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BROWNS FERRY NUCLEAR PLANT
THERMAL PERFORMANCE PROGRAM COOLING TOWER CAPACITY IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT

Limestone County, Alabama

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Symbols, Acronyms, and Abbreviations

AADT	Annual Average Daily Traffic
ADEM	Alabama Department of Environmental Management
AEC	Atomic Energy Commission
amsl	Above mean sea level
BFN	Browns Ferry Nuclear Plant
CAA	Clean Air Act
CCW	Condenser Cooling Water
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CT	Cooling Tower
CTLP	Cooling Tower Lift Pump
CWA	Clean Water Act
dBA	A-weighted decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPU	Extended Power Uprate
ES	Environmental Statement
FICON	Federal Interagency Committee on Noise
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutants
hp	Horsepower
HUC	Hydrologic Unit Code
HUD	United States Department of Housing and Urban Development
HWSF	Hazardous Waste Storage Facility
IPaC	Information for Planning and Consultation
Kgpm	Thousand Gallons Per Minute
L_{dn}	Day-night sound level
L_{eq}	Equivalent sound level
MDCT	Mechanical Draft Cooling Tower
Mgpm	Million Gallons Per Minute
mph	Miles Per Hour
MWt	Megawatts Thermal
NAAQS	National Ambient Air Quality Standards
NLEB	Northern Long-Eared Bat
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NEPA	National Environmental Policy Act

NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
OLTP	Operating License Thermal Power
OSHA	Occupational Safety and Health Administration
PM	Particulate Matter
$PM_{2.5}$	PM with an aerodynamic diameter equal to or less than 2.5 microns
PM_{10}	PM with an aerodynamic diameter equal to or less than 10 microns
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
SEIS	Supplemental Environmental Impact Statement
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
TVA	Tennessee Valley Authority
USGS	United States Geological Survey
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound
vpd	Vehicles Per Day
WOTUS	Waters of the United States

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

The Tennessee Valley Authority (TVA) Browns Ferry Nuclear Plant (BFN) is a three-unit General Electric boiling water reactor facility with seven linear Mechanical Draft CTs (MDCT, herein referred to as CTs) located in Limestone County, Alabama. TVA previously determined that increasing electric power generation from the BFN would be a cost-effective means of meeting increased demand for electricity in the Tennessee Valley. The increased electrical power generation was executed with the implementation of the Extended Power Uprate (EPU) at BFN in 2018, which resulted in increased heat rejected to the Condenser Cooling Water (CCW) from the turbine by 15 percent. To minimize thermal impacts to the Tennessee River and to reduce the potential for thermal derates, increases of both cooling tower lift pump (CTLP) flow and CT capacity are required. There are four issues related to reliable operation of the BFN CT system:

- Inadequate CTLP Flow to support three BFN units
- Equipment reliability/operational challenges
- EPU increase in heat rejection
- Deficient CT total cell capacity and material condition

To address these issues, TVA is considering the replacement and upgrade of the existing original 16-cell CT 1 and CT 2, replacement and upgrade of the CTLPs, and upgrades to CT 7.

CT 1 and CT 2 (including the associated CTLPs) were placed in service in 1974. These CTs and associated CTLPs have reached the end of useful function as performance has declined and the degradation of the Redwood frames of the CTs have introduced safety concerns. Replacement of CT 1 and CT 2 was addressed in previous National Environmental Policy Act (NEPA) documents; however, the current proposed replacements are slightly larger than those proposed in previous documents.

CT 7 was placed in service along with four new CTLPs in 2012, the environmental effects of which were addressed in a TVA 2010 Environmental Assessment (EA). Due to differences in the pumping capacity of the four CTLPs (440 thousand gallons per minute [Kgpm]) and the flow capacity of the nozzles in CT 7 (410 Kgpm in clean conditions), the CT is not able to support the operating design of all four CTLPs in service simultaneously. Initial efforts to resolve this condition were unsuccessful and resulted in the partial collapse of CT 7 in 2016. Since that time, operation has been limited to only three of the four CTLPs to prevent overflowing the hot water basin.

The Proposed Action considered for this EA would provide CT capacity improvement modifications to the BFN Thermal Performance Program including: CT replacements, CTLP upgrades, pumping station upgrades, and other improvements. Specifically, the Proposed Action consists of:

- Demolition of the existing CT 1 and CT 2, which have a 275 Kgpm flow capacity, and replacement with two CTs with a proposed design flow of up to approximately 330 Kgpm, and piping to carry water to the new CTs

- Replacement of CTLP 1A, CTLP 1B, CTLP 2A, and CTLP 2B to increase flow from 275 Kgpm to approximately 330 Kgpm, per CT including refurbishment of the pumping station
- Upgrade of the flow distribution system to gain use of all four CTLPs on CT 7
- Upgrades to the vacuum priming system and cold water channel outlet gate
- Addition of a CT CCW chlorination system.

These improvements are intended to provide margin in the design and operational flexibility for normal component fouling during operation and the ability to have margin for pump swaps and CT maintenance. The total flow delivered to and through the CTs would remain at 2.04 Million gpm (Mgpm).

This EA will update the past environmental record for CT construction and operation at BFN and address the additional system upgrades needed for more efficient and effective operation of the BFN Thermal Performance Program.

1.1 Background

BFN is located within an 840-acre parcel on the north bank of Wheeler Reservoir at Tennessee River Mile 294 in Limestone County, Alabama (**Figure 1-1**). BFN is a three-unit General Electric boiling water reactor facility with each unit having a capacity of 3,952 megawatts thermal (MWt). BFN currently has seven linear CTs with a total of 127 cells. The CTs have a design flow capability of 2.06 million gallons per minute (Mgpm) and the CCW has a maximum flow of 2.04 Mgpm.

CT 1 and CT 2 are the original towers built in 1974. CT 3, CT 4, CT 5, and CT 6 have been replaced, and CT 7 was added into service in 2012. CT 1 and CT 2 have reached the end of useful function and are an outdated design, and therefore are not performing to desired levels. An EA prepared in 2010 evaluated the replacement of CT 1, CT 2, CT 5 and CT 6, and construction of the new CT 7. In that EA, CT 1 and CT 2 were to be replaced with two 20-cell towers, and no lift pump replacements, pumping station refurbishment, or other system improvements were proposed. Replacement of CT 1 and CT 2 with larger CTs was also addressed in a 2002 Final Supplemental Environmental Impact Statement (SEIS) for Operating License Renewal of the Browns Ferry Nuclear Plant in Athens, Alabama (NEPA Index No. 735) as Alternative 2C.

1.2 Decision to be Made

TVA is to consider the following decision:

- To continue to operate the existing CT 1 and CT 2 at BFN without replacement or construction of the proposed associated upgrades
- To replace CT 1 and CT 2 and construct the proposed associated upgrades

Replacement and upgrades would include demolition of the existing CT 1 and CT 2; construction of the new CT 1 and CT 2; refurbishment of the pumping station and piping to carry water to the new CTs; demolition of four existing CTLPs; construction of four new CTLPs at CT 1 and CT 2; upgrades to the flow distribution system to CT 7, vacuum breaker system, and CT outlet gate; and relocation of the CCW chlorination system.

1.3 Related Environmental Reviews

Several evaluations in the form of environmental reviews have been prepared for actions related to the construction and operation of CT replacements, CTLP upgrades, pumping station upgrades and other improvements at the BFN. This incorporates by reference information from the body of related TVA environmental reviews listed in **Table 1-1** below.

Table 1-1

Environmental Reviews and Documents Pertinent to CT Capacity Improvement Modifications to the BFN Thermal Performance Program

Type of Review / Agency	Title	Decision and Findings	Summary/Relevance
EA / Nuclear Regulatory Commission / NRC	Proposed Extended Power Uprate	Finding of No Significant Impact (FONSI) issued June 2017	Amendment, referred to as an EPU, to authorize an increase in the maximum power level from 3,458 MWt to 3,952 MWt for each unit. The EPU represented an increase of approximately 14.3 percent above the licensed thermal power level of 3,458 MWt per unit.
Environmental Report / TVA	Attachment 42 – Supplemental Environmental Report	Not Applicable	Attachment to the EPU License Amendment Request. The TVA supplemental Environmental Report contained an assessment of the hydrothermal impacts of a proposed output power increase for BFN Units 1, 2, and 3.
Supplemental EA / TVA	Browns Ferry Nuclear Plant Cooling Tower 3 Replacement	FONSI issued December 2012	Action was to replace CT 3 with a more modern CT that included larger fan motors and a larger cold water basin due to the partial collapse of the existing CT 3 in July 2012 and the resulting unsafe condition.
EA / TVA	Browns Ferry CTs – Additions and Replacements	FONSI issued October 2010	Action was to replace four original CTs at BFN with larger units and construct CT 7.
Generic Environmental Impact Statement (EIS) / NRC	Generic EIS for License Renewal of Nuclear Plants, Supplement 21 Regarding Browns Ferry Nuclear Plant, Units 1, 2, and 3. Final Report. NUREG 1437.	Record of Decision issued June 2005	Action was to renew the operating licenses for BFN for an additional 20-year period at EPU of 120 percent.
EA / TVA	Browns Ferry Nuclear Plant Extended Power Uprate for Units 2 and 3 EA, August 2003.	FONSI issued August 2003	Action was to seek a license amendment from NRC for EPU. Based on new technical and economic analyses, the TVA proposed to use existing CTs and derate to mitigate potential thermal impacts of EPU instead of building new CTs.

Table 1-1

Environmental Reviews and Documents Pertinent to CT Capacity Improvement Modifications to the BFN Thermal Performance Program

Type of Review / Agency	Title	Decision and Findings	Summary/Relevance
SEIS / TVA	Final SEIS for Operating License Renewal of the Browns Ferry Nuclear Plant in Athens, Alabama, March 2002	Record of Decision issued May 2002	Action was to seek extension of NRC licenses for BFN Units 1, 2, and 3 at 120 percent of Operating License Thermal Power (OLTP) for an additional 20 years beyond the original 40-year operating license terms. Mitigation measures for increased thermal loads to surface waters included use of existing CTs, construction of a new CT, and derating the plant as necessary.
EA / TVA	Browns Ferry Nuclear Plant Units 2 and 3 Power Uprate Project EA, March 2001.	FONSI issued March 2001	Action was to request a license amendment to increase the output of BFN Units 2 and 3 from 105 percent of OLTP to 120 percent.
EA / TVA	Browns Ferry Nuclear Plant Units 2 and 3 Power Uprate Project EA, August 1997.	FONSI issued August 1997	Action was to request license amendment from NRC to increase BFN Units 2 and 3 maximum power level to 105 percent of OLTP.
ES [1] / AEC [2]	Browns Ferry Nuclear Plant, Units 1, 2, and 3 Final ES, Volumes 1-3, July 1971.	Record of Decision issued August 1972	Action was to construct and operate BFN.
1 – The TVA early EIS documents were entitled Environmental Statements (ES) 2 - Atomic Energy Commission (AEC); now the Nuclear Regulatory Commission (NRC)			

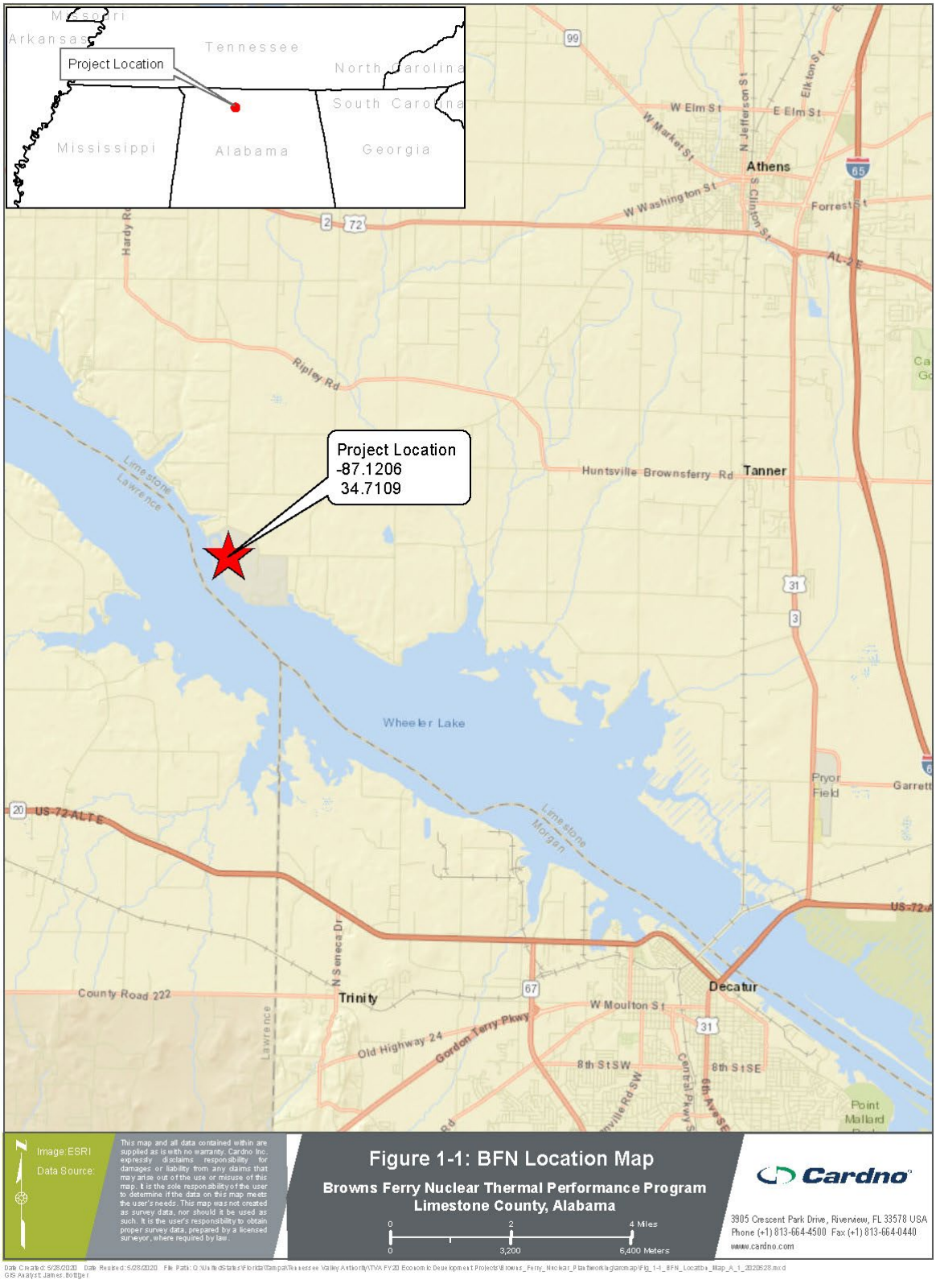

Figure 1-1. BFN Location Map

1.4 Scope of the Environmental Assessment

TVA has prepared this EA to comply with NEPA and associated implementing regulations. TVA considered the possible environmental effects of the Proposed Action and determined that potential effects to the environmental resources listed below were relevant to the decision to be made; thus, the following environmental resources are addressed in detail in this EA.

- Air Quality and Climate Change
- Geology and Groundwater
- Wetlands
- Floodplains
- Soil Erosion and Surface Water
- Aquatic Ecology
- Terrestrial Zoology
- Botany
- Archaeology
- Historic Sites and Structures
- Noise
- Solid and Hazardous Waste and Hazardous Materials
- Transportation

The detailed analysis in this EA focuses on those resource areas above that have the potential for significant impacts or those that typically interest the public. TVA determined there would be no potential for significant impacts for the following resource areas:

- *Visual Resources* –The physical height and width of the new CT 1 and CT 2 would be very similar in size to the previously replaced CT 3, CT 4, CT 5, and CT 6, and would therefore not appear differently from a visual perspective from these CTs. There would be temporary changes in the visual character of the site during the construction process until site cleanup and reclamation of disturbed areas are complete. Because the area is already comprised of nuclear plant buildings, roads, and transmission lines, this temporary change in visual character would be insignificant. Therefore, the Proposed Action would not result in significant temporary or permanent changes to the visual landscape from the present views.
- *Land Use and Prime Farmland* – The proposed construction activities would be located on previously disturbed soils and in developed areas within BFN. Facilities for construction workers would be temporary and at the completion of construction, the land would revert to prior use. Therefore, the Proposed Action would not result in significant temporary or permanent changes to land use or prime farmland.
- *Natural Areas, Parks and Recreation* – BFN is located adjacent to the Tennessee River and several natural and recreational areas are located along the river in the vicinity of BFN. However, there are no natural areas, parks, or recreational areas or facilities located within BFN. Because all proposed activities would be contained

within previously disturbed areas of BFN and no activities would prevent or hinder access, there would be no significant temporary or permanent impacts to natural areas, parks, or recreational opportunities resulting from the Proposed Action.

