossil Plant, which is no longer in operation. The nearest commercial airport is the Chattanooga Metropolitan Airport, approximately 35 miles northeast of the study area.

3.19.1.3 Raccoon Mountain Study Area

3.19.1.3.1 Roadways and Traffic Volumes

The primary access to RPS is from US 41 via Raccoon Mountain Road, a two-lane undivided road that encircles Raccoon Mountain, providing access to the RPS and to the on-site recreational amenities. Raccoon Mountain Road can also be accessed via Elder Mountain Road which provides access from the neighborhoods to the east. US 41 intersects I-24 approximately 2.5 miles southeast of Raccoon Mountain Road. I-24 serves as the primary route to the urban center of Chattanooga to the east. Table 3-53 provides roadway characteristics and AADT for the roadways serving the Raccoon Mountain study area.

Table 3-53. Characteristics of Roadways Serving the Raccoon Mountain Study Area

Roadway	Location	Highway Functional Classification	AADT (2024)
Raccoon Mountain Road	Vicinity of study area	Local	NA
Elder Mountain Road	West of Raccoon Mountain Road; in neighborhood	Minor Collector	1,903
US 41	Between Raccoon Mountain Road and I-24	Major Collector	4,982
I-24	North of US 41 intersection	Interstate	88,190

Source: TDOT 2018, 2024c

Key: NA = Data not available.

3.19.1.3.2 Waterways

The Raccoon Mountain study area is located adjacent to Nickajack Reservoir. A detailed description of transportation and navigation conditions for Nickajack Reservoir is provided in Section 3.13, Navigation. There is a recreational boat ramp located on-site, downstream of the existing intake, but no barge access facilities.

3.19.1.3.3 Rail and Air Traffic

The Raccoon Mountain study area is not directly accessible by rail. The nearest rail lines are located approximately two miles to the southeast. The nearest commercial airport is the Chattanooga Metropolitan Airport, approximately 10 miles east of the study area.

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop the PSH facility as proposed. No project-related impacts to transportation would occur.

3.19.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, existing transportation routes would be affected by the transportation of equipment, materials, supplies, and the construction workforce to the study area. As described in Section 2.4, Action Alternatives, the primary transportation modes used during construction would be via roadway and barge.

3.19.2.2.1 Roadways

Traffic generated by the construction of the PSH would consist of the construction workforce, as well as the transport of construction equipment and materials. The workforce needed to support the construction activities peaks at approximately 1,000 workers. This peak workforce would result in a traffic increase of up to 2,000 vehicles trips per day (1,000 vehicles entering the site in the morning and 1,000 vehicles leaving the site at the end of the workday). Construction-related vehicles would be driven to the construction area or delivered on flatbed trailers, primarily during mobilization and demobilization phases of the project rather than on a daily basis. It is assumed that borrow and spoil material would be contained within the study area boundaries, limiting off-site transport, with the exception of some crushed rock, concrete, and asphalt which would be obtained from commercially available, previously permitted quarries.

During the initial stages of construction, access to the site would primarily be via CR 88, which comes through the town of Pisgah. Workforce traffic and the transport of heavy construction equipment may result in localized roadway degradation and congestion during peak traffic hours on local roads such as CR 88. However, under Alternative B, designs for the project include various improvements to existing roads in proximity to and extending from the sites toward the town of Pisgah, as well as construction of a new bridge extending from CR 558 to facilitate transport across Guntersville Reservoir. These infrastructure improvements would be undertaken in the early stages of construction and would be designed to provide roadway capacity that supports the peak construction period activities.

Impacts to transportation on local roadways in the vicinity of the study area would be moderate in the short-term while initial project activities and roadway improvements are underway. If needed, mitigation measures that may be considered for temporary, localized traffic congestion include staggering work shifts to avoid localized delays at key intersections, installation of traffic lights and stop signs, and addition of turning lanes. Further from the site, project-related traffic would disperse onto major collector and arterial roadways where volumes would be absorbed into normal traffic patterns. Additionally, once the bridge and other roadway improvements designed to facilitate site access are complete, local roadway impacts from the construction workforce and heavy equipment transport would be reduced.

During operation, the bridge and roadway improvements would also facilitate access for the smaller, approximately 60-staff operational workforce, as well as traffic generated by public access to the proposed recreational facilities, such that any traffic impacts to the roadway network would be minor. Additionally, the addition of the bridge linking CR 588 and CR 88 provides a long-term benefit to local transportation, significantly reducing the commute between communities on opposite sides of the reservoir.

3.19.2.2.2 Waterways

During construction, large components and equipment could be transported by barge via the Tennessee River. TVA plans to construct a barge port facility on the eastern side of Guntersville Reservoir for loading and unloading materials and equipment. TVA may also to refurbish the existing barge facility on the Bellefonte property on the opposite side of the Reservoir. Barge traffic and access to the study area would be spread out over time and appropriately conducted to minimize interference with existing navigation and boating operations on the Reservoir. Barge transport during the operational phase, if needed, would be infrequent. As such, impacts associated with barge transport are minor.

Neither construction nor operational activities at the PSH facility are anticipated to have notable impacts on the operation of air or rail facilities in the vicinity.

3.19.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Impacts to transportation under Alternative C would be largely similar to those under Alternative B, as the traffic generated by the project would be the same. SR 117 is a minor collector and thus has somewhat more capacity to support initial construction-related traffic than does CR 88; however, delays could still occur at intersections during peak hours. Roadway improvements and development of a barge facility are also component actions of Alternative C, though it does not include the benefits associated with a new bridge over Guntersville Reservoir.

3.19.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Impacts to transportation under Alternative D would be less than those under Alternatives B and C because, while traffic generated by the project would be similar, the existing on-site roadway infrastructure is already in place. There is a turning lane from US 41 onto Raccoon Mountain Road so that traffic coming from the east (from I-24 from Chattanooga) does not have to stop, reducing the likelihood of congestion and delays outside the study area. No barge facility or roadway infrastructure improvements are proposed.

3.19.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, direct increases or changes in traffic patterns would be expected. Several of the reasonably foreseeable actions include improvements or repairs on roadways affected by the proposed project, including SR 35, US 72, and I-24. Roadway projects can result in lane closures or detours that compound delays caused increased traffic generation by the proposed project. However, none of the reasonably foreseeable future actions impact roadway segments in close proximity to the study areas, where traffic impacts are greatest. As such, these actions would likely have minor aggregate impacts on roadway transportation in the area.

3.20 Air Quality and Climate Change

3.20.1 Affected Environment

3.20.1.1 Air Quality

Ambient air quality is determined by the type and concentration of pollutants emitted into the atmosphere, and physical characteristics of the airshed such as size, topography, and meteorology. The CAA is the comprehensive law that affects air quality by regulating emissions of air pollutants from stationary sources (e.g., power plants) and mobile sources (e.g., automobiles). It requires the EPA to establish National Ambient Air Quality Standards (NAAQS) and directs the states to develop State Implementation Plans to achieve these standards. This is primarily accomplished through permitting programs that establish limits for emissions of air pollutants. NAAQS have been established for the following criteria pollutants to protect the public health and welfare:

- Sulfur dioxide (SO_2)
- Ozone
- Nitrogen oxides (NO_X)
- Particulate matter equal to or less than 10 micrometers in size (PM_{10})

- Particulate matter equal to or less than 2.5 micrometers in size ($PM_{2.5}$)
- Carbon monoxide (CO)
- Lead

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with the NAAQS. These designations include:

- Attainment – any area where air quality achieves the NAAQS.
- Nonattainment – any area with air quality worse than the NAAQS.
- Maintenance – an area that was formerly in nonattainment but has monitored attainment and is currently under a maintenance plan.
- Unclassified – not enough data to determine attainment status. However, the unclassifiable or attainment/unclassifiable status areas are treated as in attainment with NAAQS, for CAA planning and permitting requirements.

The EPA has designated Hamilton and Jackson Counties as maintenance areas for $PM_{2.5}$ and in attainment for all other criteria pollutants. Marion County is in attainment for all criteria pollutants (USEPA 2023c).

The proposed construction and operation of PSH facilities at any of the project sites considered would be subject to federal, state, and county regulations. These regulations may impose permitting requirements and specific standards for expected air emissions.

3.20.1.2 Climate Change

The Earth's natural warming process is known as the "greenhouse effect." The Earth's atmosphere consists of a variety of gases that regulate the Earth's temperature by trapping solar energy. These gases—including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride—are cumulatively referred to as greenhouse gases (GHGs) because they trap heat like the glass of a greenhouse. Anthropogenic activities, which include the burning of fossil fuels to produce energy and deforestation, have contributed to elevated concentrations of GHGs in the atmosphere since the Industrial Revolution. GHGs in the atmosphere have caused an increase in average global temperature. While the increase in global temperature is known as global warming, the resulting change in a range of global weather patterns is known as "climate change".

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action Alternative

3.20.2.1.1 Air Quality

Under the No Action Alternative, there would be no additional emissions from project-related activities, therefore, there would be no impact on regional air quality.

3.20.2.1.2 Climate Change

Under the No Action Alternative, TVA would continue to rely on existing sources of generation and purchased power to ensure an adequate energy supply and to meet its goals for increased intermittent energy.

3.20.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

3.20.2.2.1 Air Quality

Air quality impacts associated with this alternative would occur from emissions during site preparation, construction and dredging equipment operations, and vehicle use by the construction workforce. The equipment required to support clearing and grading, excavation, dredging, and construction activities is expected to be gasoline and diesel powered. As such, this equipment would emit the air pollutants normally associated with mobile fossil fuel-powered equipment. Equipment and vehicle emissions from these activities would contain CO, PM, NO_x, volatile organic compounds (VOCs), and SO_2. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Air quality emissions from construction equipment would be temporary (up to 5.5 years), intermittent, and would be minimized through the use of BMPs (e.g., dust control measures) as required to reduce off-site emissions. In addition, proposed construction activities would be subject to both federal and state regulations. These regulations impose permitting requirements and specific standards for expected air emissions.

During construction activities, additional commuter vehicles, trucks, and other construction vehicles would pass daily through routes leading to the project sites. This traffic would include the passenger cars and light-duty trucks of the construction workforce (anticipated to peak at 1,000 workers) and truck traffic for the delivery of construction materials and heavy equipment used to support development (e.g., excavators, bulldozers, heavy-haul trucks, cranes). Increased traffic volumes would result in locally increased emissions during construction. The increases in emission levels are expected to have a minimal impact on air quality from criteria pollutants.

