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JOHNSONVILLE COGENERATION PLANT
FINAL ENVIRONMENTAL ASSESSMENT
Humphreys County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
Chattanooga, Tennessee

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Table of Contents

List of Appendices

List of Tables

List of Figures

Symbols, Acronyms, and Abbreviations

AADT	Average Annual Daily Traffic
ACS	American Community Survey
APE	Area of Potential Effect
BMP	Best Management Practices
CEC	Categorical Exclusion Checklist
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CT	Combustion Turbine
dB	Decibels
dBA	A-Weighted Decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPCRA	Emergency Planning and Community Right-To-Know Act
ERP	Emergency Response Plan
ESA	Endangered Species Act of 1973
FHWA	Federal Highway Administration
GHG	Greenhouse Gas
gpm	gallons per minute
HRSG	Heat Recovery Steam Generator
Hz	Hertz
JOF	Johnsonville Fossil Plant
Ldn	Day-Night Sound
Leq	Equivalent Sound Level
MGD	Million Gallons per Day
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMSZ	New Madrid Seismic Zone
NO_x	Nitrous Oxides
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM	Particulate Matter
RFAI	Reservoir Fish Assemblage Index
RCRA	Resource Conservation and Recovery Act of 1976
RMP	Risk Management Plan
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide

SO_x	Sulfur Oxides
SQG	Small Quantity Generator
TCA	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
TMSP	Tennessee Multi-Sector Storm Water General Permit
TRM	Tennessee River Mile
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TVA	Tennessee Valley Authority
Unit 20	GE 7EA CT Unit 20
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
VSMP	Vital Signs Monitoring Program

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Tennessee Valley Authority's (TVA) Johnsonville Fossil Plant (JOF) is the oldest fossil plant in the TVA system and is located on the east bank of the Tennessee River near New Johnsonville, Tennessee. Construction of JOF began in 1949 and was completed in 1952. JOF has 10 coal-fired units which produce approximately 6 billion kilowatt-hours of electricity per year, enough to supply 400,000 homes.

In April 2011, TVA and the U.S. Environmental Protection Agency (USEPA) entered into a Federal Facilities Compliance Agreement to resolve disputes arising under the Clean Air Act's New Source Review program with regard to maintenance and repair activities at TVA's coal-fired power plants. TVA also entered into a judicial consent decree with the States of Alabama, Kentucky, Tennessee, and North Carolina, and three environmental advocacy groups, the Sierra Club, the National Parks Conservation Association, and Our Children's Earth Foundation to resolve the same disputes. This consent decree is substantively similar to the USEPA compliance agreement (collectively the "EPA Clean Air Agreements"). As part of the EPA Clean Air Agreements, TVA agreed to retire all 10 coal-fired units at JOF by December 31, 2017.

TVA currently provides steam produced at JOF to an external strategic customer (herein referred to as "the steam customer"), located adjacent to the plant. The existing contract to provide steam will be extended to December 2017 when the coal-fired units at JOF are retired. TVA is evaluating actions to continue to provide steam to the steam customer following the retirement of all of the coal-fired units at JOF. Long-term actions related to closure of JOF are independent actions outside the scope of this EA and will be addressed by TVA in the future at the time such actions are proposed.

1.2 Decision to be Made

TVA must decide whether to continue to provide steam to the steam customer following the retirement of JOF by December 2017 or whether to discontinue this service. TVA's decision will consider factors such as potential environmental impacts, economic issues, availability of resources, and TVA's long-term goals. This Environmental Assessment (EA) is prepared to support the decision-making process and determine whether an Environmental Impact Statement (EIS) should be prepared.

1.3 Purpose and Need

TVA proposes to construct and operate a heat recovery steam generator (HRSG) integrated into an existing combustion turbine (CT) at JOF. The purpose of the project is to replace the steam produced by the coal-fired facility at JOF for the steam customer with steam supplied by an existing CT unit. The project is needed to allow TVA to continue to provide steam to the steam customer following retirement of the coal-fired units at JOF.

1.4 Summary of Proposed Action

TVA added 16 CT units at JOF in the mid-1970s and another four in 2000. These 20 CTs are located in the northeast corner of the 85.4-ac JOF project site (Figure 1-1). The proposed action is to add a HRSG onto an existing GE 7EA CT (Unit 20) at JOF.