- *Socioeconomics and Environmental Justice* – There would no significant change in operating employment levels, payroll, or other plant-related expenditures resulting from the Proposed Action. In addition to the existing operating plant workforce, construction activity would require a minimal number of construction-related personnel over the temporary duration of construction. The number of construction-related personnel would vary over the course of the proposed work with a maximum construction workforce of approximately 125 workers onsite at the peak of construction. However, the temporary increase in workers would not result in significant impacts to employment and income in the area. There would be no noticeable effect on community services and housing and local government revenues because of the small and temporary increase in the number of additional workers. Additionally, no disproportionate impacts to disadvantaged populations in the local area are anticipated.

1.5 Necessary Permits or Licenses

Construction activities would be performed in compliance with applicable stormwater permitting requirements. If one acre or more of land would be disturbed at a given period of time, TVA would be required to obtain coverage under the 2018 National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Associated with Construction Activity (ALR100000). Coverage would require development of a site-specific Construction Best Management Practices Plan (CBMPP) that would specify applicable best management practices (BMPs) such as installation of sediment and erosion controls during construction activities. In addition to NPDES storm water permitting, BFN may be required to obtain permits for solid and hazardous waste disposal. No other federal, state, or local permits are anticipated to be required based on the resources impacted as discussed in this EA.

CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

Based on internal scoping, TVA has determined that there are two reasonable alternatives to assess under NEPA regulations: the No Action Alternative and the Action Alternative.

2.1.1 No Action Alternative

Under the No Action Alternative, TVA would not replace CT 1 and CT 2 or construct the proposed associated upgrades. TVA would continue to operate CT 1 and CT 2 without replacement or construction of the proposed associated upgrades. This would result in gradual declining performance and degrading of CT 1 and CT 2 followed by subsequent shutdown of the CTs or large expenditures of resources for repair of the degraded CTs. Additionally, CT 7 would continue to operate at diminished capacity, being limited to operating with only three of the four CTLPs. The No Action Alternative would not meet the TVA objective of increasing electric power generation from the BFN as a means of providing cost-effective electricity to meet increased demand in the Tennessee Valley

2.1.2 Action Alternative

Under the Action Alternative, TVA would conduct multiple activities to ensure successful CT capacity improvements, including replacement of the existing CT 1 and CT 2, which have a flow capacity of 275 Kgpm, with two CTs with a design flow of up to approximately 330 Kgpm, upgrading of four CTLPs, upgrading of the existing CT 7, and completion of associated upgrades. Construction activities would occur within a 224.46-acre area, herein referred to as the Project Area depicted in **Figure 2-1**.

The Action Alternative would be constructed in six phases over a 7-year period between 2020 and 2027 as detailed in the following sections.

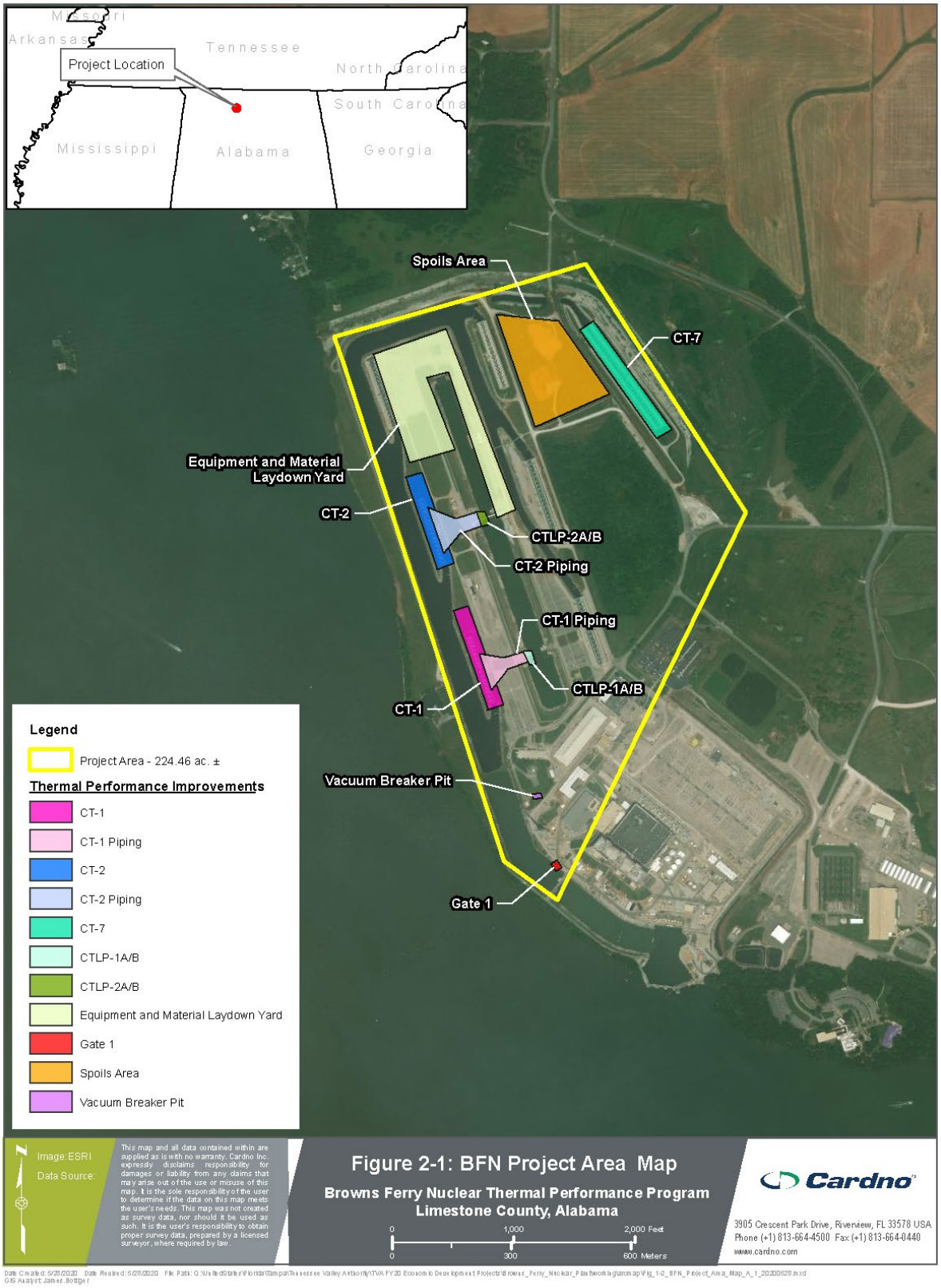

Figure 2-1. BFN Project Area

2.1.2.1 Action Alternative Phased Approach

Modification Phase 1 – Replacement/Expansion of CT 1 and CT 2

Modification Phase 1 would consist of the following actions:

- Demolition of the existing CT 1 and CT 2 (constructed in 1974) and associated basin and electrical distribution systems. The current CTs are 16 cell CTs designed for a total flow of 275 Kgpm. Each cell uses 200 horsepower (hp) to power the fan creating the air / water interaction. These CTs have a 55 degrees Fahrenheit (ºF) wet bulb design[1]. The current basins are approximately 600 feet long by 55 feet wide and the CT heights are approximately 52 feet at the decks and 66 feet at the top of the fan stacks. The demolition process would consist of:
  - Removal of electrical equipment including transformers, cable, motors, and motor control centers
  - Removal of fans and gearboxes
  - Removal of concrete mixture (transite) panels
  - Mechanical demolition of remaining material
  - Removal of concrete CT basin

  Material removed from the CTs would be recycled if possible or disposed of at a licensed landfill. The estimated volume of material (including transite panels noted above) is 6,000 cubic feet plus 1,100 cubic feet of concrete (estimate by dimension) per CT.
- Excavation of a new longer and wider basin to support installation of CT 1 and CT 2 with a design flow of up to 330 Kgpm. The new basin would be approximately 75 feet wide by 800 feet long and approximately two feet taller. The new basin is designed to support a total flow of up to 330 Kgpm at a design wet bulb temperature of 82 ºF with 250 hp fans.
- Increasing the design flow from 275 Kgpm up to approximately 330 Kgpm would likely result in a larger CT 1 and CT 2 layout due to the increase in number of cells. However, the physical height and width of the new CTs would be similar in size to the previously replaced CT 3, CT 4, CT 5, and CT 6.
- Modification of the underground piping from the CTLPs may be required, including increasing in size and changing the routing to support the new CT 1 and CT 2 layout and capacity. This would involve excavation of the piping area of CT 1 and CT 2 and replacement of the piping with new larger pipes that would be routed farther to the northwest to better align with the centerline of the larger CT 1 and CT 2.
- Relocation and increase in size of the two existing electrical centers (transformers and motor control centers) for each CT from the center line of the current CT 1 and

[1] Wet bulb temperature is the lowest temperature to which air can be cooled by the evaporation of water into the air at a constant pressure. It is measured by wrapping a wet wick around the bulb of a thermometer and the measured temperature corresponds to the wet bulb temperature.

CT 2 to the new CTs centerline, due to the increase in length of the new CT 1 and CT 2.

- The following associated activities would be completed:
  - The parking areas nearest to CT 1 (between warm water channel and cold water channel) would be temporarily closed for normal BFN activities to allow for equipment, material staging and construction activity and to provide contractor parking.
  - Several TVA modular office structures would be relocated within the BFN site to remove interference with the Action Alternative. These relocations could result in modifications to potable water and sewage piping to accommodate tie-in from the new locations. The relocated offices would provide office space for personnel. In addition, the CT vendor would mobilize several management and craft trailers to the site for construction activities.
  - Due to the widening of CT 1 and CT 2 bases, existing underground fire protection piping to area hydrants and previously abandoned deluge piping for CT 1 and CT 2 would be rerouted and replaced.
- Other considerations include:
  - It is anticipated that the CT construction period would peak at 125 additional contractors on site, 5 days per week, for approximately 20 weeks.
  - Two main laydown areas would be used during construction. The first is in the existing parking lot near CT 1. The second is at the northwest end of the warm water channel in an area currently in use as a laydown for CT spare material.
  - All spoils that remain on site (silt and soil) would be deposited in the spoils area already in use.

Modification Phase 2 – Replacement / Upgrade of CTLPs 1A, 1B, 2A, and 2B

Modification Phase 2 would involve replacement and upgrade of CTLPs 1A, 1B, 2A, and 2B, and would consist of the following components:

- Replacing four existing 3,100 hp, 137.5 Kgpm pumps with new approximately 5,500 hp, 165.0 Kgpm pumps.
- Demolition
  - Removal of the existing pumps, motors, and valves. These components would be stored in a laydown area for future refurbishment as spares. A mobile stand may be constructed to store these mechanical pieces.
  - Removal of the existing motor feeder cables, piping, sensing lines, and instruments. This material would be recycled where possible or disposed of at a licensed landfill.

- Refurbishing the pump deck and controls
  - The pump deck structural steel and railings would be stripped of lead-based material and recoated for outdoor protection.
  - The concrete would be tested for strength, then cleaned, repaired, and coated where necessary. Structured steel modifications may be needed for strength improvements.
  - Improved lighting would be installed on the pump decks for night access.
  - The pump suction pits would be cleaned and removed silt placed in the spoils pile.
  - The instruments and controls would be relocated to a new enclosure (replaces existing enclosure of same size) that is higher on the platform to eliminate moisture effects during operation.
- New equipment
  - New pumps and motors would be installed into the existing pump decks.
  - New power cables would be routed in the existing raceway (trenches and conduits) from where the previous cables were removed. Conduit upsizing may be required.

Modification Phase 3 – Flow Distribution System Upgrade for CT 7

Modification Phase 3 would involve upgrade of the flow distribution system for CT 7 to restore the originally intended capability to run all four CTLPs at CT 7. These upgrades would consist of the following components:

- Replacing approximately 31,000 plastic nozzles in the hot water basin of CT 7 with new ultraviolet resistant nozzles. The removed nozzles would be recycled or disposed of in a licensed landfill.
- Addition of hot water basin walkways and ladders to CT 7 that would be made of the same fiberglass reinforced plastic used to construct the CTs and would match the similar designs used in previously replaced CT 3, CT 5, and CT 6.
- Place a cover over the hot water basin on both sides to reduce sunlight impacts and the deposition of debris into the basin.

Modification Phase 4 – Vacuum Priming System

Modification Phase 4 would improve the performance of the vacuum system by converting a single vacuum line with two pumps to independent pump systems with crossties. This equipment is enclosed within two structures, but it is anticipated to require the installation of pipes under ground between the two buildings (4-inch diameter or less and less than 50 feet long) and electrical conduits of the same size and length. The work area would require removal of soil to access the area for conduit / pipe installation. The area would then be recovered with the same material.

Modification Phase 5 – Gate 1

To support increase in flow returning from the CTs discharge to the outlet diffusers through Gate 1, modification Phase 5 would consist of potential modifications to enlarge the opening in the gate to reduce the pressure drop through the gate. This could include installation of new gates (there are 3 gates within Gate 1) and operators, and widening of the concrete opening. The overall layout of Gate 1 would remain the same.

Modification Phase 6 – Relocation of CCW Chlorination System

Modification Phase 6 would involve injection of chemicals (likely sodium hypochlorite, which is similar to what is used in CCW treatment at the BFN) at the discharge of the applicable CTLPs to provide chlorination of the piping and CT water distribution system. A chemical (likely sodium bisulfite) would be injected into the CT cold water basin to counteract the chlorine and return the water to a neutral state prior to return to the Tennessee River. This system would be put in place for each CT and CTLP and would be a smaller version of what is currently used in the BFN CCW system. The installation would be designed with appropriate monitoring to insure water being returned to the Tennessee River would be in compliance with existing BFN permits and procedures.

2.1.2.2 Action Alternative Construction Techniques and Equipment

Onsite demolition and construction would consist of manual and machine-based labor. Typical machinery would include excavators (backhoes), loaders, track loaders, booming fork trucks, dump trucks, cranes, and generators. Use of this equipment would be intermittent, during normal business hours (6:00 AM to 6:00 PM), and similar to that used in the typical maintenance, modification, and operation of the BFN.

Materials would be brought to the site in pieces to be assembled onsite, and no dedicated or oversized loads are anticipated. Commercial and employee / contractor traffic would be directed through Shaw Road and Nuclear Plant Road.

2.1.3 Alternatives Considered but Eliminated From Further Discussion

TVA initially evaluated an additional alternative that would consist of specific design procurement, inspections, and action plans to improve material condition of CT 1 and CT 2. This alternative would result in minor thermal performance improvements, but would not increase CT flow from 275 Kgpm to 330 Kgpm, would not safeguard avoiding the need to derate, and would not support the objective of placing all three BFN units online. Consequently, this alternative would not meet the Purpose and Need and was dismissed from further evaluation.

Installation of alternative types and sizes of CTs were considered in the original 1972 EIS, as well as the 2002 Final SEIS and the 2010 Final EA. Different CT sizes were also considered in the various EPU EAs. These analyses included consideration of construction of and / or replacement with in-kind CTs, round MDCTs, and Hyperbolic (Natural Draft) CTs. Each of the alternative types and sizes of CTs were rejected due to cost, time to construct, and location difficulties for CTs not built on the existing layout. Some of the alternative types and sizes of CTs were dismissed due to inadequate capacity for the proposed layout. TVA reevaluated these alternatives and determined that the alternatives

do not meet the Purpose and Need. The previous analyses are incorporated by reference into this EA, and therefore these alternatives are not discussed herein.

2.2 Comparison of Alternatives

The environmental impacts of the alternatives derived from the information and analyses provided in Chapter 3 and Chapter 4 of this EA are summarized in **Table 2-1**.

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

Resource Area	No Action Alternative	Action Alternative
Air Quality and Climate Change	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Geology and Groundwater	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Wetlands	No Impacts	No Impacts
Floodplains	No Impacts	No Impacts
Soil Erosion and Surface Water	No Impacts	Minor, Temporary, Localized Impacts (Construction) Minor, Intermittent, Localized Beneficial Impacts (Operations)
Aquatic Ecology	No Impacts	No Impacts
Terrestrial Zoology	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Botany	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Archaeology	No Impacts	No Impacts
Historic Sites and Structures	No Impacts	No Impacts
Noise	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Solid and Hazardous Waste and Hazardous Materials	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)
Transportation	No Impacts	Minor, Temporary, Localized Impacts (Construction) No Impacts (Operations)

2.3 Identification of Mitigation Measures

To minimize or reduce the environmental effects, TVA would utilize the following standard operating procedures, BMPs, and mitigation measures.

- If one acre or more of land would be disturbed at a given time, TVA would obtain coverage under the 2016 NPDES General Permit for Discharges Associated with Construction Activity (ALR100000).
- To control fugitive dust during construction activities, TVA would comply with the Alabama Department of Environmental Management (ADEM) Air Division Administrative Code Chapter 335-3-4, Control of Particulate Emissions and implement reasonable precautions and applicable BMPs.
- Applicable BMPs such as installation of sediment and erosion controls would be implemented and construction activities would be performed in compliance with applicable stormwater permitting.
- Specific avoidance and conservation measures would be implemented to reduce effects to federally-listed bat species. These measures are identified in the TVA Bat Strategy Project Screening Form (**Attachment A**).
- TVA would implement applicable BMPs to minimize the amount and duration of noise generated during construction activities.
- To ensure that BFN noise levels continue to meet applicable guidelines, TVA would conduct additional environmental sound pressure level assessments with all CTs running in July 2020 and following completion of the CT replacements.
- All wastes would be managed in accordance with existing BFN waste management procedures and general BMPs.