The operation of PSH facilities would result in minimal air emissions. Generation and pumping equipment would be electrically powered, and there would be no emissions from the generators. Electricity used to power the turbines in pumping mode would be generated from existing regional power sources, including fossil fuel combustion, solar, and wind. The specific effect of the generation used for pumping on air quality would depend on the relative contribution of combustion-driven generators compared to wind and solar. However, pumping operations would most likely to occur when there is a surplus of energy on the grid, so project operation would have a minor effect on an increase in emissions from combustion-driven generators compared to the No Action Alternative. The pumping equipment would operate in compliance with all state regulations. The operation of vehicles for inspections of project sites and project maintenance would occur sporadically and in limited numbers. These activities would have negligible effects on air quality.

Overall, the construction and operation of the new facility near Rorex Creek would result in minor, localized impacts on air quality and would not result in an exceedance of applicable air quality standards.

3.20.2.2.2 Climate Change

Construction activities, such as the operation of construction vehicles, commuter vehicles, and construction equipment, would result in GHG emissions, principally CO_2. Additionally, the flooding of large stocks of terrestrial organic matter could fuel microbial decomposition, converting the organic matter stored in aboveground and belowground biomass to CO_2, CH_4, and N_2O (Deemer et al. 2016). The new reservoir could also emit GHGs due to the natural decay of organic material in the water. However, as TVA proposes to excavate the upper reservoir down to bedrock, removing all vegetative matter before filling the reservoir, these potential effects would be avoided.

Under Alternative B, there is potential for impact on GHG emissions due to construction. However, hydroelectric facilities are one of the oldest renewable energy sources. GHG emissions would occur during construction and operation of the PSH facility; however, based on results from a 2023 study by Simon et al. (2023) assessing the global warming potential of PSH compared to other energy storage technologies, this type of system can offer benefits and has a reduced global warming potential (Simon et al. 2023). Therefore, the GHG emissions associated with construction of this alternative would have a minimal impact on global climate change. Project operation would improve TVA’s ability to incorporate intermittent energy in alignment with the IRP, which would potentially result in a reduction in generation based GHG emissions, providing a net benefit.

3.20.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

3.20.2.3.1 Air Quality

Under Alternative C, air quality impacts during construction and operation would be similar to those described in Alternative B, limited to the construction period, and within emissions standards. Therefore, similar to Alternative B, Alternative C would have minor effects on air quality.

3.20.2.3.2 Climate Change

Similar to impacts discussed for Alternative B, the creation of the new pumped storage facility near Widows Creek would create GHG emissions due to fossil-fuel powered construction equipment. However, acreages associated with Alternative B would be slightly less than Alternative B. Therefore, the GHG emissions associated with construction of this alternative would have a minimal impact on global climate change. Project operation would improve TVA’s ability to incorporate intermittent energy resources in alignment with the IRP, which would potentially result in a reduction in generation based GHG emissions, providing a net benefit.

3.20.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

3.20.2.4.1 Air Quality

Under Alternative D, there would be fewer emissions associated with air quality than Alternatives B and C, due to the expansion of an existing PSH facility rather than the construction of a new reservoir. While this alternative would still require the use of both gasoline and diesel-powered construction equipment for tunneling and construction activities, the volume of emissions would be considerably less than for Alternatives B and C. Therefore, the expansion of Raccoon Mountain would create minor air quality impacts limited to the construction period and would not exceed air quality standards.

3.20.2.4.2 Climate Change

Emissions resulting from fossil-fueled excavating equipment would include GHGs that contribute to climate change. However, these emissions would be less than the emissions associated with Alternatives B and C. Therefore, the GHG emissions associated with construction of this alternative would have a minimal impact on global climate change. Project operation would improve TVA's ability to incorporate intermittent energy resources in alignment with the IRP, which would potentially result in a reduction in generation based GHG emissions, providing a net benefit.

3.20.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2, Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on the local environmental setting and the design characteristics of these other proposed actions, direct increases or changes in air emissions and GHGs would be expected. These identified foreseeable future actions by others would result in emissions that would potentially affect the same region as that of the Action Alternatives and, as such, may have the potential to affect air quality during construction. However, potential impacts to air quality from construction activities from each of these projects are expected to be localized, short term, and executed in compliance with applicable regulations and permits. As such, these actions would likely have minimal aggregate impacts on air quality and are not expected to result in an exceedance of applicable air quality standards.

3.21 Noise and Vibration

3.21.1 Affected Environment

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

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA) which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud, whereas the noise level associated with a 20 dBA change is considered four times as loud and would, therefore, represent a "dramatic change" in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night average sound level (L_{dn}), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas are anticipated to range between an L_{dn} of 35 and 50 dBA, whereas higher-density residential and urban areas' background noise levels range from 43 dB to 72 dBA (USEPA 1974). Common indoor and outdoor noise levels are listed in Table 3-54.

Table 3-54. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 5 m (16.4 ft)
Jet Flyover at 300 m (984.3 ft)		
	100	
		Inside Subway Train (New York)
Gas Lawn Mower at 1 m (3.3 ft)		
	90	
		Food Blender at 1 m (3.3 ft)
Diesel Truck at 15 m (49.2 ft)		Garbage Disposal at 1 m (3.3 ft)
	80	
		Shouting at 1 m (3.3 ft)
Gas Lawn Mower at 30 m (98.4 ft)	**70**	Vacuum Cleaner at 3 m (9.8 ft)
Commercial Area		Normal Speech at 1 m (3.3 ft)
	60	
		Large Business Office
	50	Dishwasher Next Room
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	
		Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
		Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

Source: FHWA 2018.

Key: dB = decibels; ft. = feet; m = meters

There are no federal, state, or locally established quantitative noise level regulations specifying environmental noise limits in any of the jurisdictions in which the study areas are located. However, the EPA noise guideline recommends outdoor noise levels do not exceed L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety" (USEPA 1974). The U.S. Department of Housing and Urban Development considers an L_{dn} of 65 dBA or less to be compatible with residential areas (U.S. Department of Housing and Urban Development 1985).

3.21.1.1 Noise Receptors

Sensitive noise receptors include residences or other developed sites where frequent human use occurs, such as churches, parks, and schools. As all three study areas are located adjacent to the Tennessee River system, sensitive receptors include recreators on Guntersville and Nickajack reservoirs.

In addition, there are scattered residences located in the vicinity of both the Rorex Creek and Widows Creek study areas, the closest of which are less than 50 feet from the study area boundaries. Two private youth camps are also located within approximately 1 mile of the Rorex Creek study area. There is a campground and several churches located within 1 mile of the Widows Creek study area.

The closest residences to the RPS are approximately 700 feet south of the Raccoon Mountain study area and are separated from the upper reservoir by forested land and steep topography. The facility is also surrounded by a network of mountain bike trails.

3.21.1.2 Sources of Noise

Sources of noise along the Tennessee River system reservoirs, such as the Guntersville and Nickajack reservoirs, along which the study areas are located, include developed recreation sites, recreational watercraft use, and navigation uses. Noise emissions associated with developed recreation land uses depend on the location of the facilities and the type and intensity of recreational use. For example, recreational facilities that support low-intensity uses, such as parks or open spaces, generate less noise than more intensive uses such as marinas and developed recreation areas. Noise levels and patterns at developed recreation areas are typical of campground and day-use recreation areas. These developed recreational use areas could be compared to residential areas with an L_{dn} range of about 50 dBA (quiet suburb, not close to major roads, and little nighttime activity) to about 65 dBA (relatively noisy residential area). The most conspicuous recreational noise producers are power boats and personal watercraft (jet skis) on the reservoirs. While power boats and jet skis may both have an average sound level of about 90 dBA, noise emissions from these sources can exceed 115 dBA depending on speed and other operational factors (USDOI 2008).

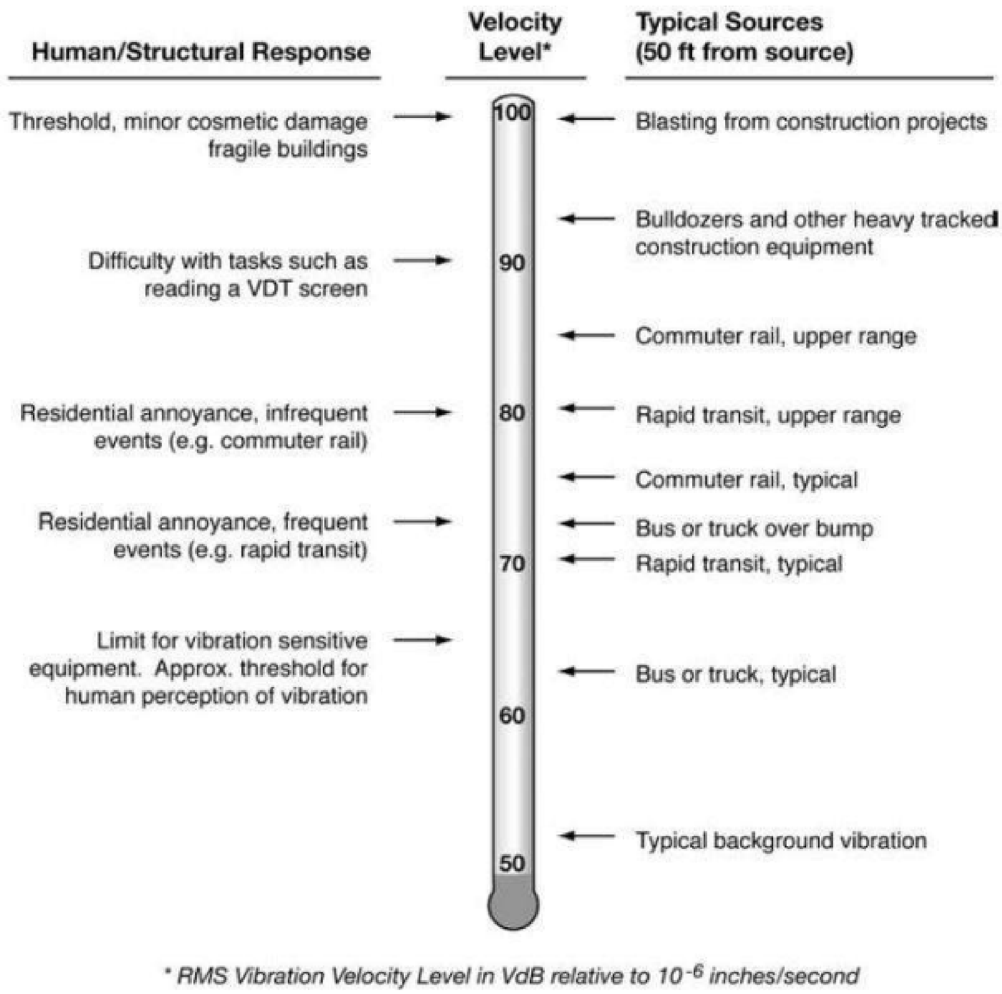
West of the Guntersville Reservoir, noise on the plateau portions of the Rorex Creek and Widows Creek study areas are characterized by rural residential and agricultural development. Typical L_{dn} for suburban residential areas is expected to range from 48-57 dBA (USEPA 1974). The most significant sources of noise would generally consist of vehicle noise on nearby roads and intermittent noise from the operation of agricultural equipment.