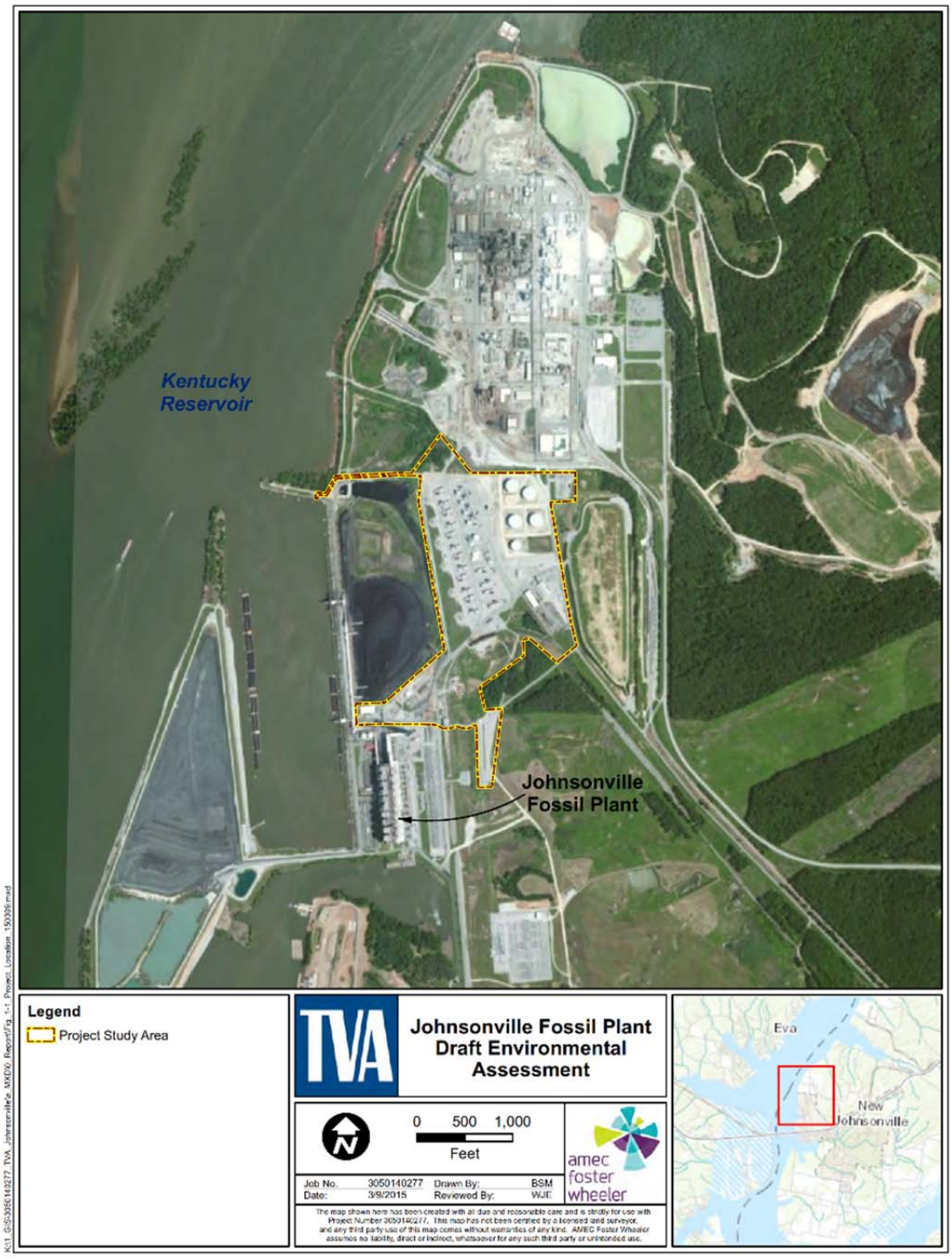

Figure 1-1. Project Location

The HRSG would include duct firing to provide the required steam flow. Two auxiliary boilers averaging 300 kilopounds per hour each would be provided for redundancy. All major equipment would be placed on TVA property.

Demineralization or metals removal by ion exchange or reverse osmosis would be required for the water used by the HRSG and auxiliary boilers. TVA may use the existing demineralization plant at the facility or build a new one closer to CT Unit 20. The project could use the existing cooling water intake structure as well as the fire suppression intake structure. Three water line routes have been proposed for design flexibility. Water from the existing demineralization plant would be conveyed to the proposed site planned for development of the plant as well as to an existing storage tank located within the project area. An additional water line would be installed near the north end of the harbor emergency fire suppression intake. The line would extend to a new demineralization plant that would be built within the area proposed for plant construction. Steam would be delivered to the steam customer using the existing steam transmission line. All discharges would go to the existing coal yard runoff pond.

1.5 Related Environmental Reviews and Consultation Requirements

Several environmental reviews have been prepared for actions related to construction and operation of associated boilers and the steam generation at JOF:

Environmental Review of Cogeneration Project (TVA, 1994). This environmental review assesses the environmental impacts of constructing a steam supply line from JOF to the steam customer.

Categorical Exclusion Checklist (CEC) 30689, Maintenance, Including Clearing and Grading, of Ash Pond 1A (TVA 2014). This environmental review assesses the impacts of maintenance on the portion of the old ash pond 1A located on TVA property.

The description of the affected environment and the assessment of impacts contained in the document(s) listed above are incorporated into analyses for each environmental resource in Chapter 3.

1.6 Scope of the Environmental Assessment

The geographic scope of this analysis includes the proposed 85.4-ac portion of the JOF facility (see Figure 1-1) that would be impacted by the proposed action. Retirement of the coal-fired units at JOF, as required under the EPA Clean Air Agreements, has been established as a baseline condition.

TVA prepared this EA to comply with the National Environmental Policy Act (NEPA) and regulations promulgated by the Council on Environmental Quality (CEQ) and TVA's procedures for implementing NEPA. Through internal scoping of the proposed action, TVA determined the resources listed below are potentially impacted by the alternatives considered.

- Air Quality
- Climate Change
- Water Resources
- Wetlands

- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Noise
- Visual Resources
- Geology
- Floodplains
- Natural Areas, Parks and Recreation
- Cultural and Historic Resources
- Solid and Hazardous Waste
- Socioeconomics and Environmental Justice
- Transportation
- Land Use/Prime Farmland

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplains Management), EO 11990 (Protection of Wetlands), EO 12898 (Environmental Justice), EO 13112 (Invasive Species), and EO 13653 (Preparing the United States for the Impacts of Climate Change); and applicable laws including the National Historic Preservation Act (NHPA) of 1966, Endangered Species Act of 1973 (ESA), Clean Water Act of 1972, and Clean Air Act.

1.7 Public and Agency Involvement

TVA's public and agency involvement includes a public notice and a 30-day public review of the Draft EA. The availability of the Draft EA was announced in the News Democrat, the newspaper that serves Humphreys County, Tennessee. Copies of the Draft EA were made available in the Humphreys County Public Library in Waverly, Tennessee. The Draft EA was also posted on TVA's website. Agency involvement in this review includes circulation of the Draft EA to state agencies and federally recognized tribes. A list of agencies and tribes notified of the availability of this Draft EA is provided in Chapter 5.

1.8 Necessary Permits or Licenses

TVA holds the permits necessary for the operation of JOF. Depending on the decisions made with respect to the proposed action, however, TVA may have to obtain or seek amendments to the following permits:

- Air construction permit for new emissions sources.
- Modification of JOF's existing air operating permit to reflect the increased hours of operation of CT Unit 20 and operation of new auxiliary boilers and HRSG duct firing.
- National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit for storm water runoff from construction activities.
- Modification of NPDES Discharge Permit.
- This action may also involve a water withdrawal notification to State agencies.

CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

Alternatives evaluated in this EA include:

- Alternative A – No Action
- Alternative B –Supply Steam to the Steam Customer from a Cogeneration Plant

2.1.1 Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would continue to operate in its current configuration until the scheduled retirement of coal-fired units at JOF by December 31, 2017. Following closure of the fossil plant, TVA would no longer supply steam to the steam customer. No construction or demolition activities would be undertaken by TVA as part of this alternative.