2.4 Preferred Alternative

The Action Alternative is the preferred alternative to accomplish the Purpose and Need.

CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter consists of a summary of the existing environmental conditions at BFN that are anticipated to be affected through implementation of the Action Alternative or the No Action Alternative.

3.1 Air Quality and Climate Change

With authority granted by the Clean Air Act (CAA) 42 U.S.C. 7401 et seq. as amended in 1977 and 1990, the U.S. Environmental Protection Agency (USEPA) established National Ambient Air Quality Standards (NAAQS) to protect human health and public welfare. The USEPA codified NAAQS in 40 CFR 50 for the following defined criteria pollutants:

- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- ozone, sulfur dioxide (SO_2)
- lead
- particulate matter (PM) with an aerodynamic diameter equal to or less than 10 microns (PM_{10})
- PM with an aerodynamic diameter equal to or less than 2.5 microns ($PM_{2.5}$)

The NAAQS reflect the relationship between pollutant concentrations and health and welfare effects. Primary standards are designed to protect human health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are designed to protect public welfare, including visibility, animals, crops, vegetation, and buildings. These standards reflect the latest scientific understanding and have a margin of safety intended to address uncertainties and provide a reasonable degree of protection.

Sources of non-radiological air pollutants at BFN include the MDCT, the auxiliary steam generators, the emergency diesel generators, and miscellaneous other sources such as fuel storage facilities. BFN operates as a minor source under air quality permits approved by ADEM (TVA 2002a). Permit No. 708-0003-X005 issued in June 2017, authorizes BFN operation and emissions generated from support facilities and plant deliveries such as diesel generators, auxiliary steam boilers, and vehicular / construction traffic. Emissions include CO, carbon dioxide (CO_2), PM, nitrogen oxides (NO_x), sulfur oxides (SO_x), and volatile organic compounds (VOCs). BFN is not considered a major source of emissions and is therefore not required to obtain a Title V air permit (USEPA 2020).

Fugitive dust is a source of respirable airborne PM, including PM_{10} and $PM_{2.5}$, which could result from ground disturbances such demolition, grading, excavation, and travel on unpaved roads. The amount of dust generated is a function of the activity, silt and moisture content of the soil, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. ADEM Air Division Administrative Code Chapter 335-3-4, Control of Particulate Emissions requires reasonable precautions to prevent PM from becoming airborne. Such reasonable precautions include grading of roads; clearing of land; and the

use of water or chemicals for control of dust in construction operations on dirt roads and stock piles as needed.

Other pollutants, such as hazardous air pollutants (HAPs) and greenhouse gases (GHGs) are also a consideration in air quality impacts analyses. HAPs, also known as toxic air pollutants or air toxics, are pollutants that are listed under Section 112(b) of the CAA because the pollutants present a threat of adverse human health effects or adverse environmental effects. Although there are no applicable ambient air quality standards for HAPs, the emissions are limited through permit thresholds and technology standards as required by the CAA.

GHGs are non-toxic and non-hazardous gases that trap heat in the atmosphere at normal ambient concentrations. At this time, there are no applicable ambient air quality standards or emission limits for GHGs under the CAA. GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. GHG emissions due to human activity are the main cause of increased atmospheric concentration of GHGs since the industrial age and are the primary contributor to climate change. The principal GHGs are CO_2, methane, and nitrous oxide.

Vegetation serve as carbon sinks that use photosynthesis to convert CO_2 into sugar, cellulose, and other carbon-containing carbohydrates that are utilized for food and growth. The process by which carbon sinks remove CO_2 from the atmosphere is known as carbon sequestration. Although vegetation does release some CO_2 from natural processes such as decay and respiration, healthy vegetation typically stores carbon at a greater rate than it releases carbon.

3.2 Geology and Groundwater

BFN is located within the southeastern portion of the Nashville structural dome and merges into the slope of the Appalachian geosyncline. The Tennessee Valley Highland Rim section of the Interior Low Plateau Physiographic Province is characterized by rolling relief. The nearly flat formations of carbonate rock are overlain by unconsolidated sediments deposited by the Tennessee River and underlain by Tuscumbia Limestone generally located 30 to 50 feet below the surface to the northwest. The thickest portion of the formation is at the Hot Water Channel located 50 feet below the surface. No active faults with recent surface displacement have been located within a 200-mile radius of BFN. Existing topography in the vicinity of BFN ranges from 560 feet above mean sea level (amsl) to 680 feet amsl. The depth to groundwater beneath BFN has been measured at approximately 555 feet amsl.

Tuscumbia Limestone are carbonate rocks and can be susceptible to dissolution and potentially form springs or disappearing streams. Dissolution features in the Tuscumbia Limestone are typically sinkholes or vertically-oriented solution cavities. A subsurface geophysical investigation of the Tuscumbia Limestone in the area around the Low-Level Radwaste Storage Facility at the BFN was completed in 1980 and confirmed the absence of sinkholes or near surface cavities as referenced in the TVA Final Safety Analysis Report.

A survey was conducted in May 2018 to detect the presence of springs and seeps potentially occurring at BFN. None of the surface areas on BFN were identified as being connected to groundwater sources, including springs or seeps. Additionally, other

landforms associated with carbonate dissolution were not observed (Arcadis U.S., Inc. 2018).

3.3 Wetlands

BFN is located within the Interior Plateau ecoregion (Omernik 1987). Wetlands in this region are associated with riparian floodplains and bottomlands, low-lying, poorly drained areas, and the embayments and shorelines of reservoirs. Approximately two percent of the total land use / land cover in the region is comprised of wetlands (Loveland and Acevedo 2012).

The 2010 EA for replacement of CTs 1, 2, 5, 6 and construction of CT 7, which had a similar, but larger project area, found no impacts to wetlands. A desktop review of the Project Area was completed using United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) data, aerial photographs, and topographic maps (**Figure 3-1**) to confirm those findings. Today, small, scattered areas of wetland vegetation (*Typha latifolia*) are located along the margins of the CT cells within the Project Area; however, these areas are associated with the wastewater system at the BFN and are not considered jurisdictional Waters of the United States (WOTUS) subject to Clean Water Act (CWA) Section 404 permitting from the United States Army Corps of Engineers (USACE) and CWA Section 401 Water Quality Certification from ADEM.

3.4 Floodplains

Executive Order (EO) 11988 (Floodplain Management) stipulates that all proposed facilities must be located outside the limits of the 100-year floodplain for non-repetitive actions unless alternatives are evaluated that either would identify a better option or support and document a determination of “no practicable alternative” to siting within the floodplain. Based on 2018 Limestone County, Alabama, Flood Insurance Rate Maps 01083C0235F, 1079C0155D, and 01083C0255F, the Project Area within BFN is not located in the Tennessee River 100-year floodplain.

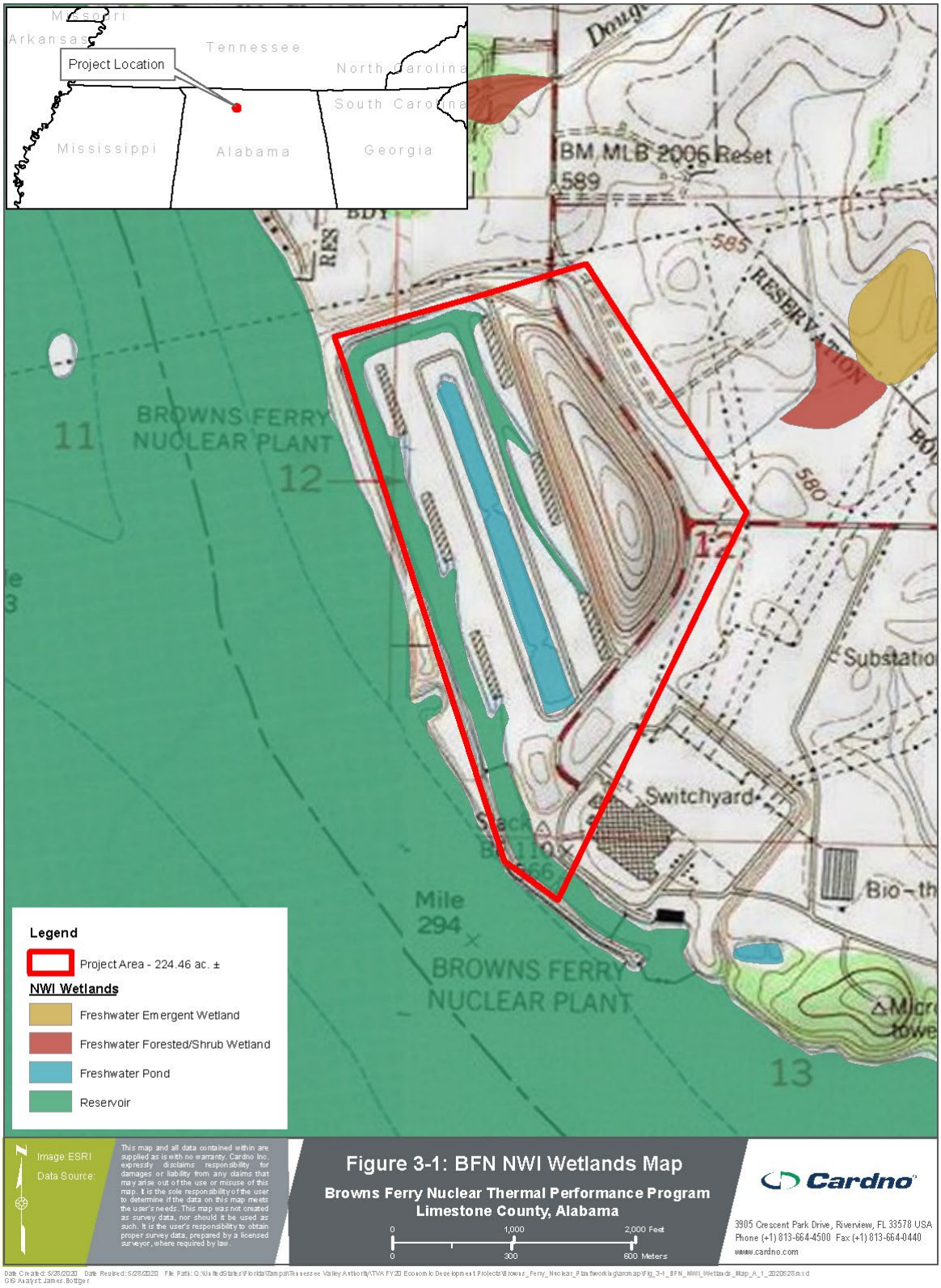

Figure 3-1. USGS Quadrangle and NWI Data

3.5 Soil Erosion and Surface Water

Soil erosion is a natural process where surface soils are worn away, typically by wind or water. Factors that influence the erosion potential of soil include gradation (distribution of soil particles), vegetation cover, length and percent of slope, rainfall, and wind intensity. Soils on steep, long slopes are more susceptible to water erosion than those on short slopes because the steeper slopes accelerate the flow of surface runoff. Erosion causes loss in soil structure, organic matter, and nutrients, all of which contribute to healthy plant growth and ecosystem stability.

BFN is located within the Upper Lake Wheeler ten digit Hydrologic Unit Code (HUC) (0603000211) watershed, which includes the Wheeler Reservoir. The Wheeler Reservoir impoundment consists of 67,100 acres of surface area when at full capacity. Surface waters present in the Project Area include the CT cool and warm water channels; however, these waters are not considered jurisdictional WOTUS subject to CWA Section 404 permitting from the USACE and CWA Section 401 Water Quality Certification from ADEM. Designations and classifications for the surface waters in the vicinity of BFN are listed in **Table 3-1** (ADEM 2017).

Table 3-1
Designations for Surface Waters in the Vicinity of the BFN

	Public Water Supply	Swimming and Other Sports	Shellfish Harvesting	Fish and Wildlife	Limited Warmwater Fishery	Agricultural and Industrial Water Supply	Outstanding Alabama Water
Tennessee River / Wheeler Reservoir	--	Yes	--	Yes	--	--	--
Tennessee River Unnamed Tributaries	--	--	--	Yes	--	--	--

Precipitation in the vicinity of BFN averages 58.4 inches per year, with the greatest precipitation occurring in January (5.31 average inches annually) and least precipitation occurring in August (3.11 average inches annually). Stream flow varies depending upon rainfall, but annual runoff averages 24.57 inches per year, or approximately 1.81 cubic feet per second, per square mile of drainage area (USGS 2008).

Under the CWA, all states are required to identify waters of the state with insufficient pollution controls necessary to attain or maintain applicable water quality standards. States are also required to establish priorities for the development of limits based on the severity of pollution and sensitivity of the established uses of those waters. States are to submit reports of identified noncompliant waters to the USEPA. The 303(d) list is a listing of impaired and threatened surface waters identified by the state that do not meet water quality standards for given parameters. The portion of the Wheeler Reservoir / Tennessee River adjacent to BFN is currently listed on the Alabama 303(d) list for impairment of

nutrients due to agriculture activities and perflouorooctanesulfonic acid due to industrial activities (ADEM 2020).

The 2010 Final EA includes a description of the hydrothermal effects on water quality associated with several CT configurations from the original finding in the 2002 Final SEIS. Results of the Final SEIS analyses indicated that as long as TVA complied with the thermal limits in the plant NPDES permit (**Table 3-2**), then none of the CT alternatives were found likely to have any significant adverse impacts on Wheeler Reservoir. Maintaining compliance with regulatory requirements included not only appropriate operation of the CT, but also implementation of unit derates (TVA 2010).

The updated hydrothermal model results were included in the 2010 Final EA with the determination that the additional CT and updates to several of the CTs were found to reduce the amount of summer 2010 waste heat released to the Wheeler Reservoir, reduced the need to derate, and would reduce the overall summer average diffuser discharge temperature (TVA 2010). While the model was not reproduced for this assessment, it is assumed that these findings remain valid.

Table 3-2.
BFN NPDES Thermal Limits

Parameter	Period	NPDES Limit
Downstream River Temperature	Rolling 24-hour average	90°F
Downstream River Temperature	Rolling 1-hour average	93°F
River Temperature Rise	Rolling 24-hour average	10°F

Notes
1. Temperatures are measured by monitors upstream and downstream of the plant.
2. The limit for the 1-hour average temperature (93°F) applies at any one of the downstream temperature monitors.
3. The downstream 24-hour average temperature may exceed 90°F if the upstream 24-hour average temperature exceeds 90°F; however, in these situations, the downstream 24-hour average temperature may not exceed the upstream 24-hour average temperature.

Thermal impacts refer to the changes in water temperature and other water quality parameters of the Wheeler Reservoir / Tennessee River as a result of the power uprates at BFN. Previous studies of the thermal impacts due to the proposed power uprates of the BFN units are included in TVA (2003), TVA (2004) and TVA (2015). To predict the impact of additional heat, hydrothermal model simulations were updated from those performed for the 2003, 2004 and 2015 studies. The evaluations summarized below incorporate observations from three recent years containing warm and dry meteorology and river temperatures (2010), normal meteorology and river temperatures (2016), and wet meteorology (2018) and planned future changes in the BFN CTs.

BFN utilizes a once-through condenser circulating water system to dissipate waste heat from steam turbines. The water is withdrawn from the Wheeler Reservoir / Tennessee River by an intake structure at approximate Tennessee River Mile (TRM) 294.3, and returned to the river through submerged diffusers located on the bottom of the river at approximate TRM 294.0. The diffusers are designed to mix the BFN thermal effluent with the water in the river by discharging the effluent through thousands of small outlet ports provided in the diffuser pipes. In terms of thermal impacts on the Wheeler Reservoir / Tennessee River, operation of the circulating water system is regulated by the state of Alabama under NPDES permit number AL0022080 (ADEM, 2018). The permit specifies that the river

ambient temperature is to be measured by an upstream monitor located at approximate TRM 297.8, and that impacts relative to the ambient will be measured by three downstream monitors located at approximate TRM 293.5. The upstream monitor is approximately 3.8 miles upstream of the diffusers and the downstream monitors are located near the end of a mixing zone, which extends 2,400 feet (0.45 miles) below the diffusers. The current NPDES permit specifies that at the downstream end of the mixing zone, the operation of BFN will not cause:

- The measured 1-hour average temperature to exceed 93°F
- The measured daily average temperature to exceed 90°F
- The measured daily average temperature rise (relative to ambient) to exceed 10°F

The most efficient manner of operating BFN is open mode, wherein the circulating water is routed directly from the condensers to the Wheeler Reservoir / Tennessee River. When BFN operating conditions create river temperatures nearing or exceeding one or more of the NPDES limits, BFN is shifted from open mode operation to helper mode operation, wherein the condenser circulating water from one or more units is treated (cooled) by CTs before it is released to the river. The amount of water treated by the CTs depends on the amount of cooling needed for the plant to remain within compliance of the NPDES limits. The three units can be placed in helper mode individually or collectively (i.e., one, two, or all three units). Although the current CTs have enough designed capacity to treat all of the condenser circulating water flowing through BFN, the actual capacity is not sufficient to do so due to the inability of CT 7 to utilize all four lift pumps and the degraded conditions of CTLPs on Towers 1 through 6. As a result, operating conditions can still occur wherein treatment by all of the CTs is insufficient to prevent an exceedance of an NPDES limit. In such cases, BFN can reduce the thermal power of one or more of the nuclear units to maintain regulatory compliance. A thermal downpower, in turn, results in a reduction, or derate, in the plant electric power generation.