Equipment associated with the existing RPS facility is housed in an underground powerhouse, and, thus, typical operational noise is not readily perceptible to above-ground receptors. Ambient noise is relatively quiet, typical of an outdoor environment with low-intensity recreational use (bike trails).

3.21.1.3 Vibration

Construction and demolition activities, including the operation of heavy machinery and construction-related vehicles, and blasting, can create ground vibration. Three primary types of receivers can be adversely affected by ground vibration: people, structures, and equipment. Ground vibrations and ground noise can cause annoyance to people who live or work near sources of vibration. Additionally, if the vibration amplitudes are high enough, there is the possibility of physical and cosmetic damage to structures and the possibility of interference with the functioning of sensitive machinery. The length of time and strength of vibration varies with the equipment used. For example, the vibration from blasting has a high amplitude and short duration, whereas vibration from grading or highway traffic is lower in amplitude but longer in duration (California Department of Transportation [Caltrans] 2020).

During the construction of the PSH facility, most of the vibration sources would consist of equipment that produces continuous vibration, including excavation equipment, tracked vehicles, and heavy machinery operation. However, single-impact vibration sources such as blasting may also be used during the excavation of the upper reservoir and power tunnel. The Federal Transit Administration developed a noise and vibration impact assessment manual for estimating vibrations generated by common transportation and construction sources, possible damage levels, and dampening distances. Figure 3-34 presents typical levels of ground-borne vibration at 50 feet for common transportation and construction equipment. At 50 feet from the source, community annoyance begins at a velocity level of 70 vibration decibels (VdB) for frequent events. Damage to structures occurs at 100 VdB for one-time activities such as blasting operations (FTA 2018).



Source: Federal Transit Administration 2018

Figure 3-34. Typical Levels of Ground Borne Vibration

3.21.2 Environmental Consequences

3.21.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. Therefore, there would be no impacts on noise receptors resulting from the proposed action under this alternative, and ambient noise levels would remain similar to current conditions.

3.21.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, on-site construction activities for the PSH facility near Rorex Creek would result in increased noise levels adjacent to the construction site due to the operation of construction equipment on site and along roadways used by construction-related vehicles. Construction activities would last approximately 5 to 7 years, with above ground work typically occurring during daytime hours, on weekdays, but up to seven days a week, or during evening hours, should the schedule be accelerated. Noise is generated by construction equipment including trucks, truck-mounted augers and drills, excavators, tracked cranes, and bulldozers. Typical noise levels from this construction equipment are expected to be 85 dBA or less at 50 feet from the construction site (FHWA 2016). Based on straight-line noise attenuation, noise produced from this typical construction equipment would attenuate to 65 dBA or less at 500 feet. Receptors within 500 feet of the construction areas would have the potential to experience periods of very loud (65 to 85 dBA) noise during construction. While this is notably higher than current ambient noise levels, it illustrates a temporary, worst-case scenario in which construction is operated within 500 feet of a residence or recreation. TVA will follow all local noise ordinances. Furthermore, construction equipment typically does not operate at maximum levels continuously; actual noise levels are generally expected to be lower than those described above and may be further reduced by vegetation, topography, and the use of modern, well-maintained equipment, mufflers, and hydraulic systems.

In addition to typical construction equipment, periodic blasting would be required over approximately the first three years of construction, in association with the excavation of the upper reservoir. Blasting may produce noise levels that reach 126 dBA (WSDOT 2020). Due to the isolated nature of the blasting events, the noise produced by the explosion and from the collapse of rock is not a continuous, background, or intermittent noise that would contribute to typical noise levels. An isolated explosive blast event may be equivalent to a thunderclap at the source but would be temporary and short-term. In addition, TVA would require the construction contractor develop a blasting plan to include notifications to local officials, emergency departments, and neighboring businesses and residents. In summary, while the greatest noise impacts would be limited to the excavation phase at the upper reservoir, the noise environment during this period would be similar to that of a quarry and would result in significant noise impacts to residents and other sensitive noise receptors in close proximity of the study area.

Figure 3-34 shows that damage to structures can occur at 100 VdB, at 50 feet from the source, for isolated activities such as blasting operations (FTA 2018). As blasting would be contained to the footprint of the upper reservoir, more than 50 feet from the nearest residence or other structures, vibration-related impacts may result in temporary annoyance to nearby residents but would not cause structural damage.

There is also a potential for indirect noise impacts associated with increased workforce vehicle traffic. Roadway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in an approximately 3 dBA increase in noise level, which would not normally be a perceptible noise increase (FHWA 2011). TVA estimates that the peak workforce needed during construction would consist of approximately 1,000 personnel per day. Assuming one person per commuting vehicle, there would be a maximum daily morning inbound traffic volume of approximately 1,000 vehicles and a daily outbound traffic volume of approximately 1,000 vehicles each working day. While workforce vehicles and other project-related traffic may result in doubling of traffic on local roads near the site, most traffic noise would be limited to the commuting period, twice per day as workers enter and leave the project site.

Proposed transmission line upgrades associated with Alternative B would require using standard transmission line maintenance equipment, including bulldozers, bucket trucks, boom trucks, forklifts, and helicopters. The use of this equipment may result in a considerable increase over existing background noise levels, especially for those residents and other sensitive receptors located immediately adjacent to the existing ROW. However, because of the sequence of construction activities, construction noise at a given point along the transmission line would be short-term.

Once construction activities are complete, noise levels for the PSH facility, including the powerhouse, are not expected to be noticeable at any sensitive noise receptors, and the vehicle traffic associated with the operational workforce of approximately 60 staff would not result in notable traffic noise on area roadways.

In summary, noise and vibration impacts to residents near the study area would be significant during the construction period, especially during the excavation of the upper reservoir. However, once construction is complete, operational noise impacts will be minimal.

3.21.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, impacts from noise and vibration would be similar to those under Alternative B, as the construction schedule and equipment used for the proposed Widows Creek PSH facility would be the same as described for the Rorex Creek PSH. The closest residences are located within 50 feet of the study area and have the potential for significant impacts during construction, especially during the excavation of the upper reservoir. Similar to Alternative B, once construction is complete, operational noise impacts would be minimal.

3.21.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, impacts from noise and vibration would be less than those under Alternatives B and C. The Raccoon Mountain PHS facility expansion may require increasing the storage capacity of the upper reservoir through excavation within the existing reservoir footprint, using similar methods and equipment as Alternatives B and C. A greater distance to the nearest residence along with a forested buffer and topography allow for greater noise attenuation. If mountain bike trails remain open during construction, recreators may experience notable noise. However, as these receptors would pass by for brief durations and could use alternative trails, they are generally less sensitive than residential receptors. Thus, noise and vibration impacts would be moderate during construction but, similar to Alternatives B and C, would be minor once operational.

3.22 Socioeconomics

3.22.1 Affected Environment

For the socioeconomic analysis, the area of interest for each alternative site is defined as any census block group that falls within a 5-mile radius of the proposed study area. Most project-related impacts in the human environment (e.g., construction noise and dust, visual impacts, and traffic) are likely to be greater near the study area and are expected to dissipate relatively quickly. However, a 5-mile radius was selected to conservatively bound the area where resources could be affected. For Rorex Creek, where transmission upgrades have been identified, the area of interest also includes census block groups within a 1-mile radius of the existing transmission line corridor.

The areas of interest for Rorex Creek and Widows Creek are predominantly contained within Jackson County in northeastern Alabama, with a portion of the area of interest for Widows Creek extending into adjacent DeKalb County, Alabama. The area of interest for Raccoon Mountain includes portions of Hamilton and Marion Counties in Tennessee, as well as portions of Dade and Walker Counties in Georgia. These counties and states are secondary geographic areas of reference in this analysis. Comparisons at multiple spatial scales provide a detailed characterization of populations that may be affected by the proposed actions, including minority and low-income populations. The demographic and economic characteristics of populations within the study areas were assessed using the 2018-2022 American Community Survey five-year estimates provided by the U.S. Census Bureau (USCB) (USCB 2022).

3.22.1.1 Demographic and Economic Conditions

Demographic and economic characteristics of the three areas of interest and of the secondary reference geographies are summarized in Table 3-55 and Table 3-56.

<u>Rorex Creek</u>

The block groups that comprise the Rorex Creek area of interest are predominantly rural and have a combined resident population of 25,787, which accounts for approximately 0.5 percent of the total population of the state of Alabama. Since 2010, the study area has experienced a population increase of approximately 4.6 percent, in contrast to the population decrease in Jackson County (-1.1 percent), but consistent with the growth rate of the State of Alabama (5.2 percent). Approximately 89.5 percent of the population of the Rorex Creek area of interest is white, with Blacks or African Americans comprising the largest single minority population group (3.4 percent). Minority percentages in the area of interest are generally consistent with those of Jackson County and lower than those of the State of Alabama (Table 3-55). There are 21 census block groups within the Rorex Creek area of interest, one of which has a minority population that either exceeds 50 percent of the total population, or meaningfully greater (greater than or equal to 10 percentage points), or both, than the minority population percentage of the general population (i.e., that of the county or state) (Figure 3-35).