For purposes of this analysis, TVA assumes that under the No Action Alternative, the steam customer would install the necessary equipment to provide their own steam. All construction activity would occur on a previously disturbed site adjacent to JOF that is owned by the steam customer. Under this action, the installed equipment and operational characteristics are assumed to be similar to those described for Alternative B. The steam customer is expected to comply with all local, state, and federal regulations and would acquire all applicable permits if the No Action Alternative were implemented. Assessment of impacts under the No Action Alternative is based on the following presumptions:

- The steam customer has no existing fuel source and would therefore have to construct a new natural gas line to supply gas for auxiliary boilers. The new line could be up to 30 miles long, which is the distance to the nearest existing third party interstate gas line. The magnitude of impacts due to the new line cannot be quantified in this EA as details regarding the route are not known. If this alternative was implemented, it is assumed that the steam customer would perform detailed studies to determine resource impacts and consult with the appropriate agencies to minimize any potential impacts.

- Environmental impacts from air and greenhouse gas emissions from the auxiliary boilers operated on the steam customer's facility would be similar to those associated with the construction and operation of the auxiliary boilers and HRSG by TVA at JOF.

- Water supply to the steam generator by the steam customer would require the same volume that TVA would require and would consider a range of options including the use of potable water, use of groundwater, construction of a new surface water intake on the Tennessee River, or purchase of water from TVA. Construction and operation of a new surface water intake is assumed to require clearing of adjacent shoreline riparian zone vegetation, in-stream construction activities, and water withdrawal from the river at a rate similar to water use demands of the auxiliary boilers and HRSG on the TVA site.

- The size of land use/disturbance areas associated with construction of the auxiliary boilers would be similar to those expected for the TVA cogeneration plant construction; however, the steam customer would also need to build a gas supply

line which could result in additional environmental impacts. Potential impacts associated with solid and hazardous waste would be addressed through application of the steam customer's existing environmental and waste management program.

Under the No Action Alternative, it is assumed that construction of the auxiliary boilers at the steam customer's facility would not be as readily integrated into the existing infrastructure of the steam customer's operational facility as compared to Alternative B. Increased engineering effort and complexity would likely be required to modify infrastructure (gas lines, utility lines, roadways), and other site components to accommodate the new infrastructure required to develop the steam supply. Therefore, it is expected that this alternative would require greater construction effort and higher costs for the steam customer as compared to Alternative B.

2.1.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under this alternative, TVA would continue to provide steam to the steam customer following retirement of the JOF coal-fired units by December 31, 2017. The steam would be produced by adding a HRSG onto the existing CT Unit 20 at JOF with redundant auxiliary boilers within the permanent use area (Figure 2-1). This alternative would include the following:

- All major equipment would be placed on TVA property.
- The HRSG would include duct firing to provide the required steam flow.
- Two natural-gas fired 300-kilopounds per hour auxiliary boilers would be installed for redundancy.
- This project could utilize an existing JOF water intake structure and a new 12-inch pipeline extending to the plant. The water line would be installed in a 5-ft deep trench and deliver water to the area proposed for construction of the steam generating facilities (identified as the Permanent Use Area on Figure 2-1). This water line would also deliver water to an existing storage tank located within the project area. In order to provide flexibility of design and an additional option for water for the HRSG operation, a new water line from the existing fire suppression system intake at the north end of the harbor could be used to supply water to the plant. This 12-inch pipe would also be installed in a 5-ft deep trench and would be located between the existing fire water line and the road.

> ***What is a HRSG?***
>
> A heat recovery steam generator or HRSG is an energy recovery heat exchanger that recovers heat from a hot gas stream. It produces steam that can be used in a process (cogeneration) or used to drive a steam turbine (combined cycle).

Figure 2-1. Alternative B Site Utilization Areas

- The existing JOF demineralization plant could be used to provide boiler-grade water. However, if water is withdrawn from the fire suppression system intake, water would be delivered to a smaller new demineralization plant that would be built within the permanent use portion of the project area.
- Aqueous ammonia handling and storage equipment would be installed.
- Discharge associated with operation of the plant would be to the coal yard runoff pond, which is eventually pumped to the ash pond.
- Steam would be provided by connecting the plant to the existing pipeline servicing the steam customer's facility. The southern-most portion of the existing steam pipeline extending from the JOF coal-fired boilers to the plant area would be abandoned in place.

Retirement of JOF coal-fired units, as required under the EPA Clean Air Agreements has been established as a baseline condition. Actions related to the closure and decommissioning of JOF would be addressed by TVA in the future at the time any such actions are proposed. A summary of the primary characteristics of the proposed cogeneration plant during both construction and operation is provided in Table 2-1.

Table 2-1. Primary Characteristics of the Proposed Cogeneration Plant

Project Feature	Characteristic	Value
HRSG Construction	Permanent use area	9.7 ac
	Primary temporary use areas (two) (construction)	11.1 ac
	Project area	85.4 ac
Auxiliary Boilers	Outlet stack on each aux boiler	175 ft
Height	Outlet stack	<150 ft
Depth of Excavation	Piles to bedrock with 4-ft foundations	Based on geotechnical investigation
Employment Workforce	Construction	100 to 200 workers
	Operation	Nine workers
Water Use	Water supply from the Kentucky Reservoir (Tennessee River) via two existing intake structures	1.1 MGD (800 gpm)
Pipelines	Water supply pipelines installed in 5-ft deep trenches to convey water from the existing demineralization plant to the steam facilities and to an existing water storage area.	See Figure 2-1 for location of water lines
Process Discharge Water	Blowdown from HRSG	0.04 MGD (30 gpm)

2.1.2.1 Emission Monitoring and Controls

The CT and duct burner emissions would be controlled utilizing dry low nitrous oxide (NO_x) burners and selective catalytic reduction (SCR). The boilers' emissions would also be controlled utilizing low NO_x burners and SCR. Continuous emissions monitors for NO_x and carbon monoxide (CO) would be installed on the HRSG exhaust and the boilers. Emission monitoring and control equipment for the proposed plant includes the following:

- Continuous emissions monitors for NO_x, CO, oxygen (O_2) on each flue (two auxiliary boiler and one HRSG);
- DCN-1 combustion on gas; water injection on oil fuel for CT Unit 20;
- SCR on HRSG and auxiliary boilers; and
- CO catalyst on HRSG.