3.6 Aquatic Ecology

3.6.1 General Aquatic Habitat and Fauna

TVA monitors ecological conditions at 69 sites at 31 reservoirs on a two-year cycle. The health ratings are based on dissolved oxygen, chlorophyll, fish, bottom dwellers, and sediment. In 2017, Wheeler Reservoir rated “Fair”. The average rating for Wheeler Reservoir (1994 to 2017) is “Fair”. The only surface waters present in the Project Area are the CT cool and warm water channels. These surface waters do not provided suitable or preferred habitat for aquatic organisms.

3.6.2 Aquatic Threatened and Endangered Species

Nine federally protected and state-listed aquatic species were identified within the Upper Lake Wheeler ten digit HUC (0603000211) watershed through the TVA Regional Natural Heritage database and the USFWS Information for Planning and Consultation (IPaC) database as summarized in **Table 3-3**. Freshwater mussels listed as historical (greater than 25 years old) suggests these species are very rare or no longer occur in the area.

Table 3-3.

Records of Federal and State-listed Aquatic Animal Species from within the Upper Lake Wheeler Watershed and / or IPaC.[1]

Common Name	Scientific Name	Rank [2]	Federal Status [3]	State Status [3]	State Rank [4]
Fish					
Slackwater Darter	*Etheostoma boschungi*	E	LT	SP	S1
Spring Pygmy Sunfish	*Elassoma alabamae*	E	LT	SP	S1
Tuscumbia Darter	*Etheostoma tuscumbia*	E	--	SP	S2
Mussels					
Hickorynut	*Obovaria olivaria*	H	--	PSM	SX
Kidneyshell	*Ptychobranchus fasciolaris*	H	--	PSM	S2
Mucket	*Actinonaias ligamentina*	E	--	PSM	S2
Ohio Pigtoe	*Pleurobema cordatum*	H	--	PSM	S2
Orange-foot Pimpleback	*Plethobasus cooperianus*	H	LE	SP	SX
Painted Creekshell	*Villosa taeniata*	H	--	PSM	S2
Pink Mucket	*Lampsilis abrupta*	E	LE	SP	S1
Pink Papershell	*Potamilus ohiensis*	E	--	PSM	S3
Pocketbook	*Lampsilis ovata*	E	--	PSM	S2
Purple Lilliput	*Toxolasma lividus*	E	--	PSM	S2
Rough Pigtoe	*Pleurobema plenum*	E	LE	SP	S1
Sheepnose	*Plethobasus cyphyus*	E	LE	SP	S1
Snuffbox Mussel[5]	*Epioblasma triquetra*	--	LE	PSM	S1
Spectaclecase	*Cumberlandia monodonta*	E	LE	SP	S1
Tennessee Pigtoe	*Fusconaia barnesiana*	E	--	PSM	S1
White Heelsplitter	*Lasmigona complanata*	H	--	PSM	S2
Snails					
Slender Campeloma	*Campeloma decampi*	E	LE	SP,P1	S1

1 - Source: TVA Natural Heritage Database and/or IPaC, queried on 1/31/2020
2 - Element Rank: E = Extant; H = Historical; Element occurrence is greater than 25 years old.
3 - Status Codes: LE = Listed Endangered; LT = Listed Threatened; SP = State protected; PSM = Protected State Mussel.
4 - State Rank: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; SX = Presumed Extirpated

3.7 Terrestrial Zoology

3.7.1 General Terrestrial Wildlife

The Project Area within BFN is industrialized, consisting primarily of existing buildings and structures, parking areas, roads, cool and warm water channels, and maintained grasses. Scattered trees are located throughout the Project Area and a small forested area is located near the center of the Project Area. Common mammals, birds, and reptiles have been observed using parts of buildings abandoned or used infrequently by humans. Several species of bats commonly found in this region may roost in abandoned, dark, or quiet areas of structures including big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), southeastern bat (*Myotis austroriparius*), and tricolored bat (*Perimyotis subflavus*) (Harvey 1992). Migratory birds may also roost in buildings or infrequently used areas of buildings.

Birds that have been observed nesting or roosting in TVA buildings and structures include American robin (*Turdus migratorius*), barn swallow (*Hirundo rustica*), Carolina wren (*Thryothorus ludovicianus*), mourning dove (*Zanaida macroura*), northern mocking bird (*Mimus polyglottos*), osprey (*Pandion haliaetus*), and rock dove (*Columba livia*). Other mammals and reptiles that may opportunistically use human structures include black rat (*Rattus rattus*), black rat snake (*Pantherophis obsoletus*), deer mouse (*Peromyscus maniculatus*), eastern gray squirrel (*Sciurus carolinensis*), house mouse (*Mus musculus*), northern raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*).

Review of the TVA Regional Natural Heritage database on did not identify any known cave records within 3.0 miles of the Project Area. No caves were found within the Project Area during a February 2020 field review of the site. Therefore, no suitable winter roosting habitat for bat species occurs within the Project Area.

Review of the USFWS IPaC database (USFWS 2020) identified 13 migratory birds of conservation concern (bald eagle (*Haliaeetus leucocephalus*), blue-winged warbler (*Vermivora cyanoptera*), golden eagle (*Aquila chrysaetos*), Henslow's sparrow (*Ammodramus henslowii*), Kentucky warbler (*Geothlypis formosa*), king rail (*Rallus elegans*), Le Conte's sparrow (*Ammodramus leconteii*), lesser yellowlegs (*Tringa flavipes*), prairie warbler (*Setophaga discolor*), red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), semipalmated sandpiper (*Calidris pusilla*), and wood thrush (*Hylocichla mustelina*)) that have the potential to occur in the Project Area. Bald eagles are addressed in detail in Section 3.7.2. Suitable habitat for these species exists within and adjacent to the Project Area. No records of a colonial wading bird colonies are known within 3.0 miles of the Project Area. The nearest record of a colonial wading bird colony is approximately 2.4 miles from the Project Area. The nearest record of osprey is a record of a nest located 930 feet from the Project Area. However, this nest was not found during the February 2020 field review. Additionally, no migratory birds of conservation concern were documented within the Project Area during the field review.

3.7.2 Threatened and Endangered Terrestrial Species

A review of threatened and endangered terrestrial species records in the TVA Regional Natural Heritage Database in February 2020 identified one state-listed species (osprey) and one federally listed species (gray bat [*Myotis grisescens*]) within 3.0 miles of the Project Area. Additionally, one federally protected species (bald eagle) has been identified within Limestone County, Alabama. Though no known records currently exist, the USFWS has determined that the federally listed Indiana bat (*Myotis sodalis*) and northern long-eared bat (NLEB) (*Myotis septentrionalis*) have the potential to occur in Limestone County, Alabama. **Table 3-4** lists the federal and state-listed terrestrial species reported from Limestone County, Alabama and documented within 3.0 miles of the Project Area.

Table 3-4.

Federal and State-Listed Terrestrial Species Reported from Limestone County, Alabama and Other Species of Conservation Concern Documented within 3 miles of the BFN

Common Name	Scientific Name	Status[2]	
		Federal	State(Rank[3])
Birds			
Bald eagle[4]	*Haliaeetus leucocephalus*	DM	SP(S4B)
Osprey	*Pandion haliaetus*	--	SP(S4)
Mammals			
Gray bat[4]	*Myotis grisescens*	LE	SP(S2)
Indiana bat[5]	*Myotis sodalis*	LE	SP(S2)
Northern long-eared bat[5]	*Myotis septentrionalis*	LT	SP(S2)

1 - Source: TVA Regional Natural Heritage Database, extracted 2/12/2020 and USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), accessed 2/12/2020.

2 - Status Codes: DM = Delisted, recovered, and monitored; LE = Listed Endangered; LT = Listed Threatened; SP = State Protected.

3 - State Ranks: S#B = State Breeding Rank; S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable.

4 - Federally listed species that have been recorded in Limestone, Alabama, but not within 3.0 miles of the Project Area.

5 - Federally listed species with the potential to occur in Limestone County, Alabama though no known records currently exist.

Osprey can be found near lakes, rivers and on seacoasts. Osprey establish nests near water. Nests are built in trees, on sheds, poles, docks, and special platforms (National Geographic 2002). The nearest record of osprey is a nest record that occurs approximately 930 feet from the Project Area. During the field review in February 2020, this nest was not found at the recorded location. An inactive osprey nest was documented approximately 1,350 feet from the Project Area. Suitable foraging habitat for osprey exists in and above the cool and warm water channels within the Project Area. Additional foraging habitat for osprey exists adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013). This species is associated with large, mature trees capable of supporting large nests. Bald eagle nests are typically located near larger waterways where eagles forage (Turcotte and Watts 1999). The nearest bald eagle record is a nest that is approximately 6.0 miles from the Project Area. During the field review in February 2020, no bald eagles or nests were documented within 660 feet of the Project Area. Suitable foraging habitat for bald eagle exists in the cool and warm water channels within the Project Area. Additional foraging habitat for bald eagle exists adjacent to the Project Area in the Wheeler Reservoir / Tennessee River.

Gray bats inhabit caves throughout the year, migrating among different caves across seasons (Brady et al. 1982, Tuttle 1976). During summer months, bats disperse from colonies at dusk to forage for insects over streams, rivers, and reservoirs (Harvey 1992). The nearest record of a gray bat is a historical record from a cave that is approximately 9.5 miles from the Project Area. No known cave records exist within 3.0 miles of the Project Area. During the field review in February 2020, no caves or structures providing suitable winter roosting habitat for gray bat were documented in the Project Area. The CTs proposed for demolition or modification under the Action Alternative provide minimal to no protection from temperature changes or weather events. Additionally, the current use of the

CTs would discourage use by gray bats. Foraging habitat for gray bats exists in and above the cool and warm water channels within the Project Area. Additional foraging habitat for gray bat exists adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River.

Indiana bats hibernate in caves during winter months and inhabit forest areas around these caves for swarming (mating) in the fall and staging in spring months, prior to migration to summer habitat. During summer months, Indiana bats roost under exfoliating bark, and within cracks and crevices of trees in mature forests with an open understory, often near sources of water. Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years (Pruitt and TeWinkel 2007, Kurta et al. 2002, USFWS 2017). The nearest known record of Indiana bat is a historical record from a cave that is approximately 9.5 miles from the Project Area. No known cave records exist within 3.0 miles of the Project Area. During the field review in February 2020, no caves or structures providing suitable winter roosting habitat were documented in the Project Area. The CTs proposed for demolition or modification under the Action Alternative are composed primarily of metal and offer minimal to no protection from temperature changes or weather events. Additionally, the current use of the CTs would discourage use by Indiana bat. Foraging habitat for Indiana bat exists in and above the cool and warm water channels as well as above and along the forested area within the Project Area. Additional foraging habitat for Indiana bat exists adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River.

The NLEB predominantly overwinters in large hibernacula such as caves, abandoned mines, and cave-like structures. During the fall and spring months, the species utilizes entrances of caves and the surrounding forested areas for swarming and staging. In the summer months, NLEBs roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. Roost selection by NLEBs is similar to Indiana bat; however NLEBs are more opportunistic in roost site selection. The species is also known to roost in abandoned buildings and under bridges. NLEBs emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (Harvey et al. 2011; USFWS 2014; USFWS 2017). There are no known records of NLEBs from Limestone County, Alabama. No known cave records exist within 3.0 miles of the Project Area. During the field review in February 2020, no caves or structures providing suitable winter roosting habitat were documented in the Project Area. The CTs proposed for demolition or modification under the Action Alternative are composed primarily of metal and offer minimal to no protection from temperature changes or weather events. Additionally, the current use of the CTs would discourage use by NLEB. Foraging habitat for NLEB exists in and above the cool and warm water channels as well as above and along the forested area within the Project Area. Additional foraging habitat for NLEBs exists adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River.

3.8 Botany

3.8.1 Vegetation

The BFN site has been heavily disturbed by construction, maintenance, and operation of the facility. As a result of the alteration of the physical landscape, no portion of the Project Area supports natural plant communities. Much of the Project Area is non-vegetated,

although some areas do contain early successional vegetation dominated by non-native herbaceous vegetation. These areas are regularly mowed or treated with herbicide to control vegetation and facilitate maintenance and operation of the facility. No areas within the Project Areas contain unique or important vegetative habitats.

3.8.2 Threatened and Endangered Plants

A review of the TVA Regional Natural Heritage Database indicated that no federal or state-listed plant species have been previously reported within 5.0 miles of the Project Area. No federally listed plant species have been previously reported from Limestone County, Alabama. A desktop review indicated that no habitat for federal or state-listed plant species occurs in the Project Area. Additionally, no designated critical habitat for plant species occurs in the Project Area.

3.9 Archaeology and Historic Sites and Structures

Federal agencies are required by the National Historic Preservation Act (NHPA) and by NEPA to consider the possible effects of actions on historic properties. This applies to any project, activity, or program that is funded under the direct or indirect jurisdiction of a federal agency or is licensed, permitted, or assisted by a federal agency. An agency may fulfill its statutory obligations under NEPA by following the process outlined in the regulations implementing Section 106 of NHPA, at 36 CFR Part 800. Under these regulations, considering the possible effects on historic properties by an action is accomplished through a four-step review process:

- Initiation - Defining the action and the area of potential effects (APE), and identifying the consulting parties
- Identification - Studies to determine whether cultural resources are present in the APE and whether the resources qualify as historic properties
- Assessment of adverse effects - Determining whether the action would damage the qualities that make the property eligible for the National Register of Historic Places (NRHP)
- Resolution of adverse effects – Implementation of avoidance, minimization, or mitigation measures

Throughout the four-step review process, the agency must consult with the appropriate State Historic Preservation Officer (SHPO), federally-recognized Indian tribes that have an interest in the action, and any other party with a vested interest in the action.

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, and locations of important historic events that lack material evidence of those events. Cultural resources that are included or considered eligible for inclusion in the NRHP maintained by the National Park Service are considered historic properties. To be included or considered eligible for inclusion in the NRHP, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association. In addition, the cultural resource must also meet one of four criteria:

- Association with important historical events

- Association with the lives of significant historic persons
- Having distinctive characteristics of a type, period, or method of construction, or representing the work of a master, or having high artistic value
- Having yielded or having the potential to yield information important in history or prehistory

An action may have effects on a historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the National Register. However, if the agency determines (in consultation) that the effect of an action on a historic property within the 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 Part 60.4), the effect is considered to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting structures within the viewshed of a historic building in such a way as to diminish the integrity of feeling or setting of the structure. Federal agencies are required to resolve the adverse effects of their actions on historic properties. Resolution may consist of avoidance (such as choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with SHPOs, tribes, and others throughout the Section 106 process and to document adverse effects to historic properties resulting from agency actions.

3.9.1 Area of Potential Effect (APE)

An APE is defined at 36 CFR Part 800.16(d), as “the geographic area or areas within which an action may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.” The APE considered for this EA consists of the areas where ground-disturbing activities would take place (gate, vacuum breaker pit, cooling tower footprints for CT 1, CT 2, and CT 7, equipment and material laydown yard, and spoils area), and areas within a one-half mile radius of the proposed replacement CTs that would have unobstructed views to the new CTs. The area of ground-disturbing activities is referred to as the Project boundaries; areas within which visual effects could occur is referred to as the Project viewshed.

3.9.2 Cultural Resources

TVA has conducted several archaeological surveys within BFN. In 2001, TVA conducted a Phase I survey for a BSN License Renewal project. This survey identified one archaeological site outside the APE for the BFN Thermal Performance Program (TPP) project. In 2013, TVA conducted archaeological surveys for two separate transmission line projects that included sections of transmission lines associated with BFN. Neither survey identified archaeological sites at BFN. In addition, TVA records and records at the Alabama Office of Archaeological Research do not indicate the presence of any archaeological sites within the Project Area boundary.

TVA has conducted a desktop review of the Project Area in development of this EA. The entire Project Area has been previously disturbed during the construction of the BFN and subsequent development activities. None of these areas retain the original soils that could have contained archaeological sites. TVA has therefore determined that no archaeological sites are located within the Project Area.

TVA has not performed a formal evaluation of the eligibility of BFN for inclusion in the NRHP as a historic architectural resource. In 2001, TVA consulted with the Alabama SHPO regarding the potential adverse visual effects of the then-proposed plant expansions. Neither TVA nor SHPO recommended that the expansion project would result in effects on BFN. Correspondence with the Alabama Historical Commission is provided in Appendix B (May 24, 2001 letter). In addition, the TVA 2002 Final Environmental Impact Statement for the BFN Operating License Renewal states that “an architectural survey was conducted within the visual APE of the proposed project area. No historic structures were identified.”