Table 3-55. Demographic and Socioeconomic Characteristics of Areas of Interest and Reference Geographies – Rorex Creek and Widows Creek

	Area of Interest (Block Groups within 5-Mile Radius) Rorex Creek	Area of Interest (Block Groups within 5-Mile Radius) Widows Creek	Jackson County, Alabama	DeKalb County, Alabama	State of Alabama
Population[1,2]					
Population, 2022 estimate	25,787	17,848	52,618	71,680	5,028,092
Population, 2010	24,664	20,508	53,227	71,109	4,779,736
Percent Change 2010-2022	4.6%	-13.0%	-1.1%	0.8%	5.2%
Persons under 18 years, 2022	20.0%	20.7%	20.6%	23.9%	22.1%
Persons 65 years and over, 2022	20.8%	21.9%	20.6%	17.3%	17.3%
Racial Characteristics[1]					
Not Hispanic or Latino					
White alone, 2022 (a)	89.5%	88.3%	88.8%	79.1%	64.6%
Black or African American, 2022 (a)	3.4%	3.6%	3.2%	1.5%	26.2%
American Indian and Alaska Native, 2022 (a)	0.8%	0.7%	0.8%	0.5%	0.3%
Asian, 2022 (a)	0.7%	0.4%	0.4%	0.1%	1.4%
Native Hawaiian and Other Pacific Islander, 2022 (a)	0.1%	0.1%	0.0%	0.0%	0.0%
Some Other Race alone, 2022 (a)	0.1%	0.0%	0.1%	0.5%	0.3%
Two or More Races, 2022	3.8%	3.8%	3.5%	2.9%	2.6%
Hispanic or Latino, 2022	1.7%	3.1%	3.2%	15.4%	4.6%
Income and Employment[1]					
Median household income, 2022	$ 54,099	$ 46,173	$ 46,748	$ 47,920	$ 59,609
Persons below poverty level, 2022	14.9%	22.5%	18.6%	20.2%	15.7%
Persons below low-income threshold, 2022 (b)	40.7%	49.4%	44.1%	44.7%	34.8%
Civilian Labor Force, 2022	11,215	6,745	21,717	32,085	2,329,696
Percent Employed, 2022	95.8%	92.0%	94.0%	96.1%	94.8%
Percent Unemployed, 2022	4.2%	8.0%	6.0%	3.9%	5.2%

Source: 1. USCB 2022; 2. USCB 2010.

Notes: (a) Includes persons reporting only one race; (b) Low-income threshold is defined as two times the poverty level

Table 3-56. Demographic and Socioeconomic Characteristics of Areas of Interest and Reference Geographies – Raccoon Mountain

	Area of Interest (Block Groups within 5-Mile Radius) - Raccoon Mountain	Marion County, Tennessee	Hamilton County, Tennessee	State of Tennessee	Dade County, Georgia	Walker County, Georgia	State of Georgia
Population[1,2]							
Population, 2022 estimate	68,368	28,852	367,193	6,923,772	16,239	68,065	10,722,325
Population, 2010	66,239	28,237	336,463	6,346,105	16,633	68,756	9,687,653
Percent Change 2010-2022	3.2%	2.2%	9.1%	9.1%	-2.4%	-1.0%	10.7%
Persons under 18 years, 2022	18.4%	20.7%	20.8%	22.0%	19.4%	21.4%	23.4%
Persons 65 years and over, 2022	16.7%	20.0%	18.1%	16.7%	19.9%	18.8%	14.4%
Racial Characteristics[1]							
Not Hispanic or Latino							
White alone, 2022 (a)	73.2%	90.9%	70.1%	72.6%	92.2%	89.9%	50.8%
Black or African American, 2022 (a)	15.7%	2.9%	17.7%	16.1%	1.0%	3.9%	31.1%
American Indian and Alaska Native, 2022 (a)	0.0%	0.1%	0.1%	0.1%	0.0%	0.2%	0.1%
Asian, 2022 (a)	2.0%	0.5%	1.9%	1.8%	0.8%	0.6%	4.3%
Native Hawaiian and Other Pacific Islander, 2022 (a)	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Some Other Race alone, 2022 (a)	0.5%	0.1%	0.4%	0.3%	0.3%	0.1%	0.5%
Two or More Races, 2022	4.2%	3.5%	3.6%	3.0%	3.1%	2.8%	3.1%
Hispanic or Latino, 2022	4.3%	2.1%	6.2%	6.0%	2.6%	2.7%	10.1%
Income and Employment[1]							
Median household income, 2022	$ 80,216	$ 58,139	$ 69,069	$ 64,035	$ 59,531	$ 52,276	$ 71,355
Persons below poverty level, 2022	14.5%	16.3%	12.3%	14.0%	6.5%	13.7%	13.5%
Persons below low-income threshold, 2022 (b)	31.3%	37.2%	27.8%	32.6%	30.5%	38.5%	31.4%
Civilian Labor Force, 2022	35,307	12,965	191,232	3,430,845	7,483	32,463	5,350,069
Percent Employed, 2022	95.3%	94.3%	95.6%	95.0%	94.5%	94.5%	94.8%
Percent Unemployed, 2022	4.7%	5.7%	4.4%	5.0%	5.5%	5.5%	5.2%

Source: 1. USCB 2022, 2. USCB 2010.
Notes: (a) Includes persons reporting only one race; (b) Low-income threshold is defined as two times the poverty level.

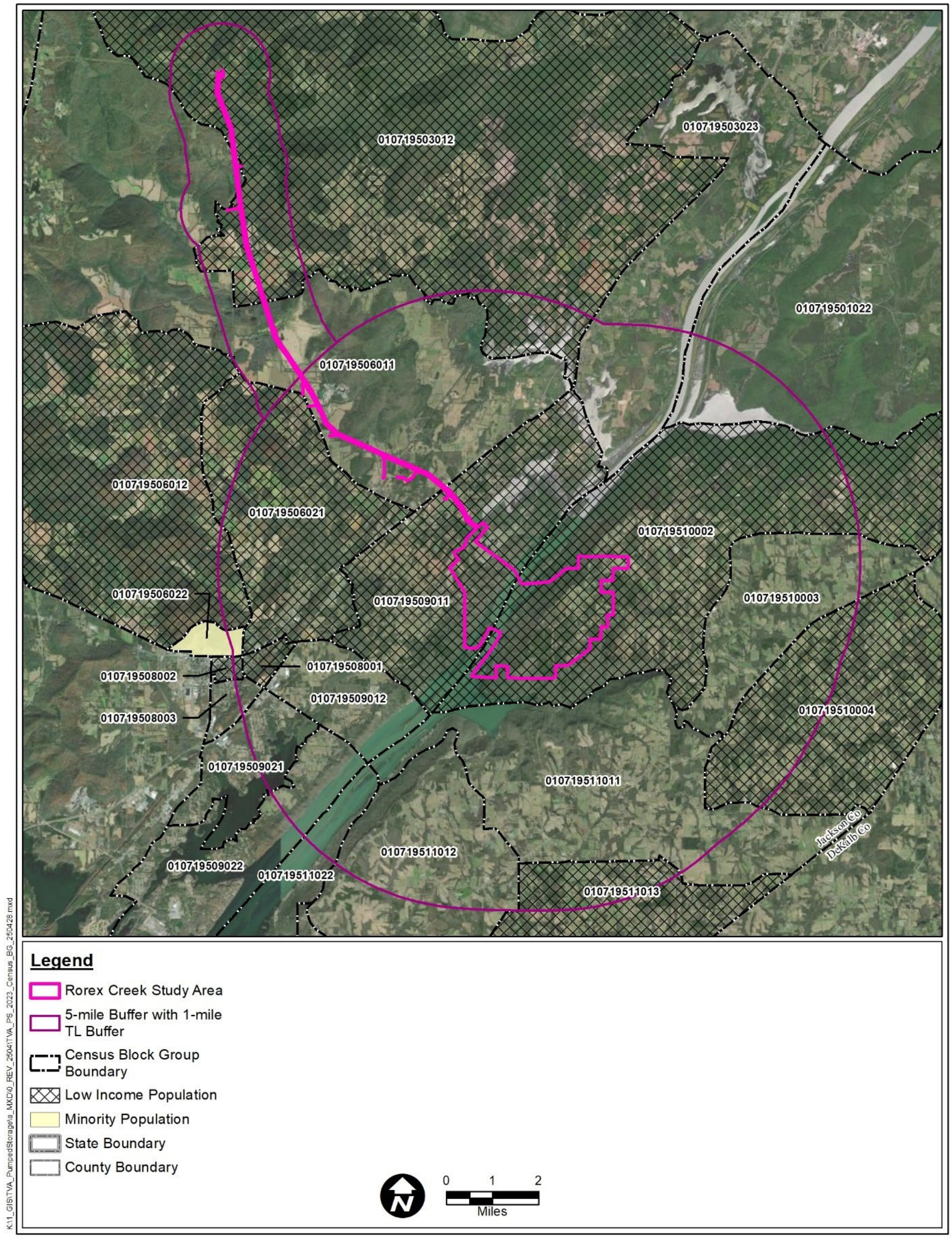


Figure 3-35. Minority and Low-Income Populations Within the Rorex Creek Area of Interest

The nationwide poverty level is determined annually by the USCB and varies by the size of family and number of related children under 18 years of age. The 2022 USCB Poverty Threshold for an individual under the age of 65 is an annual income of $15,225, and for a family of four with two children, it is an annual income of $29,678 (USCB 2023). The average median household income in the block groups that make up the Rorex Creek area of interest is $54,099, which falls between the median household income reported for Jackson County ($46,748) and that of the state of Alabama ($59,609) (Table 3-55). The percentage of the population of the area of interest falling below the poverty level (14.9 percent) is lower than that of the county and state (15.7 percent and 18.6 percent, respectively).

For the purposes of this assessment, low-income individuals are those whose annual household income is less than two times the poverty level. More encompassing than the base poverty level, this low-income threshold is a reasonable measure for consideration because current poverty thresholds are often too low to adequately capture the populations adversely affected by low levels of income, especially in high-cost areas (USEPA 2019). According to the EPA, the effects of income on baseline health and other aspects of susceptibility are not limited to those below the poverty thresholds. For example, populations having an income level from one to two times the poverty level also have worse health overall than those with higher incomes (Centers for Disease Control and Prevention 2011). The percentage of the population of Alabama living below the low-income threshold is 35.4 percent, while Jackson County has a percentage of 44.1 percent. Approximately 40.7 percent of people living within the Rorex Creek area of interest are considered low-income, with percentages for individual block groups ranging from 22.3 to 63.5 percent of the population. As shown on Figure 3-35, nine of the census block groups have low-income populations that either exceed 50 percent of the total population or significantly exceed the low-income percentage of the general population, including the block groups in which the primary project activities would occur.

The total civilian labor force within the census block groups that make up the Rorex Creek area of interest is 11,215, with the unemployment rate at 4.2 percent. This unemployment rate is noted to be lower relative to the unemployment rates of Jackson County (6.0 percent), and the state of Alabama (5.2 percent) (Table 3-55).