2.1.2.2 Water Supply

Operation of the proposed cogeneration plant would require the supply of approximately 1 million gallons per day (MGD) [800 gallons per minute (gpm)] of water. Three water line routes within the project area have been proposed for design flexibility. The water would be obtained from existing JOF water intake structures located on Kentucky Reservoir (see Figure 2-1) and conveyed to the permanent use area via pipeline. Water from the existing demineralization plant could be conveyed to the proposed site planned for development of the plant as well as to an existing storage tank located within the project area. An additional water line would be installed near the north end of the harbor emergency fire suppression intake. The line would extend to a new demineralization plant that could be built within the area proposed for plant construction.

2.1.2.3 Fuel Supply

TVA has existing dual-fuel CT units on-site, and construction of the HRSG would not require an additional fuel supply. Two auxiliary boilers would be provided for redundancy as a backup power source in the event that the CT units are off line. Auxiliary boilers would be fired by natural gas only.

2.1.2.4 Plant Construction

The HRSG and associated facilities of the proposed plant would be constructed onto an existing CT Unit 20 located on the JOF. The plant would permanently occupy 9.7 ac of the 85.4-ac site. Two temporary use areas totaling 11.1 ac have been identified on the site that would be used for primary equipment and laydown during construction. However for purposes of the impact analysis in this EA, it is assumed that additional laydown areas could be utilized on any of the previously disturbed areas within the project study area. The conceptual design of a typical HRSG is shown on Figure 2-2.

Project materials and equipment would be delivered to the site primarily by truck. Transport of some large components would be by barge, utilizing the existing barge unloading facility and heavy duty trucks to move components on site.

Construction is expected to last 18 months with peak construction occurring from April 2016 to October 2016. During the peak construction period, 100 to 200 workers could be employed on site.

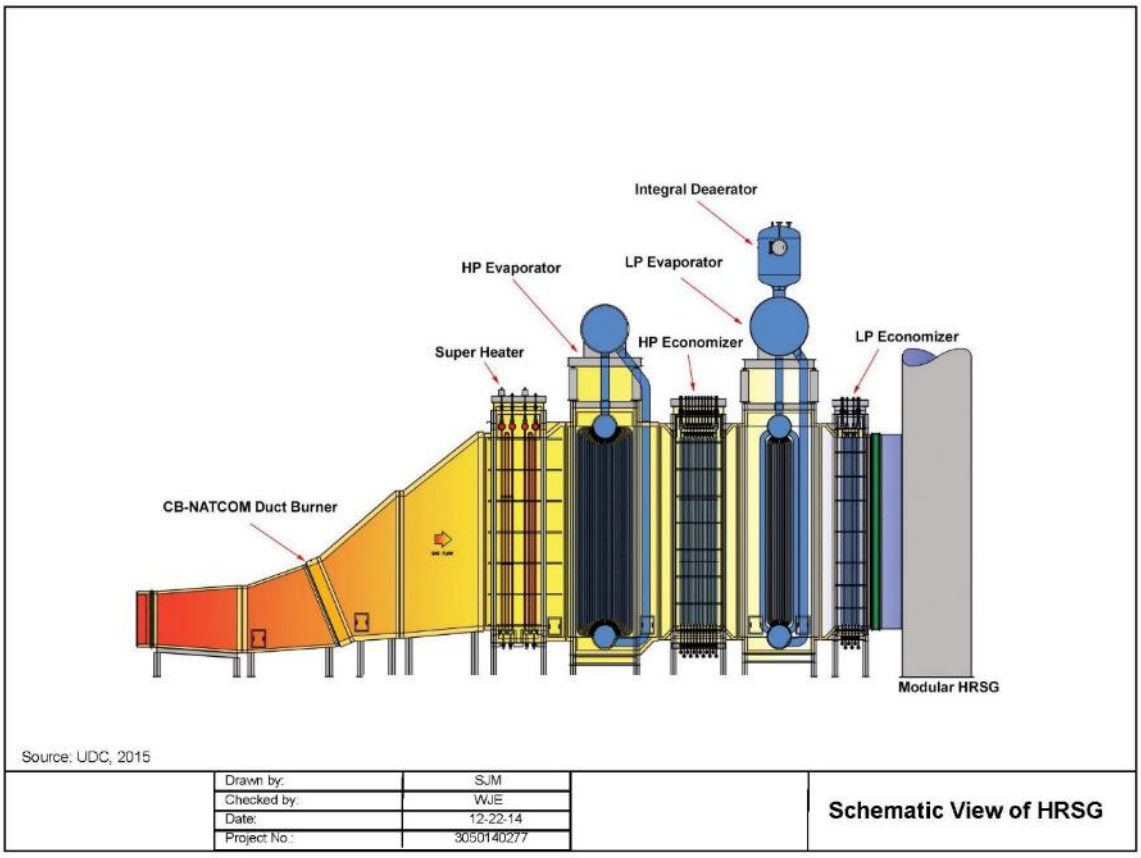

Figure 2-2. Schematic View of Typical HRSG Design

2.1.3 Alternatives Considered but Eliminated From Further Discussion

TVA carefully considered a range of options for layout and configuration of the proposed project on TVA properties. Minimization of environmental impact and enhancing engineering feasibility/constructability were important factors that led to the elimination of alternative layout options. Key considerations included the following:

- *Maximized Use of Other Constructed Assets*. The location of the proposed HRSG facility provides important benefits in the use of existing, previously constructed assets that effectively minimize project costs. Specifically, the existing CT Unit 20 was chosen for the HRSG due to its proximity to the steam customer, ease of connection to the existing steam line, appropriate size for steam requirements, and ability to discharge effluents to the existing ash pond for treatment prior to release.
- *Use of Previously Disturbed Lands.* The plant site and primary laydown areas are located exclusively on the TVA-owned lands at the JOF site. The construction site is previously disturbed and lacks highly sensitive environmental resources (wetlands, surface water resources, sensitive species, cultural resources, sensitive land uses, residential receptors, etc.). Therefore, the proposed site offers important advantages in reducing overall environmental impacts.

In summary, no other potential site is likely to have advantages of the proposed site or be environmentally preferable.

2.2 Comparison of Alternatives

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

2.3 Identification of Mitigation Measures

No mitigation measures will be necessary to reduce potential adverse environmental impacts to below significant levels. TVA would implement routine best management practices (BMPs) for avoiding or reducing minor adverse environmental effects from the construction, operation, and maintenance of the proposed project.