BFN meets minimum age criteria (a property achieving significance within the past 50 years) for inclusion in the NRHP, therefore BFN is potentially eligible for inclusion in the NRHP. However, no formal determination of eligibility has been made for BFN.

3.10 Noise

Noise is measured in logarithmic units of 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 the A-weighted decibel (dBA). A-scale weighting reflects the fact that a human ear hears poorly in the lower octave-bands and emphasizes the noise levels in the higher frequency bands received more efficiently by the ear and discounts the lower frequency bands.

The equivalent sound level is the constant sound level that conveys the same sound energy as the actual varying instantaneous sounds over a given period. It averages the fluctuating noise heard over a specific period as if it had been a steady sound. The day-night sound level (L_{dn}) is the 24-hour average noise level with a 10-dBA penalty between 10:00 p.m. and 7:00 a.m. to account for the fact that most people are more sensitive to noise while they are sleeping.

There are no federal, state, or local municipal noise standards, regulations, or ordinances applicable to the Action Alternative; however, USEPA (1974) guidelines recommend that L_{dn} not exceed 55 dBA. The United States Department of Housing and Urban Development (HUD) considers an L_{dn} of 65 dBA or less to be compatible with residential areas (HUD 1985). The USEPA protective noise guideline (USEPA 1974) recommends an average annual equivalent L_{dn} of 55 dBA to protect the health and well-being of the public with an adequate margin of safety. TVA uses the USEPA guideline of 55 dBA L_{dn} as a design goal, when feasible, if the nearest receptor is residential. For industrial and commercial areas, TVA uses the equivalent sound level (L_{eq}) of 60 dBA at the property line. In addition, TVA uses the Federal Interagency Committee on Noise (FICON 1992) recommendation that a three decibel increase in L_{dn} indicates possible impact and the need for further analysis when the background L_{dn} is 60 dBA or less.

BFN is located in a rural area along the north bank of Wheeler Reservoir, southwest of Athens and northwest of Decatur, Alabama. The only noise source of significance from BFN

that can periodically be heard off-site is from the CTs, which operate most frequently during the summer months. The nearest sensitive noise receptors to the Project Area are residences in the Paradise Shores community located within approximately 0.1 to 0.5 miles north of the Project Area along Douglas Drive and Paradise Shores Drive. These residences are in close proximity of the CT area and most likely to be sensitive to construction and operation noise. Additional residences are located to the southeast of the Project Area along Hawkins Drive, Vandergrift Drive, Davenport Drive, Lookingbill Lane, and James Drive; these residences range from within 0.8 to 1.7 miles of the Project Area. These residences are more than a mile from the nearest CTs and there is a small hill and the main plant in between the residences and the CTs. Because of the physical configuration and the lack of favorable conditions for sound propagation in this direction, this residential area is not considered sensitive to environmental noise. There are also residences located directly across from BFN in the Lakeview Community along the south bank of Wheeler Reservoir; the nearest of these residences is approximately 1.4 miles from the Project Area. Although these residences are more than a mile from the Project Area, they could be sensitive to noise because the open pathway across water is favorable to sound propagation. However, CT noise has not been audible during previous environmental sound pressure level assessments conducted at the Lakeview Community.

Previous environmental sound pressure level assessments have been performed for BFN, the most recent of which was performed in 2012 at the location of the nearest residence in the Paradise Shores Community. The 2012 assessment found that background noise levels without CT operation was 59.7 dBA, and that the noise levels with operation of six of the seven CTs was 61.9 dBA, an increase of 2.2 dBA. TVA compared this level with the FICON recommendation that a 3-dBA increase in noise indicates a possible impact and the need for further analysis. Based on this criteria, TVA determined that although the measured background noise level without operation of the CTs exceeded the 55 dBA guideline for residential areas, the 2.2 dBA noise level increase emitted by operation of the CTs is acceptable.

3.11 Solid and Hazardous Waste and Hazardous Materials

Operation and construction at BFN generates the following four categories of non-radiological waste streams (TVA 2017 – Supplemental Environmental Report):

- General plant solid waste consisting of paper, cardboard, wood, metals, and garbage
- Recycled solid waste such as office paper, cardboard, wood pallets, scrap metal, aluminum cans, plastic bottles, and batteries
- Construction and demolition debris associated with site activities
- Universal Waste and Hazardous Waste as defined under the Resource Conservation and Recovery Act (RCRA)

3.11.1 Solid Waste

Operation and construction at BFN generates municipal solid waste that consists of food waste, plastic film, paper waste, and food product packaging waste. Solid wastes generated in conjunction with operation of BFN are managed in accordance with applicable state and federal environmental regulations, and disposed in approved and licensed disposal

facilities. General municipal solid waste is collected as part of routine operation activities at BFN. Waste material is collected in dumpsters and transported to a licensed landfill permitted to accept waste materials. Solid waste generation rates for BFN are approximately 1.6 tons per day (TVA 2017 – Supplemental Environmental Report).

3.11.2 Recycled Solid Waste

The BFN has an active recycling program that segregates and recycles scrap metal, cardboard, office paper, wood pallets, aluminum cans, plastic bottles, and batteries. The segregated materials are accepted for recycling by TVA-approved waste treatment and disposal facilities (TVA 2017 – Supplemental Environmental Report).

3.11.3 Construction and Demolition Solid Waste

BFN contracts with local solid waste haulers to dispose of construction and demolition solid waste in permitted local landfills. These waste include material produced directly or incidentally by construction and demolition at BFN such as scrap lumber, bricks, sandblast grit, crushed metal drums, glass, wiring, non-asbestos insulation, roofing materials, building siding, scrap metal, concrete with reinforcing steel, nails, wood, electrical wiring, rebar, bricks, concrete, excavated dirt, tree stumps, rubble, and similar construction and demolition wastes. BFN currently has in place the necessary contracts for proper disposal of construction and demolition wastes.

3.11.4 Hazardous Waste

BFN generates a variety of wastes that are classified as hazardous under RCRA. These wastes include paint-related materials, spent solvents used for cleaning and degreasing, spent batteries, and fluorescent light tubes. The majority of the hazardous wastes generated at the BFN are from spent solvents used in cleaning and degreasing activities and paint-related wastes from coating activities. In addition to these major waste streams, BFN generates universal waste such as spent batteries, fluorescent light bulbs, and used oil for recycling (TVA 2017 – Supplemental Environmental Report).

Hazardous wastes generated at BFN are managed through the TVA Direct Shipment Program with a licensed landfill (TVA 2017 – Supplemental Environmental). Hazardous waste generation rates for BFN from 2010 to 2014 are summarized in **Table 3-5**. BFN did not generate more than 2,200 pounds in any one month during the 2010 to 2014 period, therefore BFN is not considered a Large Quantity Generator.

Table 3-5.
Annual Hazardous Waste Generation for BFN for 2010 to 2014

Year	Hazardous Waste Generated at BFN (pounds)	RCRA Generator Status
2010	1,917	Small Quantity Generator
2011	3,179	Small Quantity Generator
2012	3,601	Small Quantity Generator
2013	4,343	Small Quantity Generator
2014	2,335	Small Quantity Generator

BFN generation rates for low level radioactive waste materials are approximately 30 to 40 cubic meters per month. Spent resins are packaged, de-watered and stored on-site in concrete storage modules, or shipped for burial in a licensed disposal facility. Dry active waste is collected within BFN, and transported to a waste processor for volume reduction and subsequent shipment to a licensed disposal facility. Irradiated non-fuel plant components are stored on-site or processed for shipment to a licensed disposal facility (TVA 2002a).

TVA operates a Hazardous Waste Storage Facility (HWSF) in Muscle Shoals, Alabama that holds a permit for temporary storage of hazardous wastes. The HWSF serves as a central collection point for TVA-generated hazardous wastes, and maintains contracts with waste treatment and disposal facilities. All hazardous waste generated at BFN is shipped to the HWSF for consolidation, storage, and disposal through approved and licensed facilities. BFN recycles paint solvents (primarily methyl ethyl ketone) using an on-site still.

3.12 Transportation

BFN is directly accessible from Shaw Road and Nuclear Plant Road. Shaw Road intersects U.S. Highway 72 approximately six miles north of the site. Nuclear Plant Road intersects U.S. Highway 31 approximately nine miles east of the site. U.S. Highway 31 intersects U.S. Highway 72 northeast of the site. Shaw Road and Nuclear Plant Road are two lane roads with level alignment, passing zones, and speed limits of 45 miles per hour (mph). Access into BFN is provided at the intersection of Shaw Road and Nuclear Plant Road. The large intersection and traffic light at the entrance allows for turning movements into and out of the plant. An additional access at the northeast corner of BFN is provided off Nuclear Plant Road. Once inside BFN, a network of existing roads provide access into and throughout the Project Area.

The workforce at BFN peaks during outages, which occur every 24 months (per unit) for approximately two months. Communities located along the county roads that provide access to BFN are also traffic generators in the area. **Figure 3-2** depicts the local road network in the area of BFN as well as roads within BFN that provide access to the Project Area. The most recent available Annual Average Daily Traffic (AADT) counts in close proximity to BFN indicate approximately 14,717 vehicles per day (vpd) on U.S. Highway 72 north of BFN and 13,280 vpd on U.S. Highway 31 south of U. S. Highway 72 (ALDOT 2018). There are no available traffic counts on Shaw Road and Nuclear Plant Road or along other county roads in the vicinity of BFN.

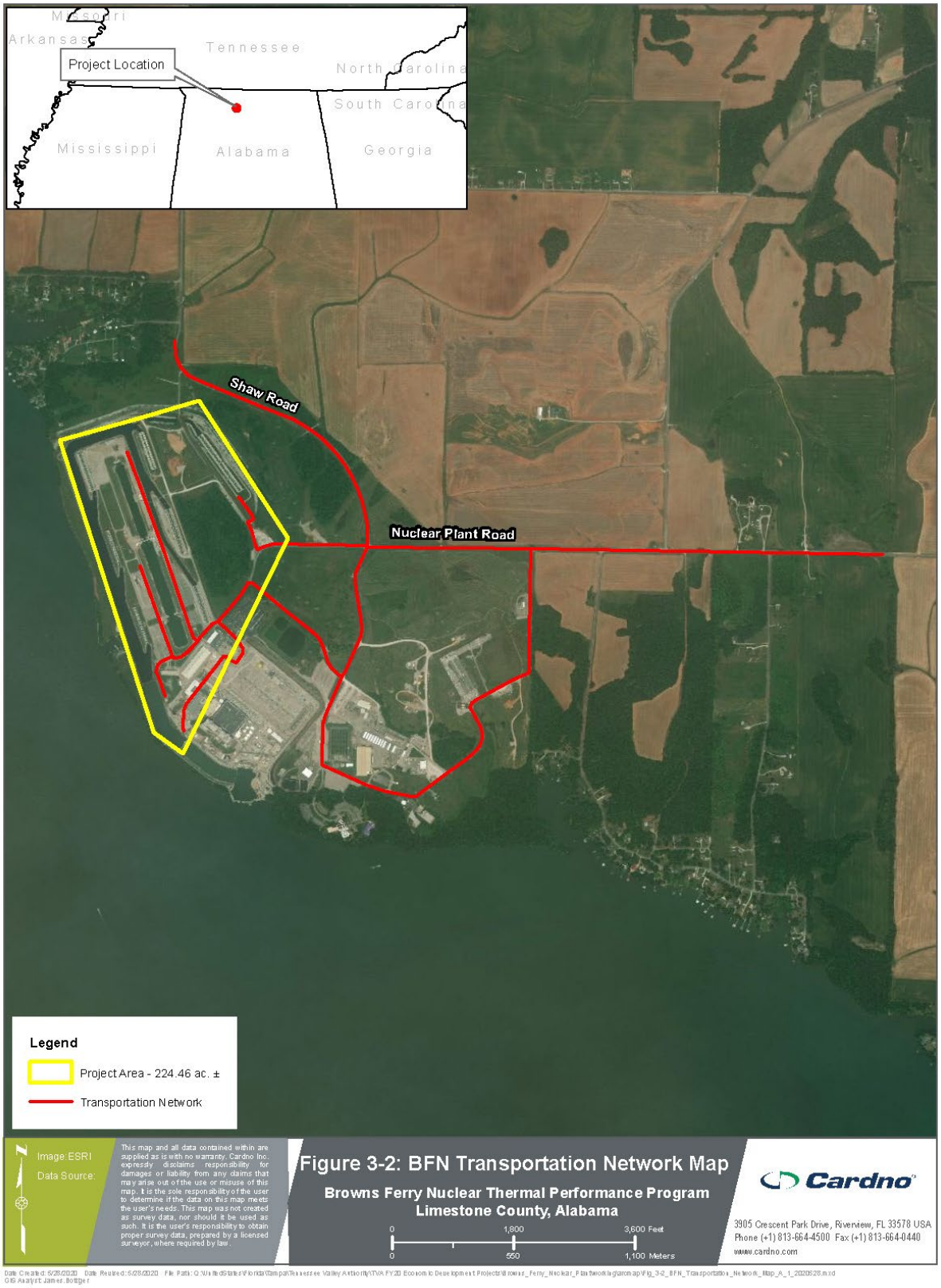

Figure 3-2. BFN Transportation Network

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental effects that could result from implementation of either of the No Action Alternative or the Action Alternative based on the information available for this analysis.

4.1 Air Quality and Climate Change

4.1.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no changes to the BFN operational effects on air quality or climate.

4.1.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. Impacts to air quality associated with construction activities under the Action Alternative include emissions from fossil fuel-fired equipment and vehicles and fugitive dust from ground disturbances. Fossil fuel-fired equipment and vehicles are a source of combustion emissions, including NO_X, CO, VOCs, SO_2, PM_{10}, $PM_{2.5}$, GHGs, and minimal amounts of HAPs. Emissions from fossil fuel-fired equipment and vehicles used during construction would be temporary and intermittent, and would fluctuate depending on the number and type of vehicles and equipment in use at any given period. Gasoline and diesel engines used during construction of the Action Alternative would comply with the USEPA mobile source regulations in 40 CFR Part 85 for on-road engines and 40 CFR Part 89 for non-road engines. These regulations are designed to minimize emissions and require a maximum sulfur content in diesel fuel of 15 parts per million (ppm).

Ground disturbance such as demolition, grading, excavation, and travel on unpaved roads associated with construction of the Action Alternative could generate localized fugitive dust in the Project Area and surrounding areas. To control fugitive dust during construction activities, TVA would comply with the ADEM Air Division Administrative Code Chapter 335-3-4, Control of Particulate Emissions and implement reasonable precautions and applicable BMPs.

With the use of BMPs and other required measures to reduce emissions and control fugitive dust associated with construction of the Action Alternative, air quality impacts would be minor, temporary, and localized; and would not be anticipated to result in violations of applicable ambient air quality standards or impact regional air quality. Following completion of the Action Alternative, operation at the BFN would result in no additional air emissions as compared to operations at the current permitted levels.

The amount of GHG emissions associated with the construction would be temporary and minor, and would not adversely affect global GHG levels. Additionally, substantial vegetation clearing is not proposed for the Action Alternative, and no reduction in carbon sequestration would result. Therefore, the Action Alternative would not result in impacts on climate change. Following completion of the CT replacements and associated upgrades,

operation at BFN would result in no additional GHG emissions as compared to operations at the current permitted levels.

4.2 Geology and Groundwater

4.2.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to geologic or groundwater resources.

4.2.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. Implementation of the Action Alternative would result in ground disturbance during construction activities, primarily during demolition of existing foundations and basins, construction of new foundations and basins, and modifications and upgrades to underground piping. However, ground disturbance would be minor, temporary, and localized and would not be at depths that would intersect public groundwater supplies (typically 50 to 150 feet beneath the land surface [USGS 1990]) or result in significant impacts to geologic and groundwater resources. Additionally, construction activities would not impact seeps or springs as none have been identified in the Project Area. Groundwater use is not proposed under the Action Alternative. Any discharges permitted under NPDES regulations would remain within those limitations (Arcadis U.S., Inc. 2018).

4.3 Wetlands

4.3.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to wetlands.

4.3.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. There are no wetlands in the Project area that are jurisdictional WOTUS. As such, the proposed construction activities would not be subject to CWA Section 404 permitting from the USACE and CWA Section 401 Water Quality Certification from ADEM. Therefore, similar to the No Action Alternative, the Action Alternative would result in no direct or indirect impacts to wetlands.

4.4 Floodplains

4.4.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impact on floodplains and their natural and beneficial values.

4.4.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The proposed construction activities would not take place in the Tennessee River 100-year floodplain. Therefore, similar to the No Action Alternative, the Action Alternative would be consistent with EO 11988 and the Action Alternative would have no direct or indirect impact on floodplains and associated natural and beneficial values.

4.5 Soil Erosion and Surface Water

4.5.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades or supporting facilities. No impacts to soils or surface water quality would occur as a result of construction activities; however, potentially beneficial thermal impacts associated with these upgrades would not be realized. Hydrothermal conditions at BFN would continue to meet NPDES thermal limitations over time, but derating would still be required to meet these limits.