Widows Creek

The block groups that make up the Widows Creek area of interest are also predominantly rural and have a combined resident population of 17,848, accounting for approximately 0.4 percent of the total population of the state of Alabama. Most residential development is located toward the northwestern side of the area of interest, near the city of Stevenson. Since 2010, the area of interest has experienced a population decline of approximately 13.0 percent. Over the same period, Jackson County experienced a lesser decline of 1.1 percent, while DeKalb County and the State of Alabama grew by 0.8 percent and 5.2 percent, respectively. Like Rorex Creek, the percent of the population of the Widows Creek area of interest is predominantly white, with Blacks or African Americans comprising the largest single minority population group at 3.6 percent. Minority percentages in the area of interest are generally consistent with or lower than those of the secondary reference geographies (Table 3-56). Three of the 17 census block groups within the Widows Creek area of interest have a minority population that either exceeds 50 percent of the total population and/or is meaningfully greater than the minority population percentage of the general population (Figure 3-36). All three of these block groups are in or around Stevenson, to the west.

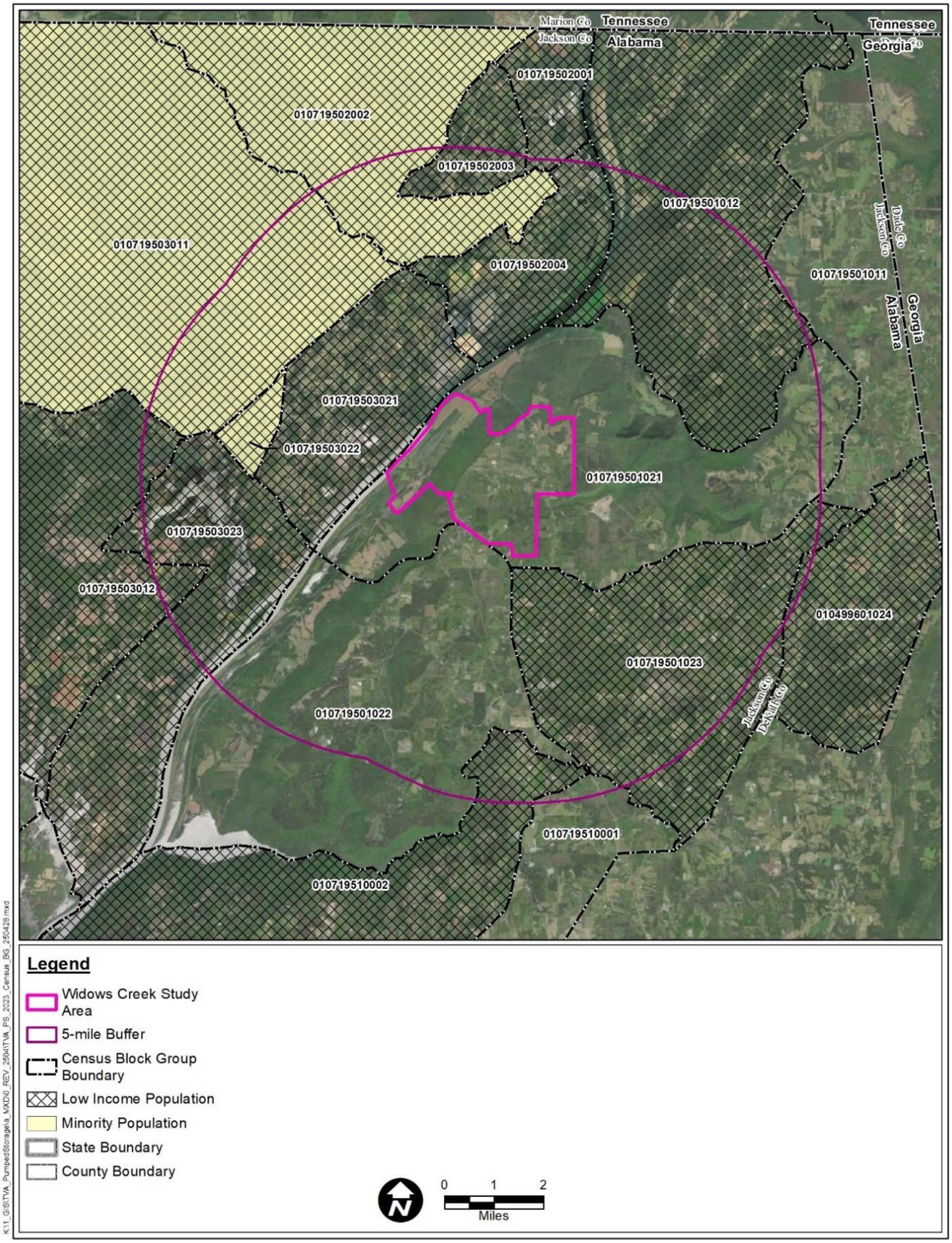


Figure 3-36. Minority and Low-Income Populations Within the Widows Creek Area of Interest

The average median household income in the block groups that make up the Widows Creek area of interest is $46,173, which is comparable to the median household income reported for the surrounding counties ($46,748 and $47,920) and lower than that of the state of Alabama ($59,609) (Table 3-56). The percentage of the population of the area of interest falling below the poverty level (22.5 percent) is higher than that of the secondary reference geographies, where percentage range from 15.7 percent to 20.2 percent of the population. Correspondingly, 49.4 percent of the population of the Widows Creek area of interest are living below the low-income threshold, which is higher than the percentages in Jackson and DeKalb counties and the state of Alabama (Table 3-55). Low-income percentages for individual block groups in the area of interest range from 22.3 percent to 63.5 percent of the population, with 13 of the 17 census block groups either exceeding 50 percent of the total population or significantly exceeding the low-income percentage of the general population (Figure 3-36).

The total civilian labor force within the block groups that make up the Widows Creek area of interest is 6,745, with the unemployment rate at 8.0 percent. This unemployment rate is noted to be higher relative to the unemployment rates of Jackson County (6.0 percent), DeKalb County (3.9 percent) and the state of Alabama (5.2 percent) (Table 3-55).

Raccoon Mountain

The census block groups that make up the Raccoon Mountain area of interest have a combined resident population of 68,368 and span Marion and Hamilton counties in Tennessee, and Dade and Walker counties in Georgia. The eastern portion of the area of interest includes part of the City of Chattanooga (Hamilton County), the largest population center in the area, while the remainder of the area is largely rural. Since 2010, the area of interest has experienced a population increase of 3.2 percent, somewhat less than growth rates of Tennessee and Georgia. Approximately 73 percent of the population of the Raccoon Mountain area of interest is white, with Blacks or African Americans comprising the largest single minority population group at 15.7 percent. Minority percentages in the area of interest are generally similar to those of Marion County and the State of Tennessee, and higher than those of the more rural counties (Marion, Dade, and Walker) (Table 3-56). Twenty-six of the 55 census block groups within the Raccoon Mountain area of interest have a minority population that either exceeds 50 percent of the total population and/or is meaningfully greater than the minority population percentage of the general population (Figure 3-37). These census block groups are concentrated around Chattanooga, to the east.

The average median household income in the block groups that make up the Raccoon Mountain area of interest is $80,216, which is higher than the median household income reported for the surrounding counties (ranging from $52,276 to $69,069) as well as those of Tennessee ($64,035) and Georgia ($71,355) (Table 3-56). The percentage of the population of the area of interest falling below the poverty level (14.5 percent) is consistent with most of the secondary reference geographies; Dade County, however, is an outlier, with just 6.5 percent of the population living below the poverty level. Similarly, the population of the Raccoon Mountain area of interest living below the low-income threshold (31.3 percent) is consistent with that of the reference geographies, which range from 27.8 percent to 38.5 percent (Table 3-56). Low-income percentages for individual block groups in the area of interest vary greatly, from 0.8 percent to 84.4 percent, with 21 of the 55 census block groups either exceeding 50 percent of the total population or significantly exceeding the low-income percentage of the general population (Figure 3-37). Like the minority populations, these block groups are largely concentrated around Chattanooga.

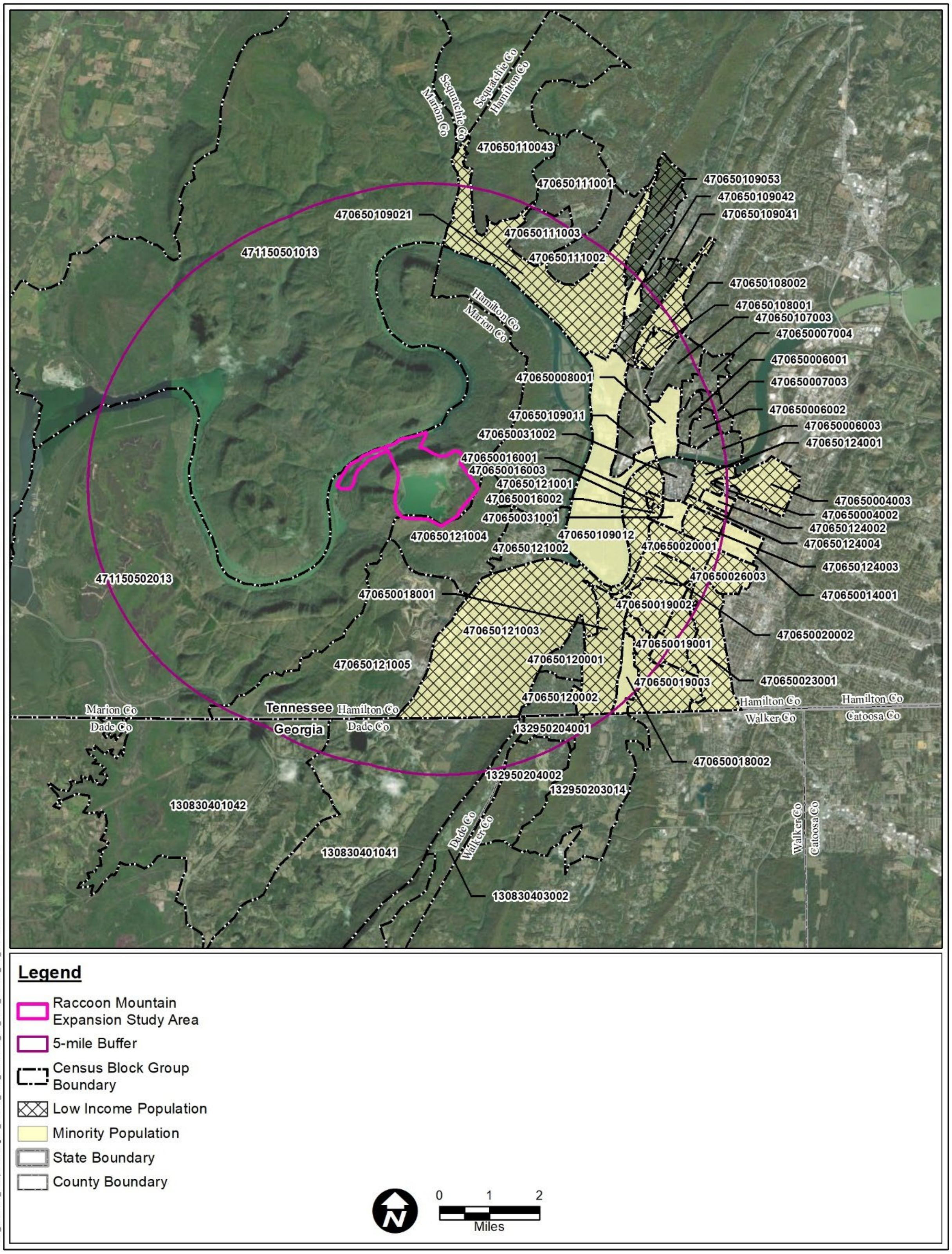


Figure 3-37. Minority and Low-Income Populations Within the Raccoon Mountain Area of Interest

The total civilian labor force within the block groups that make up the Raccoon Mountain area of interest is 35,307, with the unemployment rate at 4.7 percent. This unemployment rate is similar to the unemployment rates of the secondary reference geographies (ranging from 4.4 percent to 5.7 percent) (Table 3-56).