The following conditions and best management practices (BMPs) will be followed as listed below.

- Clean Air Act Title V operating permit conditions applicable to Alternative B would be implemented.
- Fugitive dust emissions from site preparation and construction would be controlled by wet suppression and BMPs.
- Project-specific BMPs would be developed under the NPDES Construction Storm Water Permit to ensure that all surface waters are protected from construction and operational impacts.
- Waste streams would be characterized to ensure permit limits are met.
- Per EO 13112, disturbed areas would be revegetated with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.
- BMPs would be used during construction activities to minimize and restore areas disturbed during construction.

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

Issue Area	Alternative A – No Action	Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant
Air Quality	Increase in local and regional air emissions. Additional construction phase air emissions associated with gas line.	Minor increase in local and regional air emissions.
Noise	Noise levels at nearby parklands and residences would be minor. Additional construction phase noise impacts associated with gas line.	Noise levels at nearby parklands and residences would be minor.
Surface Water Quality	Localized minor impacts to water quality during construction if surface water intake structure is used by customer to provide water. Additional construction phase impacts to surface water associated with gas line installation.	There would be no impacts to surface water quality.
Wetlands and Floodplains	Potential impact to wetlands and floodplains in the riparian zones adjacent to the Tennessee River if water intake structure is used by customer to provide water. Additional construction phase impacts to wetlands and floodplains associated with gas line.	There would be no impacts to wetlands and floodplains.
Aquatic Ecology	Localized minor impacts to aquatic ecology by water intake structure used by customer to provide water. Additional construction phase impacts to aquatic ecology associated with gas line.	There would be no impacts to aquatic ecology.
Terrestrial Ecology – Plants	Impacts to terrestrial plant communities would be minor. Additional impacts associated with gas line due to clearing requirements.	On-site impacts to terrestrial plant communities would be minor.
Terrestrial Ecology – Animals	Impacts to terrestrial animals would be minor. Additional impacts associated with gas line due to construction noise and habitat loss.	Impacts to terrestrial animals would be minor.
Endangered and Threatened Species	There would be no effect on endangered or threatened species. Some impacts associated with gas line due to construction noise and habitat loss.	There would be no effect on endangered or threatened species.
Cultural Resources	There would be no on-site impacts to cultural resources. Some impacts associated with gas line installation.	There would be no on-site impacts to cultural resources.

Issue Area	Alternative A – No Action	Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant
Visual	Visual impacts would be minor. Additional construction and operational phase impacts associated with gas line.	Visual impacts would be minor.
Socioeconomic Resources	There would be short-term beneficial increases in employment, payroll, and tax payments during construction. Additional construction phase benefits associated with gas line.	There would be short-term beneficial increases in employment, payroll, and tax payments during construction.
Environmental Justice	There would be no impacts to low income or minority populations. Some impacts associated with gas line installation.	There would be no impacts to low income or minority populations.

2.4 The Preferred Alternative

TVA's preferred alternative is Alternative B under which TVA would supply steam to the steam customer from a cogeneration plant. The steam would be produced by adding a HRSG onto existing CT Unit 20 with redundant auxiliary boilers. The plant would be built on previously disturbed land on the JOF site. The proposed facility would utilize an existing water intake structure and steam transmission line. Discharge would be to the coal yard runoff pond and eventually to the ash pond where water would be treated prior to release. The addition of the cogeneration plant would allow TVA to continue to provide steam to the steam customer after the retirement of the coal-fired units at JOF (the Purpose and Need for this proposed action). It would also allow TVA to provide approximately 85 megawatts of baseload electricity to the TVA system with the same process that provides steam to the steam customer. This cogeneration strategy utilizes low emissions equipment and enhances TVA long-term integrated resource planning.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the baseline environmental conditions potentially affected by the proposed construction and operation of the cogeneration plant on TVA lands at JOF and an assessment of impacts of the project on the environmental resources identified. TVA considered all appropriate environmental factors potentially influenced by the proposed project as part of this analysis. From this review, TVA was able to focus its environmental review on specific resources and eliminate others from further evaluation.

The EA does not contain detailed discussions on resources not found in the planning area, or that would not be impacted by any of the alternatives. These include:

- *Coastal and Estuary Areas.* The project area is located entirely in an inland location, and coastal and estuary areas are absent from the project vicinity.
- *Wild and Scenic Rivers.* No wild and scenic rivers designated under the Wild and Scenic Rivers Act of 1968 are present in the project area.
- *Mineral and Energy Resources.* No mineral or energy resource mines or sources are located within the project area.
- *Floodplains.* This project would avoid activity in the 100-year floodplain of the Tennessee River; therefore, there would be no impact to floodplains (FEMA, 2015).

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

3.1 Air Quality

3.1.1 Affected Environment

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

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

JOF is located in Humphreys County, Tennessee which is in attainment with all NAAQS. The closest air quality monitors are located in the Nashville-Davidson-Murfreesboro-Franklin, Tennessee Core Based Statistical Area which is currently designated in attainment with all of the NAAQS. On November 25, 2014, USEPA proposed lowering the ozone standard from 0.075 parts per million to a level within the range of 0.065 to 0.070 parts per million.

There are 20 dual-fuel simple cycle CTs at JOF, 16 model GE MS7001B and four model GE PG7121EA. They are operated to meet peak power demands (<3 percent capacity factor), primarily during the winter and summer.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate the CT units at JOF following the retirement of the coal units in 2017. Once the coal fired-units are retired, JOF would not supply steam to the steam customer. The steam customer would be responsible for constructing and operating their own steam-producing equipment in order to continue their manufacturing process. The steam customer's construction and operating activities would result in air quality impacts similar to those discussed in Alternative B and any specific strategies necessary to protect ambient air quality would be defined through the New Source Review permitting process.

The steam customer would have to construct a new gas line to provide natural gas to auxiliary boilers. Potential air quality impacts from construction of the proposed natural gas line would likely occur from fugitive dust generated as a direct result of the movement of equipment. Construction-related impacts would likely be temporary and minimal. Operation of the proposed line may also result in a small increase in emissions from the increased operation of compressor stations but would have little overall effect on air quality.