4.5.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. Potential impacts related to implementation of the Action Alternative measures to minimize these potential impacts are discussed below.

Stormwater Runoff – Construction activities associated with the Action Alternative have the potential to affect surface waters through stormwater runoff. Soil erosion and sedimentation can impact surface water quality and aquatic organisms. TVA would conduct construction activities in compliance with applicable state and federal permit requirements. In Alabama, a disturbance of greater than one acre requires coverage under the 2016 NPDES General Permit for Discharges Associated with Construction Activity (ALR100000) along with the development and implementation of a site-specific CBMPP. The CBMPP would identify specific BMPs such as installation of sediment and erosion controls to be implemented during construction to minimize stormwater impacts. Relevant excerpts from the *Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas June 2003 (Revised March 2009)* for BMP details would also be appended to the CBMPP (ADEM 2009).

The majority of the proposed work would take place in and around the current intake channel, the discharge channel, and adjacent to the Wheeler Reservoir / Tennessee River. Activities that take place beneath the Ordinary High Water Mark (OHWM) in WOTUS requires a CWA Section 404 permit from the USACE (nationwide or individual permit) and a CWA Section 401 Water Quality Certification from ADEM. No work is proposed beneath the OHWM of WOTUS. If working in and around surface waters, appropriate buffer zones would be established as needed, and applicable BMPs would be implemented to minimize the suspension and mobilization of sediment. Applicable BMPs may include turbidity curtains, silt fences, and sediment traps. Proper implementation of these controls would limit temporary impacts to surface waters.

Domestic Sewage – Portable toilets would be provided for the construction workforce as needed. These portable toilets would be pumped out regularly, and the sewage would be transported by tanker truck to an appropriate wastewater treatment facility.

Equipment Washing and Dust Control – Water discharges from water-only cleaning of equipment and from dust control activities would be handled in accordance with applicable BMPs.

Hydrostatic Testing – Discharges associated with hydrostatic tests would be managed in accordance with the NPDES permit maintained for the BFN.

Chemical Management – All chemicals brought on site must be reviewed and approved under the site chemical traffic control process, and must be handled, used, stored, and disposed of in accordance with the Nuclear Chemical Traffic Control Program, NPG-SPP-05.4. Any chemical and petroleum spills are to be reported to the Shift Manager and contained immediately. The Integrated Pollution Prevention Plan (BFN-RWI-007 Rev 0023) contains guidance regarding spill management.

With implementation of applicable BMPs and compliance with applicable site procedures and plans in accord with state and federal permit requirements, impacts to surface waters resulting from construction activities under the Action Alternative would be minor, temporary, and localized. Following construction, operation at BFN would continue to implement the same methods of cooling water; however, different chemicals potentially used to treat or chlorinate water as part of the CT use may also be required. Such changes would be evaluated to ensure compliance with the BFN NPDES permit, effluent toxicity limits, and would be coordinated with ADEM and the site chemical traffic control program as required. No increases in flow are proposed as a part of the Action Alternative. The proposed replacement of CT 1 and CT 2 and the upgrades to overall pumping and electrical systems would allow for additional cooling capacity as well as reduction of the duration and number of derates at the facility during the summer months to maintain discharge temperature limits.

4.5.3 Action Alternative Hydrothermal Modeling

4.5.3.1 Hydrothermal Modeling Scenarios

To predict the impact of additional heat, hydrothermal model simulations were updated from those performed for the 2003, 2004 and 2015 studies. The computer simulations were limited to the evaluation of river temperature in the immediate vicinity of BFN as represented by the NPDES mixing zone.

The dissipation of waste heat from BFN is of greatest concern in the summer, when the largest potential exists for aquatic wildlife to become stressed by high water temperature. TVA has classified summer hydrothermal conditions for BFN based on the average June / July / August ambient water temperature, measured at BFN Environmental Data Station (EDS) No. 4 and average June / July / August river flow at Guntersville Dam. For the available period of record, from 1989 through 2019 (30 years), the long-term mean temperature and mean river flow are based on the summertime values for the entire 30 year period of record. Only summers in warm and dry conditions challenge the NPDES limits for river temperature. For the period of record, approximately 35.5 percent of years

are considered warm and dry. However, in the past 20 years, ten (50 percent) are considered warm and dry.

Two sets of meteorological and river temperature and flow data were used for the hydrothermal model simulations. Air temperatures measured at BFN met station, water temperatures measured at the primary BFN upstream temperature monitor (EDS Station No. 4) and river flows computed from measured releases from Guntersville and Wheeler dams were used to assemble input data sets for the three CT replacement scenarios (Base Plan, Option 1, and Option 2). Data from 2010 were used to simulate extreme warm / dry conditions; data from 2016 were used to simulate conditions closer to historical averages, and data from 2018 were used to simulate conditions in extreme wet years. For extreme warm and dry conditions, the 2010 data were repeated eight times, changing the year from 2010 to 2020 through 2027. For normal and wet conditions, 2016 and 2018 data, respectively, were similarly repeated. Leap years were accounted for by repeating the February 28 data from 2010 and 2018 for one day for 2020 and 2024 and removing the February 29 data from 2016 for 2021, 2022, 2023, 2025, 2026, and 2027.

There are three proposed schedules for replacing CT 1 and CT 2 between fiscal years 2021 and 2027:

- **Base Plan**
  - CT 1 removed from service and demolished in early FY2021
  - CT 7 removed from service early FY2021 for replacement of spray nozzles and other repairs needed to enable full four lift pump operation
  - New CT 1 constructed early to mid-2021
  - New CT 1 placed in service in June 2021 using existing lift pumps
  - Refurbished CT 7 placed in service in June 2021
  - CT 1 removed from service early FY2023 for replacement of lift pumps
  - CT 1 placed in service in June 2023 using new lift pumps
  - CT 2 removed from service and demolished in early FY2025
  - New CT 2 constructed early to mid-2025
  - New CT 2 placed in service in June 2025 using existing lift pumps
  - CT 2 removed from service early FY2027 for replacement of lift pumps
  - CT 2 placed in service in June 2027 using new lift pumps
- **Option 1**
  - CT 1 removed from service and demolished in early FY2021
  - CT 7 removed from service early FY2021 for replacement of spray nozzles and other repairs needed to enable full four lift pump operation
  - New CT 1 constructed early to mid-2021
  - New CT 1 placed in service in June 2021 using existing lift pumps
  - Refurbished CT 7 placed in service in June 2021
  - CT 1 removed from service early FY2022 for replacement of lift pumps
  - CT 1 placed in service in June 2022 using new lift pumps
  - CT 2 removed from service and demolished in early FY2024
  - New CT 2 constructed early to mid-2024

  - New CT 2 placed in service in June 2024 using existing lift pumps
  - CT 2 removed from service early FY2025 for replacement of lift pumps
  - CT 2 placed in service in June 2025 using new lift pumps
- **Option 2**
  - CT 1 removed from service and demolished in early FY2021
  - CT 7 removed from service early FY2021 for replacement of spray nozzles and other repairs needed to enable full four lift pump operation
  - New CT 1 constructed and new lift pumps installed early to mid-2021
  - New CT 1 placed in service in June 2021 using new lift pumps
  - Refurbished CT 7 placed in service in June 2021
  - CT 2 removed from service and demolished in early FY2024
  - New CT 2 constructed early to mid-2024
  - New CT 2 placed in service in June 2024 using existing lift pumps
  - CT 2 removed from service and demolished in early FY2023
  - New CT 2 constructed and new lift pumps installed early to mid-2023
  - CT 2 placed in service in June 2023 using new lift pumps

A detailed description of the hydrothermal model is provided in TVA (2005), however since that time, significant improvements have been made to the diffuser mixing computations. In general, the hydrothermal model progresses in time, computing the NPDES temperatures based on the ambient conditions of the Wheeler Reservoir / Tennessee River, the operating conditions of BFN, and meteorology. The hydrothermal model also computes the turbine backpressure for each unit, which also contains an operating limit. Depending on the computed temperatures verses the NPDES limits (or the computed backpressure verses the backpressure limit), the hydrothermal model determines whether or not helper mode operation is needed, and whether or not a derate is needed. In this process, it is important to note that the hydrothermal model examines operating conditions only one hour into the future. Furthermore, to maintain compliance, the hydrothermal model only considers changes in the operating conditions of BFN, not that of the Wheeler Reservoir / Tennessee River. In actuality, the TVA process for managing the river and thermal plants examines forecast conditions for up to a week or more into the future, allowing changes to be made days in advance to avert, defer, or reduce the need for helper mode operation and / or a derate. The process also allows changes in the operation of the Wheeler Reservoir / Tennessee River as well as changes in the operation of the BFN. The dynamics of the actual process for managing the Wheeler Reservoir / Tennessee River and BFN are too indefinite and complex to be captured in the hydrothermal model. For this reason, hydrothermal model results are considered to represent only a rough order of magnitude estimate of the potential bounding impacts of the unit uprates.

Hot and Dry Years

The hydrothermal model estimated that operation in a series of eight hot and dry years under the Base Plan CT upgrade and replacement schedule would result in total of 270,501,380 MWh of net generation over the eight-year period of 2020 through 2027, averaging 33,812,673 MWh per year. Derates under the Base Plan totaled 3,307,688 MWh

and averaged 413,461 MWh per year and the energy used to operate the CTs totaled 828,818 MWh and averaged 103,602 MWh per year. Of the total of 3,834 hours of reduced load over the eight years, 2,651 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 2,312,349 MWh while 1,183 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 995,339 MWh.

Under the Option 1 schedule, the net generation over the same eight years would be 270,667,756 MWh, for an average of 33,833,470 MWh per year. Derates under Option 1 totaled 3,133,724 MWh and averaged 391,716 MWh per year. The energy used to operate the CTs totaled 831,361 MWh and averaged 103,920 MWh per year. Of the total of 3,709 hours of reduced load over the eight years, 2,077 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 1,739,743 MWh while 1,632 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 1,393,981 MWh.

Under the Option 2 schedule, the net generation over eight warm/dry years would be 274,819,208 MWh, for an average of 34,352,401 MWh per year. Derates under Option 2 totaled 2,936,133 MWh and averaged 367,017 MWh per year. The energy used to operate the CTs totaled 838,781 MWh and averaged 104,848 MWh per year. Of the total of 3,528 hours of reduced load over the eight years, 1,891 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 160,874 MWh while 1,637 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 1,329,259 MWh.

Normal Years

The hydrothermal model estimated that operation in a series of eight normal years under the Base Plan tower upgrade and replacement schedule would result in total of 273,656,108 MWh of net generation over the eight-year period of 2020 through 2027, averaging 34,207,014 MWh per year. Derates under the Base Plan totaled 70,737 MWh and averaged 8842 MWh per year and the energy used to operate the CTs totaled 960,543 MWh and averaged 120,068 MWh per year. Of the total of 147 hours of reduced load over the eight years, 28 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 14,922 MWh while 119 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 55,815 MWh.

Under the Option 1 schedule, the net generation over the same eight years would be 273,666,656 MWh, for an average of 34,208,332 MWh per year. Derates under Option 1 totaled 60,315 MWh and averaged 7,539 MWh per year. The energy used to operate the CTs totaled 957,679 MWh and averaged 119,710 MWh per year. Of the total of 124 hours of reduced load over the eight years, 28 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 14,772 MWh while 96 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 45,543 MWh.

Under the Option 2 schedule, the net generation over the eight normal years would be 273,675,580 MWh, for an average of 34,209,448 MWh per year. Derates under Option 2 totaled 52,499 MWh and averaged 6562 MWh per year. The energy used to operate the

CTs totaled 954,437 MWh and averaged 119,305 MWh per year. Of the total of 103 hours of reduced load over the eight years, 28 hours were due to the 24-hour averaged downstream temperature limit of 90 °F, with derates totaling 14,872 MWh while 75 hours of reduced load were due to the 1-hour averaged downstream temperature limit of 93 °F with derates totaling 37,627 MWh.

Wet Years

None of the three options resulted in derates during a series of eight wet years. The total energy needed to operate the CTs under the Base Plan was 334,620 MWh, averaging 41,828 MWh per year. The total energy needed to operate the CTs under Option 1 was 335,247 MWh, averaging 41,906 MWh per year, and the total energy needed to operate the CTs under Option 2 was 33,2018 MWh, averaging 41,502 MWh per year.

Winter Operation

In addition to derates and CT usage in the summer months, all three schedules resulted in tower usage in the months between October and April due to the 24-hour averaged downstream temperature rise (Delta T) limit of 10 °F for the dry and normal years, indicating that some CTs will have to be kept in operable condition year-round and cold weather startups with air temperatures near or below the freezing point may be necessary. No winter CT operations was predicted for the wet years.

4.5.3.2 Hydrothermal Modeling Conclusions

If the eight years from 2020 through 2027 are all warmer and drier than average in the Option 1 CT replacement schedule, this could result in increased generation over the Base Plan schedule of 166,376 MWh for the eight years or an average of 20,797 MWh/year. The Option 2 CT replacement schedule could result in increased generation over the Base Plan schedule of 349,544 MWh for the eight years or an average of 43,693 MWh/year.

Under eight years of average conditions, the Option 1 CT replacement schedule offers a slight advantage over the Base Plan in net generation of 10,548 MWh for the eight years, averaging 1319 MWh/year. The Option 2 CT replacement schedule could result in increased generation over the Base Plan schedule of 19,472 MWh for the eight years or an average of 2434 MWh/year.

Under eight years of wet conditions, the Base Plan schedule provides a marginal advantage over the Option 1 CT replacement schedule in net generation of 1,824 MWh for the eight years, averaging 228 MWh/year. The Option 2 CT replacement schedule could result in increased generation over the Base Plan schedule of 792 MWh for the eight years or an average of 99 MWh/year.

Overall, with procedural updates to provide better operational protection for the limits of 93°F and 10 F°, the results of the hydrothermal modeling indicate that under the Action Alternative with a combination of helper mode and derates, BFN should be able to successfully operate in compliance with the NPDES limits for river temperature. Therefore, the Action Alternative would reduce thermal discharges from the facility and would result in minor, intermittent, localized beneficial impacts to water quality.

4.6 Aquatic Ecology

4.6.1 No Action Alternative

4.6.1.1 General Aquatic Habitat and Fauna

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to the aquatic ecology of Wheeler Reservoir / Tennessee River.

4.6.1.2 Aquatic Threatened and Endangered Species

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to aquatic threatened and endangered species.

4.6.2 Action Alternative

4.6.2.1 General Aquatic Habitat and Fauna

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The only waterbodies present in the Project Area are the cool and warm water channels that do not provide suitable or preferred habitat for aquatic species; therefore, the Action Alternative would not impact aquatic habitats. No work would occur in the Wheeler Reservoir / Tennessee River and applicable BMPs such as installation of sediment and erosion controls would be implemented. Construction activities would be performed in compliance with applicable stormwater permitting requirements to minimize impacts to nearby aquatic habitats. Therefore, no impacts to aquatic ecology within the Project Area or within Wheeler Reservoir / Tennessee River are anticipated to occur as a result of the Action Alternative.

4.6.2.2 Aquatic Threatened and Endangered Species

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The only waterbodies present in the Project Area are the cool and warm water channels that do not provide suitable or preferred habitat for aquatic species; therefore, the Action Alternative would not impact aquatic habitats suitable for threatened and endangered aquatic species. No work would occur in the Wheeler Reservoir / Tennessee River and applicable BMPs such as installation of sediment and erosion controls would be implemented. Construction activities would be performed in compliance with applicable stormwater permitting requirements to minimize impacts to nearby aquatic habitats. Therefore, no impacts to aquatic ecology within the Project Area or within Wheeler Reservoir / Tennessee River are anticipated to occur as a result of the Action Alternative.

4.7 Terrestrial Zoology

4.7.1 No Action Alternative

4.7.1.1 General Terrestrial Wildlife

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site

conditions would be maintained, resulting in no direct or indirect impacts to the terrestrial species or habitats.

4.7.1.2 Threatened and Endangered Terrestrial Species

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to threatened and endangered terrestrial species or associated habitats.

4.7.2 Action Alternative

4.7.2.1 General Terrestrial Wildlife

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The Action Alternative would take place in previously disturbed areas and minimal vegetation would be affected. The Action Alternative would not result in additional impacts to natural, previously-undisturbed habitats.

Construction activities may result in the displacement of common wildlife species currently using the Project Area, including nesting birds. Project activities will be performed in accordance with the Migratory Bird Treaty Act (e.g., construction timing restrictions or nest surveys) to avoid impacts to avian species. Direct impacts to immobile species may occur during construction. However, due to the minimal amount of suitable wildlife habitat present within the Project Area, impacts to species would be minor, temporary, and localized during implementation of the Action Alternative.

4.7.2.2 Threatened and Endangered Terrestrial Species

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The Action Alternative would take place in previously disturbed areas and minimal vegetation would be affected. The Action Alternative would not result in additional impacts to natural, previously-undisturbed habitats.