3.22.1.2 Community Facilities, Services, and Housing

Community facilities and services include public or publicly funded facilities such as police protection and other emergency services (ambulance/fire protection), schools, hospitals and other health care facilities, libraries, day care centers, churches, and community centers. To identify facilities and emergency services that could potentially be impacted by proposed project activities, the area of interest is identified as the service area of various providers, where applicable, or the area within a 5-mile radius of each study area boundary.

Based on a review of aerial imagery and online information including the USGS Geographic Names Information System database (USGS 2024), community facilities and services available within a 5-mile radius of the Rorex Creek study area include approximately 10 churches, two schools, three post offices, three police stations, four fire stations, a community center, and a number of cemeteries. These facilities are concentrated in the city of Scottsboro to the west, and the towns of Hollywood to the northwest, Pisgah to the east, and Dutton to the south.

Within a 5-mile radius of the Widows Creek study area, there are approximately six churches, seven schools, a community center, a library, three post offices, four fire stations, two police stations, and a number of cemeteries. These facilities are concentrated in the cities of Stevenson to the west and Bridgeport to the north, and the towns of Higdon to the east and Flat Rock to the south.

Community facilities and services available within a 5-mile radius of the Raccoon Mountain study area include over a dozen churches, 10 schools and/or universities, three libraries, a hospital, four post offices, two community centers, and extensive police, fire, and emergency services, primarily concentrated on the City of Chattanooga, to the east, and its suburbs.

Table 3-57 provides information on the existing housing stock (2022) within the counties encompassing the Rorex Creek, Widows Creek, and Raccoon Mountain areas of interest (i.e., within a 5-mile radius of the study areas). The vacancy rate in Jackson and DeKalb counties, Alabama, are approximately 16 percent. Vacancy rates are lowest in Hamilton County, Tennessee; however, it provides the greatest number of available units (defined as vacant units available for rent, for sale, or for seasonal, recreational, or occasional use) due to the much larger housing stock associated with the City of Chattanooga.

Table 3-57. Housing in the Counties Comprising Areas of Interest

County	Total Housing Units			Number of Vacant Units Available[1]
	Number of Units	Percent Occupied	Percent Vacant	
Jackson County, AL[2,3]	24,706	83.7%	16.3%	789
DeKalb County, AL[3]	30,716	83.6%	16.4%	1,661
Dade County, GA[4]	7,385	82.2%	17.8%	483
Walker County, GA[4]	29,339	88.9%	11.1%	881
Hamilton County, TN[4]	163,534	91.0%	9.0%	5,616
Marion County, TN[4]	13,663	85.6%	14.4%	841

Source USCB 2022

Notes:

1. Includes vacant units for rent, for sale, or for seasonal, recreational, or occasional use.
2. County included in Rorex Creek Area of Interest.
3. County included in Widows Creek Area of Interest.
4. County included in Raccoon Mountain Area of Interest.

3.22.2 Environmental Consequences

3.22.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. Without the additional generation capacity afforded by PSH, TVA would meet peak demand by using existing dispatchable generation sources.

3.22.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

3.22.2.2.1 Demographic and Economic Impacts

Construction of a PSH facility near Rorex Creek would require a workforce of up to approximately 1,000 people and would last for approximately 5.5 years. While it is anticipated that a portion of the workforce could be drawn from the labor force that currently resides within the surrounding counties, specialty workers and laborers not available within the region would be expected to temporarily relocate to the area to support construction activities. Therefore, demographic characteristics of the region would be expected to experience a temporary change in response to the in-migration of a large construction workforce. However, this population increase would be limited to the duration of construction and represents a relatively small percentage of the existing population of Jackson County. Following the construction period, the PSH facility would require an operational workforce of approximately 60 personnel. Thus, long-term population and employment impacts would be minor.

Potential economic impacts associated with the proposed project relate to direct and indirect effects of property acquisition and construction. Under Alternative B, TVA would acquire 30 to 40 privately owned land parcels within the Rorex Creek study area, including nine to 15 residences, and the landowners would be fairly compensated for the value of such properties. Construction activities would entail a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services. Capital costs associated with the proposed action would, therefore, have direct economic benefits to the local area and surrounding community during the construction period. Revenue generated by sales tax collected from purchases by construction workers would benefit the local economy. Additionally, temporary beneficial secondary impacts would result from expenditure of the wages earned by the workforce involved in construction. For example, the hospitality and service industries would benefit from the demands brought by the influx of the construction workforce.

In addition, Alternative B includes the construction of a new bridge that would extend from CR 558 across Guntersville Reservoir, providing more direct access between the Scottsboro and Pisgah communities. These infrastructure improvements would significantly decrease the commute between communities on opposite sides of the reservoir, providing for movement of goods and services and expanding market access for local businesses. This, in combination with the proposed development of recreational amenities, may spur economic growth and development in the area of interest. Overall, economic impacts from Alternative B are anticipated to be beneficial, although minor relative to the total economy of the region.

3.22.2.2.2 Community Facilities, Services, and Housing

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Construction of the proposed PSH facility at Rorex Creek and the supporting on-site components would result in the displacement a single church, the New Hermon Baptist Church, located within the disturbance area. As the church would be fairly compensated for the acquisition of the property, leaders would have the opportunity to re-establish the church at a new location outside the study area. Additionally, one access road associated with the off-site transmission line utilizes a driveway that is associated with the House of Prayer Community Church. However, the temporary and intermittent use of this access road would not regularly impede access to the church. For these reasons, direct impacts to community facilities and services under Alternative B would be minor.

Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services. Construction of the PSH facility would require a workforce of up to 1,000, many of whom may temporarily relocate to the area from outside the region. This influx of temporary residents has the potential to increase demand for community services. However, since the population increase would be limited to the duration of construction and represents a relatively small percentage of the existing population of the area of interest (an increase of less than 4 percent, conservatively assuming all 1,000 workers are in-migrating), increased demands for services such as schools, churches, and healthcare facilities are not anticipated to put a significant strain on the availability of such resources.

During construction, in-migrating construction workers would also seek housing in proximity to the Rorex Creek study area. As shown in Table 3-57, Jackson County has approximately 789 vacant housing units available. It is assumed that a portion of the 1,000 workers would be local and would commute from existing homes within the region. In addition, some in-migrating workers may bring their own housing (recreational vehicle, camper van, or other type of portable housing) or use hotels and motels, decreasing the demand for traditional housing. Thus, the vacant housing available within Jackson County is likely sufficient to accommodate the in-migrating construction workers. However, this relatively high increase in demand for housing has the potential to increase the costs of existing houses and rental rates, resulting in a moderate but temporary impact to housing during the construction period. Once constructed, the operational workforce of approximately 60 workers would have minimal impact on the availability of housing or other community facilities and services.

3.22.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

3.22.2.3.1 Demographic and Economic Impacts

Demographic and economic impacts under Alternative C would be similar to those under Alternative B. Like Rorex Creek, the Widows Creek study area is located in Jackson County, so baseline conditions are generally similar, and the peak construction workforce, duration of construction, and operations workforces would be the same. However, Alternative C would result in greater impacts to privately owned land and require more parcel acquisition than Alternative B, as there are approximately 253 privately owned parcels within the study area, including approximately 134 residences. Additionally, the economic and transportation benefits to the local community are less, as there is no bridge or other infrastructure improvements proposed under this alternative.

As indicated in Figure 3-36, the Widows Creek study area footprint is not located in a block group with a minority or low-income population, so impacts to low-income communities would be less than those in Alternative B, though low-income populations in adjacent block groups may still be subject to temporary indirect effects from construction such as noise and traffic.

3.22.2.3.2 Community Facilities, Services and Housing

Construction of the proposed PSH facility at Widows Creek would not result in the displacement of any community facilities nor impede access to the facilities. Therefore, there would be no direct impacts to community facilities or services under Alternative C. Indirect effects of increased population associated with the temporary construction workforce would be similar to those under Alternative B. Temporary impacts to housing availability would also be similar to Alternative B, though Widows Creek is closer to neighboring DeKalb County, and thus workers may also look there for vacant housing, in addition to Jackson County. Once constructed, the operational workforce of approximately 60 workers would have minimal impact on the availability of housing or other community facilities and services, consistent with Alternative B.

3.22.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

3.22.2.4.1 Demographic and Economic Impacts

Demographic and economic impacts under Alternative D would be similar but less than those under Alternatives B and C. Expansion of the PSH at Raccoon Mountain would require a similar peak construction workforce and duration of construction. However, due to the larger population and labor force in the area of interest, it is anticipated that a larger proportion of workers could be drawn from the labor force that currently resides within the area, requiring less in-migration. Long-term employment impacts would be minimal, as permanent staffing would remain similar to staffing levels for the existing facility. Economic impacts would also be of a similar type, but smaller scale than Alternatives B and C, as there would be no property acquisition required and smaller capital costs associated with the expansion of an existing PSH facility compared to a new build PSH facility.

As indicated in Figure 3-37, the Raccoon Mountain study area footprint is not located in or directly adjacent to a block group with a minority or low-income population. As the nearest minority and low-income populations are over 1 mile from the study area footprint, there would be minimal impacts to these communities.

3.22.2.4.2 Community Facilities, Services, and Housing

Expansion of the PSH facility at Raccoon Mountain would not result in the displacement of any community facilities nor impede access to any facilities. Therefore, there would be no direct impacts to community facilities or services under Alternative D. Indirect effects of increased population associated with the temporary construction workforce would be similar but less than those under Alternatives B and C, based on more labor force availability in the area of interest (fewer in-migrating construction workers) and minimal need for additional operations workers. Temporary impacts to housing availability would also be less than Alternatives B and C due to the abundance of vacant housing units in Hamilton County and the other counties comprising the Raccoon Mountain area of interest (Table 3-57).