3.1.2.2 Alternative B –Supply Steam to the Steam Customer from a Cogeneration Plant

Following closure of the JOF coal-fired units in December 2017, TVA would continue to operate the CT units at JOF and would continue to provide steam to the steam customer by constructing and operating a HRSG on an existing GE 7EA CT (Unit 20). The HRSG would include duct firing to provide the required steam flow. Two auxiliary boilers, rated at 300 kilopounds per hour each, would be provided for redundancy.

3.1.2.2.1 Construction Impacts

Construction activities associated with Alternative B would result in temporary fugitive air pollutant emissions. Vehicles and construction equipment traveling over unpaved roads and the construction site would result in the emission of fugitive dust. The largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. The remaining fraction of the dust would be subject to transport beyond the property boundary.

Combustion of gasoline and diesel fuels to power the engines of vehicles and construction equipment would generate minor emissions of PM, NO_x, CO, volatile organic compounds (VOC), and SO_2 during the site preparation and construction period.

Air quality impacts from construction activities associated with Alternative B would be minor and temporary.

3.1.2.2.2 Operational Impacts

The proposed plant would consist of one existing dual-fuel GE 7EA CT (Unit 20); one new HRSG with duct burners and SCR, CO catalyst, and two new dual-fuel auxiliary boilers with low-NO_X burners, flue gas recirculation, and SCR.

Unlike the current configuration of CT Unit 20, this proposed facility would operate continuously in base load mode. The auxiliary boilers would use only natural gas while the

CT would primarily utilize natural gas; No. 2 fuel oil would only be used in the unlikely event of natural gas curtailment.

Sources of air emissions from the proposed cogeneration facility include the CT, the HRSG duct burner, and the auxiliary boilers. CT emissions vary with ambient temperature and operating configuration. All annual emission estimates summarized in Table 3-1 are conservatively based on maximum emission rates occurring at ISO Standard temperature (59°F).

Table 3-1. Expected Future Cogeneration Facility Emissions in Tons/Year

	Emissions		
Pollutant	**CT/HRSG Emissions[1]**	**Auxiliary Boilers**	**Total Facility**
NO_x	55	8	63
SO_2	13	2	15
CO	290	65	355
Lead	0.006	0.0004	0.0064
PM [2]	29	6	35
PM_{10} [2]	29	6	35
$PM_{2.5}$ [2]	29	6	35
VOC	50	6	56
Sulfuric Acid	0.06	0.002	0.062
CO_2	615,000	90,000	705,000

[1] These estimates include 500 hours of operation on ultra-low sulfur #2 fuel oil.

[2] PM, PM10 and PM2.5 emissions are Filterable PM only.

TVA would apply for an air permit for the construction of the cogeneration facility. The Prevention of Signification (PSD) and/or other reviews in the permitting process would ensure that there would be no significant adverse impacts to air quality. Specific strategies necessary to protect ambient air quality would be defined in the permitting process through the application of applicable emission and/or technology standards.

3.2 Climate Change

3.2.1 Affected Environment

The average temperature in the United States has increased by 1.3°F to 1.9°F since record keeping began in 1895; most of this increase has occurred since about 1970. The most recent decade was the nation's warmest on record, and temperatures in the United States are expected to continue to rise. Because human-induced warming is superimposed on a naturally varying climate, the temperature rise has not been, and will not be, uniform or smooth across the country over time (Melillo et al. 2014).

The 2014 National Climate Assessment concluded global climate is projected to continue to change over this century and beyond. The amount of warming projected beyond the next few decades is directly linked by these studies to the cumulative global emissions of greenhouse gas and particulates. By the end of this century, the 2014 National Climate Assessment concluded a 3°F to 5°F rise can be projected under the lower emissions scenario and a 5°F to 10°F rise for a higher emissions scenario (Melillo et al. 2014). As with all future scenario modeling exercises, there is an important distinction to be made between a "prediction" of what "will" happen and a "projection" of what future conditions are likely given a particular set of assumptions (Melillo et al. 2014).

3.2.1.1 Southeastern United States

The Southeastern United States is one of the few regions globally that does not exhibit an overall warming trend in surface temperature over the 20th century. This "warming hole" also includes part of the Great Plains and Midwest regions in the summer. Historically, temperatures increased rapidly in the Southeast during the early part of the 20th century, then decreased rapidly during the middle of the 20th century. Since the 1960s, temperatures in the Southeast have been increasing. Recent increases in temperature in the Southeast have been most pronounced in the summer season, particularly along the Gulf and Atlantic coasts. However, temperature trends in the Southeast over the period of 1895 to 2011 are found to be statistically insignificant for any season. Generally, in the Southeast, the number of extreme hot days has tended to decrease or remain the same while the number of very warm summer nights has tended to increase. The number of extreme cold days has tended to decrease. Global warming is a long-term trend, but that does not mean that every year will be warmer. Day-to-day and year-to-year changes in weather patterns will continue to produce variation, even as the climate warms. Generally, climate change results in Earth's lower atmosphere becoming warmer and moister, resulting in the potential for more energy for storms and certain severe weather events. Trends in extreme rainfall vary from region to region (Kunkel et al. 2013).

3.2.1.2 Greenhouse Gas

In nature, carbon dioxide (CO_2) is exchanged continually between the atmosphere, plants and animals through processes of photosynthesis, respiration, and decomposition; and between the atmosphere and ocean through gas exchange. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural and man-made processes (i.e., sources). When in equilibrium, carbon fluxes among these various global reservoirs are roughly balanced (Galloway et al. 2014). CO_2, however, constitutes less than 1/10th of a percent of the total atmosphere gases.

Similar to the glass in a greenhouse, certain gases, primarily CO_2, NO_x, methane, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride, absorb heat that is radiated from the surface of the Earth. Increases in the atmospheric concentrations of these gases can cause the Earth to warm by trapping more heat. The common term for this phenomenon is the "greenhouse effect," and these gases are typically referred to as "greenhouse gases" (GHG). Atmospheric levels of CO_2 are currently increasing at a rate of 0.5 percent per year. Atmospheric levels measured at Mauna Loa in Hawaii and at other sites around the world reached 400 parts per million in 2013, higher than the Earth has experienced in over a million years (Walsh et al. 2014). The extent to which GHGs contribute to or are responsible for increased temperatures is the subject of scientific debate.