While no observations of ospreys or bald eagles or nests have been documented within the Project Area, suitable foraging habitat for these species exists in the cool and warm water channels and adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River. Applicable BMPs such as installation of sediment and erosion controls would be implemented and construction activities would be performed in compliance with applicable stormwater permitting requirements to minimize impacts to these foraging habitats. Consequently, neither bald eagles nor ospreys would be directly or indirectly impacted by the Action Alternative.

Suitable winter roosting habitat for gray bat, Indiana bat, and NLEB does not occur in the Project Area. Because tree clearing is not proposed as a part of the Action Alternative, no suitable summer roosting habitat for protected bat species would be impacted during construction activities. Neither modification nor removal of existing structures would impact suitable roosting habitat for these species. While suitable roosting habitat for gray bat, Indiana bat, and NLEB would not be impacted during construction activities, foraging habitat for these species exists in and above the cool and warm water channels within the Project Area and adjacent to the Project Area in and above the Wheeler Reservoir / Tennessee River. Applicable BMPs such as installation of sediment and erosion controls

would be implemented and construction activities would be performed in compliance with applicable stormwater permitting requirements to minimize impacts to these foraging habitats. Consequently, gray bat, Indiana bat, and NLEB would not be directly or indirectly impacted by the Action Alternative.

Activities associated with the Action Alternative were addressed in the TVA programmatic consultation (April 2018) with the USFWS on routine actions and federally listed bats in accordance with Endangered Species Act Section 7(a)(2). For those activities with potential to affect bats, TVA committed to implement specific Conservation Measures when direct and indirect impacts to federally-listed bat species are anticipated. Relevant conservation measures for the Action Alternative listed in the TVA Bat Strategy Project Screening Form (Attachment A) and would be reviewed and implemented as a precautionary measure as part of the Action Alternative.

4.8 Botany

4.8.1 No Action Alternative

4.8.1.1 Vegetation

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained, resulting in no direct or indirect impacts to vegetation at the BFN.

4.8.1.2 Threatened and Endangered Plants

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The No Action Alternative would have no impacts on the presence of threatened or endangered plant species.

4.8.2 Action Alternative

4.8.2.1 Vegetation

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The BFN site has been heavily disturbed by construction, maintenance, and operation of the facility. As a result of the alteration of the physical landscape, no portion of the Project Area supports natural plant communities. Much of the Project Area is non-vegetated, although some areas do contain early successional vegetation dominated by non-native herbaceous vegetation. The portions of the Project Areas that are temporarily disturbed during the Action Alternative would be returned to pre-construction conditions following completion of construction. As such, impacts to vegetation would be minor, temporary, and localized during implementation of the Action Alternative.

4.8.2.2 Threatened and Endangered Plants

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. No federal or state-listed plant species have been previously reported within 5.0 miles of the Project Area. The Action Alternative would have no impacts to threatened or endangered plant species.

4.9 Archaeology and Historic Sites and Structures

4.9.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades. The proposed actions would not occur and existing site conditions would be maintained.

4.9.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. There are no archaeological sites located within the Project Area, therefore, the Action Alternative would not result in impacts to archaeological resources.

In 2010, TVA consulted with the SHPO regarding the proposed CT replacements, which included the replacements of CT 1 and CT 2. TVA determined that the action would not result in visual effects at the BFN and the SHPO agreed with this assessment. Cultural resources correspondence is included in Attachment B.

TVA reconsidered the potential visual effects of proposed CT replacements in 2020. Several of the CTs have already been replaced, under the actions proposed in 2010. These replacements, and the proposed replacements of CT 1 and CT 2, would be similar in design, dimensions, and materials to the original CTs. As such, TVA has determined that the proposed CT replacements under the Action Alternative would not result in a potential adverse effect. The CT replacements would also have no impact on the potential NRHP eligibility of BFN because the CT replacements would not diminish the qualities that give significance to BFN and would not diminish the integrity of setting, association, or feeling of BFN. Therefore, TVA has determined that the Action Alternative would not result in an adverse impacts on BFN even if BFN were found to be eligible for inclusion in the NRHP.

4.10 Noise

4.10.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades and the BFN would continue to be operated under current conditions. The proposed construction activities would not occur and the existing noise levels would be maintained, resulting in no direct or indirect noise impacts.

4.10.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The potential for noise impacts from construction and operation of replacement and additional CTs was considered in the 2012 Supplemental EA, 2002 Final SEIS, and the 2010 Final EA. Under these reviews, it was determined that noise impacts resulting from construction and operation would be insignificant. The 2002 Final SEIS described the current noise environment as having changed since the plant was constructed, including growth in adjacent residential populations, an industrial park approximately 2.0 miles upstream and across the Tennessee River, and barge traffic. None of the alternatives in the 2002 Final SEIS demonstrated potential for adverse impacts to Lakeview Communities. Alternative 2C in the 2002 Final SEIS, the Enlarged Linear MDCT Option, was assessed as potentially resulting in noise impacts to the Paradise Shores

community. The 2002 Final SEIS stated that the use of low noise fans operating at reduced speeds would lower the total predicted noise at the Paradise Shores community under the preferred alternative to acceptable noise levels. Subsequent noise analysis conducted in 2012 indicated that background or baseline noise levels without operation of the CTs reach 59.7 dBA, which exceeds the USEPA 55 dBA for residential areas. However, the FICON guidelines at residences and exterior plant boundaries was met when the CTs were operating.

Noise impacts associated with construction activities under the Action Alternative would be primarily from construction equipment. Construction activities would involve operation of bulldozers, backhoes, front-end loaders, dump trucks, concrete trucks, cranes, compressor, generators, or similar equipment and machinery over the temporary duration of construction. The noise levels of construction equipment are temporary and intermittent, and fluctuate depending on the number and type of vehicles and equipment in use at a given period. Additionally, construction-related sound levels experienced by a noise sensitive receptor near construction activity would be a function of distance, other noise sources, and the presence and extent of vegetation, structures, and intervening topography between the noise source and receptor.

Some construction noise would be noticeable above background levels at times, but construction would occur during normal work hours over a relatively limited period. Additionally, TVA would implement applicable BMPs to minimize the amount and duration of noise generated during construction activities. The most significant noise levels during construction would occur during Modification Phase 1 during demolition, site preparation, and foundation work required for replacement of CT 1 and CT 2. This heavy construction phase would require the largest and most equipment to be in operation, but is anticipated to be completed in approximately eight months per CT. The subsequent construction phases would not require as large or as many pieces of equipment. Because the noise levels generated by construction activities would be intermittent and temporary in nature, typically conducted during daytime hours, and applicable BMPs would be implemented, noise impacts resulting from construction under the Action Alternative would be minor, temporary, and localized.

Under the Action Alternative, operation of the new CT 1 and CT 2 and upgraded CT 7 is not anticipated to result in significant noise-related impacts to nearby noise-sensitive receptors. The noise from CT operation would be abated as needed to meet FICON guidelines. TVA would conduct additional environmental sound pressure level assessments with all CTs running in July 2020 and following completion of the CT replacements (i.e., a single assessment after both CTs are replaced and are fully operational) to ensure that BFN noise levels continue to meet FICON guidelines. Additionally, TVA would continue to meet FICON guidelines by working with the CT vendor to ensure noise attenuating features, such as low-noise fans, lower speed fans, and sound attenuators are incorporated as required to meet the guidelines. If TVA finds that the resulting noise levels exceed the FICON guidelines, TVA would develop and implement additional acoustical mitigation, such as modifications to fans and motors or the installation of barriers. TVA would also continue to comply with Occupational Safety and Health Administration (OSHA) regulations to protect worker health onsite.

Given continued compliance with applicable noise guidelines and the commitment to monitor and mitigate noise effects, no noise-related impacts during operations are anticipated under the Action Alternative.

4.11 Solid and Hazardous Waste and Hazardous Materials

4.11.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades and BFN would continue to be operated under current conditions. Therefore, under the No Action Alternative, there would be no additional solid and hazardous waste and hazardous materials generated than is currently generated at BFN.

4.11.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. Demolition of existing CT 1 and CT 2, basins, and electrical distribution systems would include the removal of electrical equipment, fans and gear boxes, concrete mixture (transite) panels, and concrete CT basins, as well as mechanical demolition of remaining material. The estimated volume of material is 6,000 cubic feet plus 1,100 cubic feet of concrete per CT. All removed materials would be recycled if possible or disposed of at a licensed landfill.

Solid waste from clearing and excavation activities (e.g., vegetation, soil) would be collected and disposed of at designated areas within the BFN site boundary. Other nonhazardous construction wastes (e.g., wood waste, scrap metal, plastic, paper, glass) would be placed within TVA-provided containers near the work locations and managed by TVA as part of the existing BFN waste management procedures. Concrete and asphalt would be temporarily stored on site in TVA-provided containers and periodically transported off-site for disposal at a licensed landfill.

Hazardous wastes (e.g., used oils, paint supplies, solvents, and degreasers) generated during construction would be placed in suitable containers in designated hazardous waste storage areas and managed in accordance with BFN procedures and would be transported off-site for recycling or disposal in accordance with applicable state and federal regulations.

Neither the types nor amounts of hazardous waste generated during implementation of the Action Alternative are anticipated to be different from those routinely handled at BFN. Through adherence to existing TVA waste management procedures and general BMPs, the effect of the Action Alternative on solid and hazardous waste and hazardous materials generation and disposal would be minor, temporary, and localized.

4.12 Transportation

4.12.1 No Action Alternative

Under the No Action Alternative, TVA would neither replace CT 1 and CT 2 nor construct the proposed associated upgrades and BFN would continue to be operated under current conditions. The proposed construction activities would not occur and the existing traffic associated with operations at BFN would be unchanged, resulting in no direct or indirect impacts on the transportation networks in the vicinity of BFN.

4.12.2 Action Alternative

Under the Action Alternative, TVA would replace CT 1 and CT 2, as well as implement associated upgrades. The 2010 Final EA included an analysis of the effects on transportation from implementation of the Action Alternative (replacement of CT 1, CT 2, CT 5, and CT 6, and construction of the new CT 7). While it was determined that construction of the new CT 7 would result in minor to moderate adverse impacts on transportation, the subsequent replacement of CT 1, CT 2, CT 5, and CT 6 was projected to have minor effects on traffic over the temporary duration of construction. The 2010 Final EA determined that over the projected construction period, there would be a minor increase in the number of commuter vehicles and up to approximately 10 additional trucks per day in addition to traffic generated during scheduled outages and normal operations at BFN.

The Action Alternative would result in a minor, temporary, and localized increase in traffic over the temporary construction period. At the height of construction activities, there would be a minor increase in the number of commuter vehicles (approximately 78, based on 1.6 riders per vehicle) and up to approximately 10 construction-related truck deliveries per day. During the demolition phases of construction, an estimated 600 trucks per CT would be required to haul concrete and debris from BFN. These workers and trips would be in addition to traffic generated during scheduled outages. Both Shaw Road and Nuclear Plant Road provide site access and have capacity to support the increase in traffic during the construction period.

Following completion of the CT replacements and associated upgrades, there would be no increase in the traffic generated by normal operation at BFN. Consequently, the Action Alternative would not result in permanent impacts on the local transportation network in the vicinity of BFN.

4.13 Cumulative Impacts

Cumulative impacts are defined in the Regulations for Implementing the Procedural Provisions of the NEPA at 40 CFR § 1508.7 as follows:

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

The potential impacts resulting from the Action Alternative are discussed in Section 3.0. This section discusses the potential impacts from the Action Alternative in combination with and development or construction at nearby properties within the vicinity of the BFN.

A review of available online information from the ALDOT, Limestone County Government, the Limestone County Economic Development Agency (LCEDA), the North Alabama Industrial Development Association (NAIDA), the Economic Development Partnership of Alabama (EDPA), and the TVA Economic Development websites did not identify any properties that are proposed for development or are currently under development within one mile of BFN. Should a project in the vicinity of BFN occur in the future, the cumulative

impacts to resources would be required to be avoided, minimalized, or mitigated for in accordance to applicable federal, state, and local permit requirements.

Additional upgrades and outages are proposed and planned for BFN in the reasonably foreseeable future. These upgrades and outages will be coordinated by TVA to avoid or minimize cumulative impacts (e.g., increased traffic associated with concurrent upgrades or outages would be minimized through work scheduling or alternative traffic patterns). Unavoidable impacts associated with additional upgrades and outages will be mitigated for in accordance to applicable federal, state, and local permit requirements.

Based on the review of available information, there are no cumulative impacts associated with implementation of the Action Alternative.

4.14 Unavoidable Adverse Environmental Impacts

This section describes principal unavoidable adverse environmental impacts associated with the CT replacements and associated upgrades, for which mitigation measures are considered either impracticable, do not exist, or cannot entirely eliminate the impact. Based on the evaluation conducted for this EA, the Action Alternative would not result in unavoidable adverse environmental impacts.

4.15 Relationship of Short-Term Uses and Long-Term Productivity

One of the basic requirements of NEPA is to describe “the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.” 42 U.S.C. § 4332(2)(C)(iv). TVA has considered the following decision:

- To continue to operate the existing CT 1 and CT 2 at BFN without replacement or construction of the proposed associated upgrades
- To replace CT 1 and CT 2 and construct the proposed associated upgrade

With respect to this action, short-term is defined as the study period (2019-2038) evaluated in the TVA 2019 Integrated Resource Plan (which considers power generation needs), whereas long-term is defined as the period beyond the year 2038.

In the short-term, the CT replacements would reduce the gradual declining performance and degrading of CT 1 and CT 2 and costs associated with maintenance and repair of the degraded CTs if left in place. Additionally, the associated upgrades would enable CT 7 to support the operating design of all four CTLP in service simultaneously, and prevent operation from being limited to only three of the four CTLPs. Therefore, the replacement of the CTs and associated upgrades would result in a long-term increases in electric power generation and cost-savings benefit to TVA and its customers. The short-term uses result in increases in long-term efficiency and productivity at BFN.

4.16 Irreversible and Irretrievable Commitments of Resources

This section describes anticipated irreversible and irretrievable commitments of environmental resources associated with the TVA decision to replace CT 1 and CT 2 and construct the associated upgrades. For the purposes of this analysis, the term “irreversible” applies to the commitment of environmental resources that cannot, by practical means, be reversed to restore the environmental resources to their former state. In contrast, the term

“irretrievable” applies to the commitment of material resources that, once used, cannot by practical means be recycled or restored for other uses.

The TVA decision to replace CT 1 and CT 2 and construct the associated upgrades would not result in the irreversible and irretrievable commitments of resources.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

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Involvement: Cultural Compliance

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Involvement: Air Quality and Climate Change and Solid and Hazardous Wastes and Hazardous Materials

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Involvement: Surface Water and Soil Erosion

CHAPTER 6 – EA RECIPIENTS

6.1 Federal Agencies

U.S. Army Corps of Engineers

U.S Coast Guard

U.S. Department of Agriculture, Natural Resources Conservation Service

U.S. Fish and Wildlife Service

U.S. Environmental Protection Agency

6.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Indians of Oklahoma

Alabama-Coushatta Tribe of Texas

Alabama Quassarte Tribal Town

Cherokee Nation

The Chickasaw Nation

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Jena Band of Choctaw Indians

Kialegee Tribal Town

The Muscogee (Creek) Nation

Poarch Band of Creek Indians

The Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

6.3 State Agencies

Alabama Department of Natural Resources and Conservation

Alabama Department of Environmental Management

Alabama Historical Commission

CHAPTER 7 – LITERATURE CITED

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Appendix A
TVA Bat Strategy Project Screening Form

Project Review Form - TVA Bat Strategy *(06/2019)*

*This form should **only** be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.*[1]

Project Name: Browns Ferry Nuclear Thermal Performance Program EA **Date:** 3/6/2020

Contact(s): Taylor Cates **CEC#:** **Project ID:** 35925

Project Location (City, County, State): Limestone County, Alabama

Project Description:

BFN proposes to demolish the existing 16 cell Cooling Towers (CT) 1 and 2 and replaced with two new CTs with a design flow of approximately 330 Kgpm, four CT Lift Pumps would be upgraded, upgrades to existing CT 7 would occur, and associated upgrades. See DOPAA for complete project description.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental support staff, Environmental Project Lead, or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

- ☐ 1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands
- ☐ 2 Protect Cultural Resources on TVA-Retained Land
- ☐ 3 Manage Land Use and Disposal of TVA-Retained Land
- ☐ 4 Manage Permitting under Section 26a of the TVA Act
- ☐ 5 Operate, Maintain, Retire, Expand, Construct Power Plants
- ☐ 6 Maintain Existing Electric Transmission Assets
- ☐ 7 Convey Property associated with Electric Transmission
- ☐ 8 Expand or Construct New Electric Transmission Assets
- ☐ 9 Promote Economic Development
- ☐ 10 Promote Mid-Scale Solar Generation