3.22.2.5 Potential Contributing Effects of Other Reasonably Foreseeable Future Actions

As described in Section 3.1.2 Reasonably Foreseeable Future Actions, several future actions were identified in proximity to the Action Alternative study areas. Depending on labor needs, workers may be required to relocate to the region to support the construction phase of these projects. Depending on the timing of implementation of this and other reasonably foreseeable actions, localized effects associated with workforce availability, housing availability, and the adequacy of services potentially may occur in combination with the proposed development of a PSH facility. However, the construction workforce required for the roadway improvement and maintenance projects are generally much smaller in scale and likely to be filled locally. The Moccasin Bend Environmental Campus Upgrades project is also located near Chattanooga, which has larger labor and housing markets than does Jackson County. As such, these actions would likely have minimal aggregate impacts on demographics and socioeconomics.

3.23 Utilities

3.23.1 Affected Environment

The Rorex Creek study area includes an existing, 14.7-mile-long, unenergized, double circuit 500 kV transmission line that runs from the Bellefonte Property for approximately 14.7 miles northwest to an interconnection with the existing Madison-Widows Creek 500-kV line at CR 39. Utilities that provide service to the Rorex Creek study area include Farmers Telecommunications Cooperative (telephone), The Town of Pisgah (water), Sand Mountain Electric Cooperative, which purchases its power from TVA, and Marshall County Gas District (natural gas). The Widows Creek – Bellefonte 500-kV transmission line crosses the site from the northeastern corner to the center of the study area where it divides and travels south and west across the Guntersville Reservoir. The Bellefonte – Section 500-kV transmission line parallels the Widows Creek – Bellefonte line to the center of the study area, then turns south toward the town of Section, Alabama. Both of these lines are owned and operated by TVA.

Existing utility services to the Widows Creek study area include Farmers Telecommunications Cooperative (telephone), the North Alabama Electric Cooperative (electric), and the Stevenson Utilities Board (water and natural gas). The Widows Creek 500-kV transmission line traverses across the entire site from west to east and continues running parallel to the Tennessee River for several miles. This transmission line is owned and operated by TVA.

Existing utility services to the Raccoon Mountain study area include Chattanooga Gas (natural gas), Tennessee American Water (water), and EPB of Chattanooga (telephone and electric). The Jasper – Raccoon Mountain 100/161-kV transmission line crosses the site from the southwest corner and traverses to the northeast where it connects to the Raccoon Mountain 100/161-kV transmission line, forming a loop around the site. The Raccoon Mountain – Moccasin 100/161-kV transmission line and the Raccoon Mountain – Widows Creek 500-kV transmission line also connect at this point. These transmission lines are owned and operated by TVA.

3.23.2 Environmental Consequences

3.23.2.1 Alternative A – No Action Alternative

Under Alternative A, TVA would not develop, operate, or maintain a new PSH facility or expand the Raccoon Mountain PSH facility. As such, there would be no added long-duration energy storage to assist with load balancing by allowing baseload technologies, such as nuclear generation, to run nearly full time to run nearly full time and work in coordination with intermittent generation sources. Under this alternative, TVA would be less likely to reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of intermittent energy resources onto the electric grid and complying with the requirement under the TVA ACT that power be sold at rates as low as feasible. Without long-duration energy storage, TVA may purchase the cheapest available market power which could potentially result in adverse impacts to TVA generation system reliability and increased costs to customers.

3.23.2.2 Alternative B – New Pumped Storage Hydropower Facility near Rorex Creek

Under Alternative B, TVA would construct and operate a new PSH facility at the Rorex Creek site. Utilities and service systems that would potentially be accessed or used at the site would include natural gas, alternative fuels, drinking water, process wastewater, sanitary wastewater, electrical, and fiber optics. The PSH facility would use the existing Guntersville Reservoir as the lower reservoir for pumped storage operations. The PSH facility would connect to the electric grid via a new transformer yard and switchyard facilities that would connect to the existing, unenergized, double circuit 500-kV transmission line that extends from the Bellefonte Property to the interconnection with the existing Madison-Widows Creek 500-kV line at CR 39 located within the study area. Vegetation within the transmission line corridor would be cleared to a width of 300 feet and upgrades would be completed, as necessary.

TVA would also reroute two existing 500-kV lines around the perimeter of the upper reservoir, resulting in a total of about 5.2 miles of new 500-kV transmission line and removal of about 4.0 miles of existing 500-kV transmission lines. If future studies indicate improvements are required to the regional transmission system to maintain system stability and reliability, additional site-specific NEPA reviews would be completed for those additional transmission system needs at that time. Overall, the added long-term storage would have potential long-term beneficial impacts by helping to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of intermittent energy resources onto the electric grid.

3.23.2.3 Alternative C – New Pumped Storage Hydropower Facility near Widows Creek

Under Alternative C, TVA would construct and operate a new PSH facility at the Widows Creek site using the existing Guntersville Reservoir as the lower reservoir for pumped storage operations. Utilities and service systems used would be similar to those listed under Alternative B. The PSH facility would connect to the electric grid via a new transformer yard and switchyard facilities that would connect to a new 500-kV transmission line. However, because the design, location, and requirements for potential future off site transmission line development, upgrades, or both are too speculative at this time, the potential environmental impacts from these actions would be evaluated under further NEPA review. Long-term beneficial impacts to the TVA energy portfolio would be similar to those described under Alternative B.

3.23.2.4 Alternative D – Expansion of Raccoon Mountain Pumped Storage Hydropower Facility

Under Alternative D, TVA would expand the existing Raccoon Mountain PSH facilities and continue to use Nickajack Reservoir as the lower reservoir for pumped storage operations. The project would also include construction of a new transformer yard located above the proposed underground powerhouse and a new switchyard located in proximity to the existing switchyard. Disturbance areas depicted on Figure 2-8 are based on current level of design and represent the project footprint only. Additional surface disturbance would occur as part of project construction for transmission and switchyard facilities, etc. Effects associated with these areas would need to be evaluated under further NEPA review. Long-term beneficial impacts to the TVA energy portfolio would be similar to those described under Alternative B. However, the expansion would not substantially increase the energy storage capacity of RPS, as it would increase the available MWs of input and output but would not increase the storage volume in terms of MWh. Additionally, the expansion would result in outages of the existing RPS that would prevent the operation of the plant during portions of the construction period.

3.24 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance. Impacts associated with the construction and operation of the proposed PSH facilities at Rorex Creek and Widows Creek, the expansion of the existing PSH facility at Raccoon Mountain, and the associated transmission line upgrades have the potential to cause unavoidable adverse effects to several natural and human environmental resources. TVA has reduced the potential for adverse effects during the planning process. In addition, TVA would implement mitigation measures (see Section 2.8.2, Mitigation Measures) to further reduce potential adverse effects to certain environmental resources.

Under Alternatives B, C, and D, most unavoidable adverse impacts are from construction and are attributable to activities involving land disturbance from preparing the PSH study areas such as vegetation clearing, excavation, grading, upgrading of on- and off-site access routes and construction of new routes, and the installation of upper and lower reservoir inlet/outlet structures.

It is estimated that, depending on the alternative selected, up to approximately 2,587 acres (Alternative B) of the study area would be affected by construction activities, including 1,000 acres within the upper reservoir footprint that would permanently convert natural vegetation types to open water, and would result in an unavoidable adverse impact to terrestrial resources. The terrestrial communities mainly affected by the current proposed actions include deciduous forest, hay/pasture, evergreen forest, and mixed forest. Unavoidable adverse impacts on aquatic ecology within the Guntersville Reservoir would include physical alteration of habitat to shoreline areas that are subject to shoreline stabilization, areas within the cofferdam, areas located within the footprint of the barge facility, and areas within the footprint of the bridge. However, construction-related impacts to aquatic habitats related to building within Guntersville Reservoir are temporary. Operation of a new PSH facility can result in impacts to aquatic ecology as a result of potential thermal alterations, inadvertent chemical releases, alteration to flow, and entrainment/impingement of fish and shellfish.

Forest and herbaceous vegetation that may offer some suitable summer roosting and/or foraging habitat to state- and federally listed bats would be removed under the action alternatives. TVA will commit to conservation measures outlined during consultation in compliance with Section 7 of the ESA. In addition, TVA will avoid direct impacts to documented roost trees and hibernacula as well as implement seasonal tree clearing near potentially sensitive summer roosting areas for federally protected bat species, install cave gates at important hibernacula within the study area and the region, and conduct seismic studies to determine potential for noise and vibration impacts on bats. TVA would continue to monitor caves within the Rorex Creek study area to document seasonal use and monitor local bat populations in conjunction with state, federal, and non-governmental organization partners as a part of white-nose syndrome response efforts to monitor bat populations. With the use of avoidance, minimization, and conservation measures, TVA has determined implementation of Alternative B may affect, but is not likely to adversely affect gray bat, Indiana bat, or northern long-eared bat, and would not jeopardize the continued existence of tricolored bat. A number of sensitive plant species have the potential to occur within the approximately disturbance areas. There would be major impacts to sensitive plant species located within proposed flooding areas and within the footprint of PSH facility permanent infrastructure areas.

Depending on the alternative selected, up to approximately 92.9 acres (Alternative B) of wetlands would be disturbed or filled by the proposed activities within the study area. In addition, approximately 44.1 acres or forested and shrub wetlands within the transmission line corridor associated with Alternative B would be converted to emergent wetlands. Additionally, there is anticipated to be local and temporary increase in sediments in water from increased erosion and construction stormwater runoff, and discharge of excavation dewatering. Impacts to wetlands under Alternatives B and C are considered moderate due to the amount of potential wetland impacts associated with these alternatives. However, loss of wetland habitat due to wetland fill would be compensated through wetland mitigation banking (or other acceptable method). Loss of wetland functions and values from forested wetland clearing would be compensated for at the discretion of state regulators and in line with EO 11990. With restoration processes and mitigation requirements in place that ensure no net loss of wetland function, impacts to wetlands at the watershed level are considered less than significant.

Unavoidable localized increases in air emissions, noise, and visual discord would also occur during construction activities. Activities associated with the use of construction equipment may result in varying amounts of fugitive dust, emissions of pollutants and GHGs from land-disturbing activities, and noise that may potentially impact on-site workers, users of adjacent recreational lands and water bodies, and residents located within the vicinity of the study areas, and visual discord from construction equipment. Workers would use appropriate protection and adhere to safety standards designed to minimize worker-related injuries. Emissions from on-site construction activities and equipment are minimized through implementation of BMPs including proper maintenance of construction equipment and vehicles. Overall, these impacts would be minor to moderate.