While water vapor is the most abundant GHG in the atmosphere, it is not included in the list of GHGs because changes in the atmospheric concentration of water vapor are generally considered to be the result of climate feedbacks related to the warming of the atmosphere rather than a direct result of human activity. However, the impact of water vapor is critically important to projecting future climate change and this is not yet well understood. Quantifying the effects of feedback loops on global and regional climate is the subject of on-going data collection and active research (Walsh et al. 2014).

3.2.1.3 Greenhouse Gases and Electric Utilities

The primary GHG emitted by electric utilities is CO_2 produced by the combustion of coal and other fossil fuels. Hydrofluorocarbon-containing refrigeration equipment is widely used

in industry, and these gases are emitted to the atmosphere in small amounts primarily through equipment leaks. Sulfur hexafluoride which is used as a gaseous dielectric medium for high-voltage (1 kilovolt and above) circuit breakers, switchgears, and other electrical equipment is also emitted in small amounts to the atmosphere. Methane is emitted during coal mining and from natural gas wells and delivery systems.

In 2013, worldwide man-made annual CO_2 emissions were estimated at 36 billion tons, with sources within the U.S. responsible for 14 percent of this total (Le Quéré et al. 2014). According to the official U.S. Greenhouse Gas Inventory, electric utilities in the U.S., were estimated to emit 2.039 billion tons, roughly 32 percent of the U.S. total in 2012. (USEPA 2014). In 2013, fossil-fired generation accounted for 51 percent of TVA's total electric generation, and the non-emitting sources of nuclear, hydro and other renewables accounted for 49 percent. Compared to CO_2 emissions from the entire TVA system in 2005 to those in 2013, TVA has reduced its CO_2 emissions by over 30 percent and anticipates achieving a total CO_2 emission reduction of 40 percent by 2020.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action

The impact analysis of the No Action Alternative assumes air and GHG emission impacts to the environment would be similar to those associated with the operation of the cogeneration plant by TVA. These projected CO_2 emissions are identified in Table 3-2. While a New Source Review under the Clean Air Act is expected to be required of the steam customer under this alternative, potential impacts of CO_2 emissions are considered to be minor and would not contribute significantly to climate change.

Table 3-2. Projected CO_2 Emissions, GHG Projected (Short Tons) Operating Scenario (Auxiliary Boilers and HRSG)

GHG	Additional Projected Tons/Year
CO_2 Equivalent	776,060

Note: GHG calculations utilize 40 Code of Federal Regulations (CFR) Part 98 Subpart A and C (as amended on 11-20-13 [78 FR 71904]), CT performance at 59°F, and maximum auxiliary boiler heat input. Additional need for New Source Review based on threshold of 75,000 tons per year CO_2 Equivalent.

3.2.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

The impact analysis of Alternative B assumes the action would require application for a PSD air permit as a result of increased hours of operation of Unit 20. These projected CO_2 emissions are identified in Table 3-2. and represent about 1 percent of TVA's 2013 owned CO_2 emissions. As discussed in Section 3.2.1.3, TVA anticipates achieving a total CO_2 emission reduction of 40 percent by 2020.

CO_2 emissions from the installation of an HRSG on the exhaust of existing CT Unit 20 would have a very minor and, unnoticeable impact on global emissions of CO_2 and any associated effect on global warming or climate changes. Moreover, cumulatively, net emissions of CO_2 from the JOF facility would substantially decrease as a result of the retirement of the coal-fired units.

3.3 Land Use

3.3.1 Affected Environment

The proposed plant site is located in central Tennessee along the south bank of the Tennessee River. The study area for this project consists of 85.4 ac within and adjacent to the existing JOF. As is illustrated in Figure 3-1, much of the lands associated with the existing JOF are developed lands. Current land use at the site is predominately heavy industrial development for the existing JOF. The proposed new plant would be located within previously developed lands at JOF.

The area surrounding the proposed cogeneration plant site includes a variety of land uses including industrial, recreation, and residential. Industrial developed lands owned and operated by the steam customer are located immediately to the north of the proposed plant site. Farther north and east of JOF, the areas consist of undeveloped deciduous forested lands and includes more rugged terrain. The region north of the project site includes the Johnsonville State Historic Park, which is 1.2 mi to the northeast. South of the site, the land use is dominantly industrial for approximately a mile until Broadway Street. South of Broadway, developed areas within the community of New Johnsonville consist of residential, commercial and recreational uses that include churches, residences, schools, parkland, and local government offices. The nearest residence is 1.3 mi south of JOF and the nearest church is 1.5 mi southeast. The project area is bounded to the west by the Kentucky Reservoir, which is located 0.3 mi away.

No residential or commercial land uses occur in the immediate vicinity of JOF or the proposed plant site. Land use/land cover based on the National Land Cover Database (Jin et al. 2013) within the project area and in the region around the proposed site are identified in Table 3-3. Within the project area, most of the land use is categorized as some level of developed. Other land uses include cultivated crops and deciduous and evergreen forest. Primary land uses within the 5-mi radius of the site include a mix of deciduous forest, woody wetland, cultivated crops, and developed open space. Most of this land is included in the neighboring Johnsonville State Historic Park, which is largely wooded undeveloped land.

Table 3-3. Land Use/Land Cover within the Site and Vicinity

Land Use Type	Acres Within Project Area	Acres Within 5-mi Radius
Barren Land		147.1
Shrub/Scrub		298.8
Developed, High Intensity	37.2	302.2
Developed, Medium Intensity	29.0	444.6
Emergent Herbaceous Wetlands		519.5
Developed, Low Intensity	13.9	522.8
Herbaceous		1,051.0
Evergreen Forest	0.8	1,926.7
Developed, Open Space	1.1	2,011.1
Hay/Pasture		3,107.5
Cultivated Crops	2.2	3,214.6
Woody Wetlands		3,366.4
Open Water		9,998.7
Deciduous Forest	1.2	23,354.1
Grand Total*	**85.4**	**50,264.9**

* Grand totals may not exactly match sums of individual land use types due to rounding of values.