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

☐ 1. Loans and/or grant awards	☐ 8. Sale of TVA property	☐ 19. Site-specific enhancements in streams and reservoirs for aquatic animals
☐ 2. Purchase of property	☐ 9. Lease of TVA property	☐ 20. Nesting platforms
☐ 3. Purchase of equipment for industrial facilities	☐ 10. Deed modification associated with TVA rights or TVA property	☐ 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
☐ 4. Environmental education	☐ 11. Abandonment of TVA retained rights	☐ 42. Internal renovation or internal expansion of an existing facility
☐ 5. Transfer of ROW easement and/or ROW equipment	☐ 12. Sufferance agreement	☐ 43. Replacement or removal of TL poles
☐ 6. Property and/or equipment transfer	☐ 13. Engineering or environmental planning or studies	☐ 44. Conductor and overhead ground wire installation and replacement
☐ 7. Easement on TVA property	☐ 14. Harbor limits delineation	☐ 49. Non-navigable houseboats

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

■ 18. Erosion control, minor	☐ 57. Water intake - non-industrial	☐ 79. Swimming pools/associated equipment
☐ 24. Tree planting	☐ 58. Wastewater outfalls	☐ 81. Water intakes – industrial
☐ 30. Dredging and excavation; recessed harbor areas	☐ 59. Marine fueling facilities	■ 84. On-site/off-site public utility relocation or construction or extension
☐ 39. Berm development	☐ 60. Commercial water-use facilities (e.g., marinas)	☐ 85. Playground equipment - land-based
☐ 40. Closed loop heat exchangers (heat pumps)	☐ 61. Septic fields	☐ 87. Aboveground storage tanks
☐ 45. Stream monitoring equipment - placement and use	☐ 66. Private, residential docks, piers, boathouses	☐ 88. Underground storage tanks
☐ 46. Floating boat slips within approved harbor limits	■ 67. Siting of temporary office trailers	☐ 90. Pond closure
■ 48. Laydown areas	☐ 68. Financing for speculative building construction	☐ 93. Standard License
☐ 50. Minor land based structures	☐ 72. Ferry landings/service operations	☐ 94. Special Use License
☐ 51. Signage installation	☐ 74. Recreational vehicle campsites	☐ 95. Recreation License
☐ 53. Mooring buoys or posts	☐ 75. Utility lines/light poles	☐ 96. Land Use Permit
☐ 56. Culverts	☐ 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

■ 15. Windshield and ground surveys for archaeological resources	☐ 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	☐ 69. Renovation of existing structures
☐ 16. Drilling	☐ 35. Stabilization (major erosion control)	☐ 70. Lock maintenance/ construction
☐ 17. Mechanical vegetation removal, does not include trees or branches > 3" in diameter (in Table 3 due to potential for woody burn piles)	☐ 36. Grading	☐ 71. Concrete dam modification
☐ 21. Herbicide use	☐ 37. Installation of soil improvements	☐ 73. Boat launching ramps
☐ 22. Grubbing	☐ 38. Drain installations for ponds	■ 77. Construction or expansion of land-based buildings
☐ 23. Prescribed burns	☐ 47. Conduit installation	☐ 78. Wastewater treatment plants
☐ 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	☐ 52. Floating buildings	☐ 80. Barge fleeting areas
☐ 26. Maintenance/construction of access control measures	☐ 54. Maintenance of water control structures (dewatering units, spillways, levees)	☐ 82. Construction of dam/weirs/ levees
☐ 27. Restoration of sites following human use and abuse	☐ 55. Solar panels	☐ 83. Submarine pipeline, directional boring operations
☐ 28. Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ 62. Blasting	☐ 86. Landfill construction
☐ 29. Acquisition and use of fill/borrow material	☐ 63. Foundation installation for transmission support	☐ 89. Structure demolition
☐ 31. Stream/wetland crossings	☐ 64. Installation of steel structure, overhead bus, equipment, etc.	☐ 91. Bridge replacement
☐ 32. Clean-up following storm damage	☐ 65. Pole and/or tower installation and/or extension	☐ 92. Return of archaeological remains to former burial sites
☐ 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3? ◉ **YES (Go to Step 4)** ○ **NO (Go to Step 13)**

STEP 4) Answer questions *a* through *e* below (applies to projects with activities from Table 3 ONLY)

a) Will project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)?

- (•) **NO** (NV2 does not apply)
- ( ) **YES** (NV2 applies, subject to records review)

b) Will project involve entry into/survey of cave?

- (•) **NO** (HP1/HP2 do not apply)
- ( ) **YES** (HP1/HP2 applies, subject to review of bat records)

c) If conducting **prescribed burning** (**activity 23**), estimated acreage**:** _____ and timeframe(s) below; ☒ **N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 15	☐ Mar 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	☐ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

d) Will the project involve vegetation piling/burning?

- (•) **NO** (SSPC4/ SHF7/SHF8 do not apply)
- ( ) **YES** (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

e) If **tree removal (activity 33 or 34)**, estimated amount: _____ ( )**ac** ( )**trees** (•)**N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 15	☐ Mar 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	☐ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

If warranted, does project have flexibility for bat surveys (May 15-Aug 15): ( ) **MAYBE** ( ) **YES** (•) **NO**

**** For **PROJECT LEADS** whose projects will be reviewed by a Heritage Reviewer (Natural Resources Organization only), **STOP HERE**. Click File/ Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information. Otherwise continue to Step 5. ****

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)

STEP 5) **Review of bat/cave records conducted by Heritage/OSAR reviewer?**

( ) **YES** (•) **NO** (Go to Step 13)

Info below completed by:				
☐ **Heritage Reviewer**	(name)		Date	
☐ **OSAR Reviewer**	(name)		Date	
☒ **Terrestrial Zoologist**	(name)	Christopher Logan Barber	Date	2/12/2020

Gray bat records: ☐ None ☐ Within 3 miles* ☒ Within a cave* ☒ Within the County

Indiana bat records: ☐ None ☒ Within 10 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Northern long-eared bat records: ☒ None ☐ Within 5 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Virginia big-eared bat records: ☒ None ☐ Within 6 miles* ☐ Within the County

Caves: ☒ None within 3 mi ☐ Within 3 miles but > 0.5 mi ☐ Within 0.5 mi but > 0.25 mi* ☐ Within 0.25 mi but > 200 feet* ☐ Within 200 feet*

Bat Habitat Inspection Sheet completed? (•) **NO** ( ) **YES**

Amount of SUITABLE habitat to be removed/burned (may differ from STEP 4e): _____ **(**( )**ac** ( )**trees)*** (•)**N/A**

STEP 6) Provide any additional notes resulting from Heritage Reviewer records review in Notes box below then . . . . . Go to Step 13

Notes from Bat Records Review (e.g., historic record; bats not on landscape during action; DOT bridge survey with negative results):

No suitable summer roosting habitat to be removed. Structures aren't suitable for bats. No caves will be impacted. BMPs will be used. MYSO record is from 1930s, no record of MYSO in cave since.

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

- ☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.
- ☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.
- ☐ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.
- ☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
- ☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
- ☐ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.
- ☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.
- ☒ N/A

STEP 8) Presence/absence surveys were/will be conducted: ○ **YES** ◉ **NO** ○ **TBD**

STEP 9) Presence/absence survey results, on _____ ○ **NEGATIVE** ○ **POSITIVE** ◉ **N/A**

STEP 10) Project ○ **WILL** ○ **WILL NOT** require use of Incidental Take in the amount of _____ ○ **acres or** ○ **trees** proposed to be used during the ○ **WINTER** ○ **VOLANT SEASON** ○ **NON-VOLANT SEASON** ◉ **N/A**

STEP 11) Available Incidental Take (prior to accounting for this project) as of _____

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
5 Operate, Maintain, Retire, Expand, Construct Power Plants				

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ _____ OR ◉ **N/A**

TERRESTRIAL ZOOLOGISTS, after completing SECTION 2, review Table 4, modify as needed, and then complete section for Terrestrial Zoologists at end of form.

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13) Review Conservation Measures in Table 4 and ensure those selected are relevant to the project. If not, manually override and uncheck irrelevant measures, and explain why in ADDITIONAL NOTES below Table 4.

Did review of Table 4 result in ANY remaining Conservation Measures in **RED**?

- ○ **NO** (Go to Step 14)
- ◉ **YES** (STOP HERE; Submit for Terrestrial Zoology Review. Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information).

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Name: Christopher Logan Barber

Check if Applies to Project	Activities Subject To Conservation Measure	Conservation Measure Description
☑	15, 16, 17, 18, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96	**NV1** - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
☑	69, 77, 89, 91	**AR1** - Projects that involve structural modification or demolition of buildings, bridges, and potentially suitable box culverts, will require assessment to determine if structure has characteristics that make it a potentially suitable unconventional bat roost. If so a survey to determine if bats may be present will be conducted. Structural assessment will include: o Visual check that includes an exhaustive internal/external inspection of building to look for evidence of bats (e.g., bat droppings, roost entrance/exit holes); this can be done at any time of year, preferably when bats are active. o Where accessible and health and safety considerations allow, a survey of roof space for evidence of bats (e.g., droppings, scratch marks, staining, sightings), noting relevant characteristics of internal features that provide potential access points and roosting opportunities. Suitable characteristic may include: gaps between tiles and roof lining, access points via eaves, gaps between timbers or around mortise joints, gaps around top and gable end walls, gaps within roof walling or around tops of chimney breasts, and clean ridge beams. o Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. o Applies to box culverts that are at least 5 feet (1.5 meters) tall and with one or more of the following characteristics. Suitable culverts for bat day roosts have the following characteristics: • Location in relatively warm areas • Between 5-10 feet (1.5-3 meters) tall and 300 ft (100 m) or more long • Openings protected from high winds • Not susceptible to flooding • Inner areas relatively dark with roughened walls or ceilings • Crevices, imperfections, or swallow nests o Bridge survey protocols will be adapted from the Programmatic Biological Opinion for the Federal Highway Administration (Appendix D of USFWS 2016c, which includes a Bridge Structure Assessment Guidance and a Bridge Structure Assessment Form). o Bat surveys usually are NOT needed in the following circumstances: • Domestic garages /sheds with no enclosed roof space (with no ceiling) • Modern flat-roofed buildings • Metal framed and roofed buildings • Buildings where roof space is regularly used (e.g., attic space converted to living space, living space open to rafters) or where all roof space is lit from skylights or windows. Large/tall roof spaces may be dark enough at apex to provide roost space
☑	69, 77, 89, 91	**AR2** - Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).

■	16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 70, 71, 73, 76, 77, 78, 80, 81, 82, 83, 86, 87, 88, 89, 90	**SSPC2** - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.
■	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 67, 69, 70, 71, 73, 76, 77, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91	**SSPC3** (**Power Plants only**) - Power Plant actions and activities will continue to implement standard environmental practices. These include: o Best Management Practices (BMPs) in accordance with regulations: • Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage o Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to • Minimize fuel and chemical use Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage o Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
■	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L1** - Direct temporary lighting away from suitable habitat during the active season.

▣	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L2** - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

[1]Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

- (•) HIDE
- ( ) UNHIDE

Hide Table 4 Columns 1 and 2 to Facilitate Clean Copy and Paste

- ( ) HIDE
- ( ) UNHIDE

NOTES (additional info from field review, explanation of no impact or removal of conservation measures).

No suitable summer roosting habitat to be removed. Structures aren't suitable for bats. No caves will be impacted. BMPs will be used. MYSO record is from 1930s, no record of MYSO in cave since.

STEP 14) Save completed form (Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date") in project environmental documentation (e.g. CEC, Appendix to EA) AND send a copy of form to batstrategy@tva.gov
Submission of this form indicates that Project Lead/Applicant:

Taylor Cates (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

For Use by Terrestrial Zoologist Only

☒ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) Taylor Cates has been informed of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take ○ ac ○ trees and that use of Take will require $ contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

For Terrestrial Zoology Use Only. Finalize and Print to Noneditable PDF.

Appendix B

Cultural Resources Correspondence

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

September 24, 2010

Ms. Stacye Hathorn
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36130-0900

Dear Ms. Hathorn:

BROWNS FERRY NUCLEAR (BFN) POWER PLANT COOLING TOWER ADDITIONS, LIMESTONE COUNTY, ALABAMA

The Tennessee Valley Authority (TVA) proposes to replace four of six existing cooling towers (Towers 1, 2, 5, and 6) with larger units and construct one additional 25–30 cell linear mechanical draft cooling tower site at BFN (Figures 1 and 2). The four existing cooling towers would be demolished and rebuilt within the existing footprint. In 2001, TVA consulted with your office regarding the Environmental Impact Statement (EIS) for the relicensing of Units 1, 2, and 3 and additional cooling towers for BFN (AHC 2001-1439). Your office concurred with TVA that there would be no effect provided that 1LI535 could be avoided. The EIS did not include the currently proposed new cooling tower (Tower 7).

Tower 7 would be located along the east side of Shaw Road at the location of an existing perimeter ditch and includes the installation of a new pumping station, a cold water discharge canal, lift pumps and piping, and two new transformers (Figure 2). A portion of the ditch would be relocated directly northeast of proposed Tower 7 to maintain a perimeter ditch north of the new cooling tower. In addition, the cold water discharge canal is proposed between the north end of the spoil pile and the existing western perimeter ditch, and approximately a five-acre construction staging area is necessary.

TVA considers the archaeological area of potential effect (APE) to be the footprint where ground disturbance would take place (1LI535 is outside of the APE). TVA finds the proposed undertaking would not appreciably add to the existing silhouette of BFN and there would be no visual effect.

The archaeological APE has been extensively disturbed with the construction of BFN, such that no intact archaeological deposits would be present. It is TVA's finding that no cultural resources potentially eligible for the National Register of Historic Places (NRHP) would be affected by the proposed undertaking and no further investigations are recommended. Pursuant to 36 CFR Part 800, we are seeking your concurrence with TVA's findings and recommendations.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance and eligible for the NRHP.

If you have any questions or comments, please call me or Richard Yarnell at telephone (865) 632-3463 or by e-mail at wryarnell@tva.gov.

Sincerely,

A. Eric Howard
Federal Preservation Officer
Manager (Acting), Cultural Compliance
WT 11D-K

MH:RY:IKS
Enclosures
cc: Cynthia M. Anderson, LP 5D-C
Brenda E. Brickhouse, LP 5U-C
Ruth M. Horton, WT 11D-K
Susan J. Kelly, LP 5U-C
Khurshid K. Mehta, WT 6A-K
EDMS, WT 11D-K

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

FRANK W. WHITE
EXECUTIVE DIRECTOR

TEL: 334-242-3184
FAX: 334-240-3477

October 25, 2010

Eric Howard
TVA
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Re: AHC 10-1306
Cooling Tower Additions
Browns Ferry Nuclear Plant
Cooling Tower Additions
Limestone County, Alabama

Dear ~~Mr. Howard:~~ ERIC:

Upon review of the information forwarded by your office, we have determined the proposed action should have no effect on significant cultural resources provided archaeological site 1Li535 is avoid, as stated in your letter.

We appreciate your efforts on this project. Should you have any questions, please contact Greg Rhinehart at (334) 230-2662. Please have the AHC tracking number referenced above available and include it with any correspondence.

Truly yours,

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/LAW/GCR/gcr

April 19, 2001

Ms. Stacye Hathorn
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36130-0900

Tennessee Valley Authority (TVA) Proposed Expansion of Browns Ferry Nuclear Plant, Limestone County, Alabama

Dear Ms. Hathorn:

TVA proposes to use three areas as soil disposal sites for activities related to the expansion of Browns Ferry Nuclear Plant. A Phase I archaeological survey was conducted of the three proposed sites on April 2-6, 2001.

The results of the investigation are found in the enclosed report "A Cultural Resources Reconnaissance Survey of Three Locations for the Proposed Expansion of Browns Ferry Nuclear Plant in Limestone County, Alabama." TVA Cultural Resources Staff has reviewed the report and concur with the following findings and recommendations of the author:

- archaeological site 1LI535 located in Area 1 is potentially eligible for inclusion in the National Register of Historic Places and should be avoided;
- if avoidance of 1LI535 is not possible, then further testing will be required;
- the Cox Cemetery located in Area 2 should be avoided or relocated; and
- there are no historic properties located in Area 3.

Therefore, pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR § 800, we are seeking your concurrence with our findings and recommendations for the proposed project areas.

Should you have any questions or comments, please contact me at 865/632-1583.

Sincerely,

J. Bennett Graham
Senior Archaeologist

Enclosure

cc: Dennis Baxter ABL, 1A-N
CR Files

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

LEE H. WARNER
EXECUTIVE DIRECTOR

TEL: 334-242-3184
FAX: 334-240-3477

May 24, 2001

J. Bennett Graham, Ph.D.
TVA
P.O. Box 1589
Norris, Tennessee 37828-1589

Re: AHC 01-1439
Browns Ferry Plant Expansion
Limestone County, Alabama

Dear Dr. Graham:

Upon review of the information recently forwarded by your office, the Alabama Historical Commission has determined that we agree with the author's findings. The property is cleared for project activities to resume with the exception of that area containing archaeological site 1 Li 535. As this site is potentially eligible for the National Register, we request that the site be avoided. If avoidance is not feasible, Phase II testing proposals should be developed and forward to our office for review and approval prior to project activities commencing. Also, the Cox cemetery should be avoided.

We appreciate your efforts on this project and we look forward to working with you to its conclusion. Should you have any questions or comments, please contact Stacye Hathorn or Lee Anne Hewett at our office and include the AHC tracking number referenced above.

Yours truly,

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/SGH/LAH/gcr