In the context of the availability of regional resources that are similar to those unavoidably adversely affected by the action alternatives, coupled with the application of appropriate BMPs and adherence to permit requirements, unavoidable adverse impacts would range from minor to moderate.

3.25 Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment versus the maintenance and enhancement of long-term environmental productivity. This Draft EIS focuses on the analyses of environmental impacts associated with the construction and operation of the proposed PSH facilities as well as infrastructure improvements in associated off-site areas. These activities are considered short-term uses of the environment for this section. In contrast, the long-term productivity is considered to be that which occurs beyond the conclusion of decommissioning the PSH facilities and associated infrastructure. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project sites.

The uses of the human environment associated with the action alternatives include unavoidable adverse impacts on resources associated with both the construction and operation of the PSH facilities as described above. Impacts that would cease or be reversed following plant decommissioning are considered short-term, because they would be restored to a state that supports long-term productivity following decommissioning. These include impacts on resources such as air quality, terrestrial ecology, aquatic ecology, noise, visual resources, and socioeconomic resources. The long-term productivity of those resources that can be restored following decommissioning would not be considered long-term. Impacts that cannot be reversed or would continue past the decommissioning of the PSH facilities, may be considered long-term. These include impacts to resources such as land use, water resources, and impacts on historic properties.

The short-term use of some resources and long-term use of others, and irreversible and irretrievable commitment of depletable resources would be offset by the benefit of the demonstration of PSH capabilities. This benefit would be considered short-term, occurring during the operating life of the PSH facilities. This benefit would be much larger than the productivity of any other uses of those resources during the operational life of the PSH facilities. The PSH facilities would continue to have long-term benefits even after decommissioning, as plant structures and site infrastructure may be repurposed to other productive uses, which could continue to support economic activity.

3.26 Irreversible and Irretrievable Commitments of Resources

The term “irreversible commitments of resources” describes environmental resources that are potentially changed by the construction or operation of the proposed project that could not be restored to their prior state by practical means at some later time. Irreversible commitments generally occur to nonrenewable resources, such as minerals or cultural resources, and to renewable resources only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption is neither renewable nor recoverable until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or other natural resources and are not necessarily irreversible. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road ROW as long as the road remains. Mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored.

The land used for the proposed PSH facility and associated infrastructure is not irreversibly committed under any of the project’s action alternatives because once the plant ceases operations and the facility is decommissioned, the land supporting the facility could be returned to other industrial or recreational uses. However, under Alternatives B and C, the reservoir impoundment area would be irretrievably committed because the area would remain water-inundated for the life of the project, restricting land use types. Reservoir construction would result in an irretrievable loss of approximately 6,000 acres of land under Alternatives B and C due to the permanent use of land for the reservoirs. Breeching the dam and removing liners post-decommissioning would return the site to productive status. Under Alternative D, the use of an existing PSH facility would result in no changes to the committed materials and resources associated with reservoir use.

Additionally, the implementation of any of the project’s action alternatives would result in a change in the existing landscape character of the areas surrounding each PSH facility site. The permanent conversion of primarily agricultural and undeveloped forested areas to an impoundment for the reservoir would constitute an irretrievable change to the landscape.

Constructing, operating, and maintaining the proposed PSH facility would require committing land, soil (including prime farmland), vegetation, water, and mineral resources to place permanent operational facilities, including the dam and reservoir impoundments, conveyance pipelines, access roads, structures, and transmission line corridor. Resources required for construction activities, including labor and fossil fuels, would be irreversibly committed toward the construction of the project facilities. Under Alternatives B and C, approximately 5.3 to 17 million cubic yards of soil would be required for dam embankment and associated facilities; however, most of these materials would be obtained from within the sites’ reservoir inundation area. The materials used for the construction of the facility would be committed for the life of the facility. While some of these building materials may be irreversibly committed, some metal components and structures could be recycled. The limited use of building materials for this project would not adversely affect the future availability of these resources.

Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during the construction and operation of the PSH facility and associated infrastructure. However, it is unlikely that their limited use in these efforts would adversely affect the overall future availability of these resources.

The new transformer yard, switchyard facilities, and transmission line corridor would constitute an irretrievable commitment of on-site resources, such as wildlife habitat, prime farmland soils, and forest resources, for the length of time the transmission line is in place. Furthermore, under Alternative B, vegetation clearing within the off-site transmission line corridor would result in additional commitments of wildlife habitat. Direct effects on some non-mobile species during construction may occur, particularly if construction activities transpire during breeding and nesting seasons. However, construction activities are not likely to affect populations of species common to the area, as similarly suitable and superior forested habitat is abundant throughout the adjacent landscape. Upon retirement of these facilities, the land would revert to its previous condition.

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Education:	M.S., Wildlife and Fisheries Science and B.A. Biology
Project Role:	Terrestrial Ecology (Wildlife), Threatened and Endangered Species (Wildlife)
Experience:	17 years conducting field biology, 12 years technical writing, 8 years compliance with NEPA and ESA

Name:	**Steve Cole**
Education:	PhD, Anthropology; MA, Anthropology; and B.A., Anthropology
Project Role:	Cultural Resources
Experience:	32 years in Archaeology and Cultural Resources Management

Name:	**Nikki Berger**
Education:	M.S., Engineering Management, B.S. Civil/Environmental Engineering
Project Role:	Navigation
Experience:	12 years in Navigation, 14 years in the River Forecast Center

Name:	**Fallon Parker Hutcheon**
Education:	M.S., Environmental Studies; B.S., Biology
Project Role:	Wetland Biologist
Experience:	6 years in wetland assessment, impact analysis, and compliance

Name:	**David Mitchell**
Education:	M.S, Soil and Water Science; B.S., Horticulture
Project Role:	Botany
Experience:	20 years of ecological restoration and field botany

Name:	**Chloe Sweda**
Education:	B.S., Earth and Environmental Science
Project Role:	Managed and Natural Areas
Experience:	5 years of experience in Natural Resource Management

Name:	**Carrie C. Williamson, P.E. (TN), CFM**
Position:	Program Manager, Flood Risk
Education:	M.S., Civil Engineering; B.S., Civil Engineering; Professional Engineer, Certified Floodplain Manager
Project Role:	Floodplains and Flood Risk
Experience:	12 years in Floodplains and Flood Risk; 3 years in River Forecasting; 11 years in Compliance Monitoring

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Name:	**Erin Alsop**
Education:	B.S., Environmental Science
Project Role:	Technical Review
Experience:	8 years of experience in NEPA analysis and documentation

Name:	**Matthew Basler**
Education:	M.S., Fisheries Science and B.S., Wildlife and Fisheries, Biology
Project Role:	Technical Review
Experience:	22 years of experience in aquatic and terrestrial ecology

Name:	**Karen Boulware**
Education:	M.S., Resource Planning and B.S., Geology
Project Role:	Technical Review
Experience:	30 years of professional experience in NEPA

Name:	**Paige Brazzell**
Education:	M.S., Conservation Biology; B.S., Environmental Biology
Project Role:	Wetlands, Terrestrial Zoology, Document Preparation
Experience:	7 years in the water quality field

Name:	**Ross Daniels**
Education:	M.S. Urban & Regional Planning; Master of Public Health; B.A. Earth & Environmental Science
Project Role:	Geology and Soils, Public Health and Safety, Solid and Hazardous Waste, and Transportation
Experience:	8 years of planning experience, including over 5 years in NEPA documentation

Name:	**Mary Motte Fikri**
Education:	M.S., Forest Resources and B.S., Natural Resources
Project Role:	Wildlife, Threatened and Endangered Species, Wetlands, and Technical Review
Experience:	26 years of professional experience in NEPA and Natural Resources.

Name:	**Angela French**
Education:	B.S., Environmental Science; B.S., Biology
Project Role:	Technical Review
Experience:	12 years of experience in NEPA Compliance

Name:	**Bailey Hickey**
Education:	B.S., Environmental Engineering
Project Role:	Floodplains and Groundwater
Experience:	6 years of experience in engineering consulting and environmental planning

Name:	**John Hunter**
Education:	MA, Anthropology; B.A., Anthropology
Project Role:	Cultural Resources
Experience:	25 years of experience in Cultural Resources

Name:	**Wayne Ingram**
Education:	B.S. Civil Engineering, B.S., Physics
Project Role:	Technical Review
Experience:	45 yeas professional experience in water resources engineering

Name:	**Andrea Johnston**
Education:	B.S., Environmental Science
Project Role:	Vegetation, Wildlife, Threatened and Endangered Species, and Air Quality and Green House Gases
Experience:	3 years of experience in NEPA analysis and scientific studies

Name:	**Chris Mausert-Mooney**
Education:	B.S. Biology
Project Role:	Vegetation, Threatened and Endangered Species
Experience:	16 of experience in ecological and botanical investigations

Name:	**Chelsey Nieman**
Education:	Ph.D, Fisheries and Wildlife
Project Role:	Threatened and Endangered Species, Surface Water, Aquatic Ecology, and Navigation
Experience:	14 years of experience in freshwater ecology

Name:	**Konrad Quast**
Education:	Ph.D., Hydrology and Water Resources; B.S., Hydrology and Water Resources
Project Role:	Groundwater Specialist and Technical Review
Experience:	26 years of diversified experience in hydrogeology and geochemistry, groundwater fate and transport modeling, and data analysis

Name:	**Leah Stephens**
Education:	B.A., Environmental Studies
Project Role:	Visual Resources, Noise, Socioeconomics, Unavoidable Adverse Impacts, Relationship of Short Term Uses to Long-Term Productivity, and Irreversible and Irretrievable Commitments of Resources
Experience:	5 years of experience in NEPA analysis and documentation

Name:	**David Tamsky**
Education:	B.A., Environmental Studies
Project Role:	Land Use, Prime Farmland, Natural Areas and Parks and Recreation, Irreversible and Irretrievable Commitments of Resources, and Mitigation Measures
Experience:	1 year of experience in NEPA analysis

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Appendix A – Scoping Report

Appendix B – Wildlife and Protected Terrestrial Animal Species Assessments

Appendix C – Threatened and Endangered Species Descriptions

Appendix D – Bat Mist-Net Survey Reports

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Appendix E – Botany and Sensitive Vascular Plant Habitat and Species Assessments

Appendix F – Mollusk and Fisheries Survey Reports

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Appendix G – Wetlands and Aquatic Resources Technical Reports

Appendix H – Agency Consultation