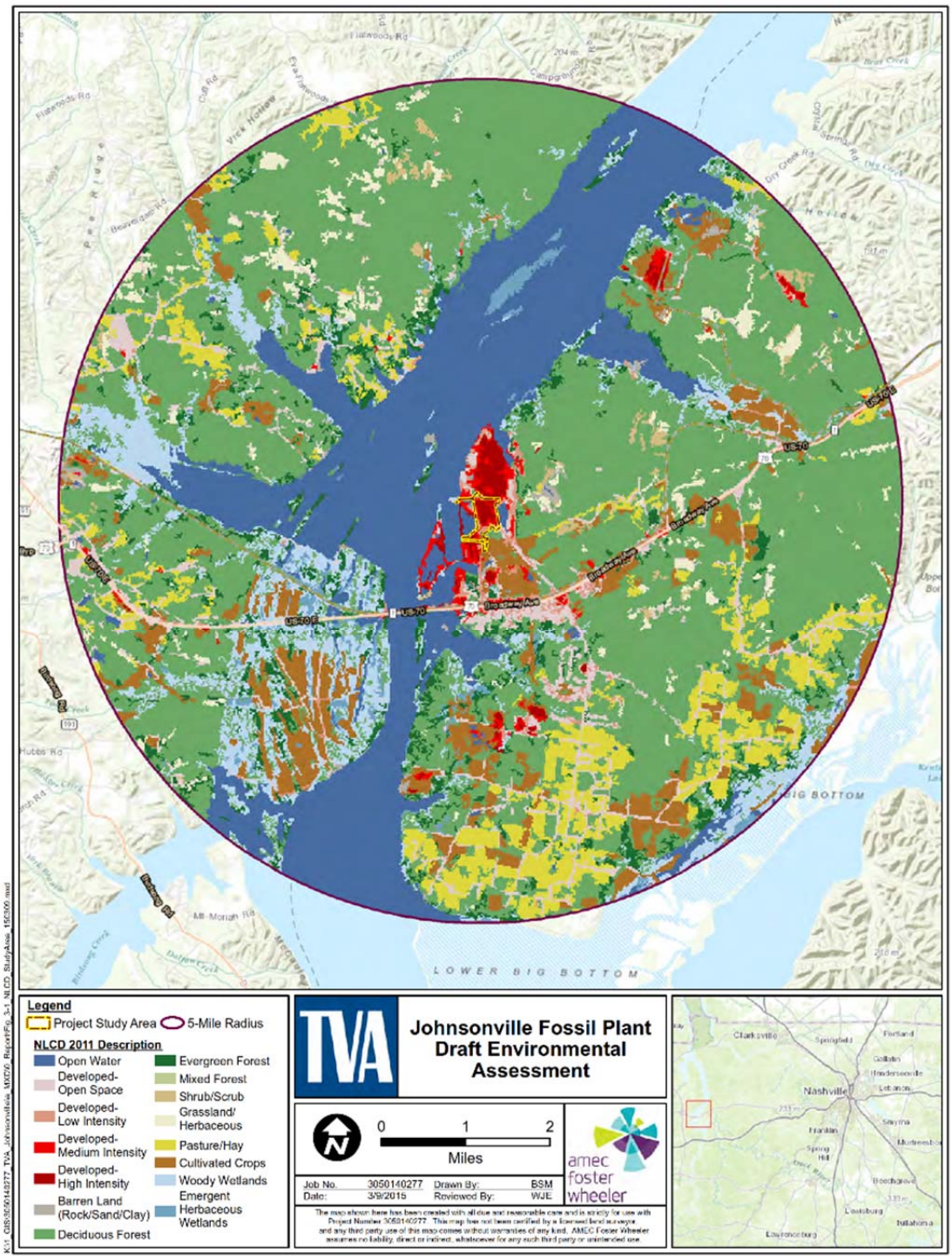

Figure 3-1. Land Use/Land Cover in the Project Area

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action

Under Alternative A, TVA would not provide steam to the steam customer. Therefore, no impacts to land use would occur on TVA owned lands. However, under this alternative, auxiliary boilers would be constructed on previously developed lands owned by the steam customer. Lands expected to be used for construction-related activities and operations are already used for heavy industrial use. Accordingly, no changes in land use would occur at the steam customer's facility with this alternative.

The steam customer would have to construct a new gas line up to 30 miles long to supply gas for auxiliary boilers. While the location of the corridor is not known, given the generally undeveloped land use in the region around the steam customer's site, it is expected that substantial impacts to land use would result from the conversion of land uses to accommodate a new utility corridor.

3.3.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Alternative B would result in no changes to land use at the proposed plant. The potential construction-related land use impacts to the project area and near off-site areas are based on the site utilization areas illustrated in Figure 2-1. Lands expected to be used for construction-related activities and operations are already used for heavy industrial use. Accordingly, no changes in land use would occur with this alternative.

Construction of the proposed plant would not result in conversion of any land uses to industrial facilities as it is proposed within an existing industrial area. Construction impacts include potential temporary impacts to 11.1 ac of developed land. Short-term impacts would include the temporary conversion of the some vacant areas to laydown areas to support various construction-related activities. These short-term impacts would include new construction parking lots, laydown and stockpile areas, and temporary crew trailers and offices. Upon completion of construction activities, it is anticipated that these areas would be restored to their previous state.

A construction stormwater permit would be obtained from the Tennessee Department of Environment and Conservation (TDEC) for the proposed construction activities. In accordance with the application package for that permit, a storm water pollution prevention plan would be developed.

Since most of the lands within the whole project area and the permanent use area specifically are considered to be previously developed, the few acres of undeveloped lands that would be converted to industrial facilities are minor when compared to the abundance of undeveloped land remaining within a 5-mi radius of the site (see Table 3-3). Additionally, these acres are not within the permanent use area, therefore any impacts would only be temporary. Furthermore, the proposed land use of the site is consistent with the current use of the site. Therefore, impacts to land use from construction and operations would be minor.

3.4 Prime Farmland

3.4.1 Affected Environment

The 1981 Farmland Protection Policy Act and its implementing regulations (7 Code of Federal Regulations [CFR] Part 658) require all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting land to a use incompatible with

agriculture. Prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air, not excessively erodible or saturated for extended period, and are protected from frequent flooding.

Within the entire proposed project area, approximately 46 ac are mapped as prime farmland soils (Table 3-4). Approximately 12 acres of prime farmland soils are mapped in the permanent and temporary use areas. It should be noted, however, that some of these lands mapped as having prime farmland soils are actually previously disturbed and partly developed, and therefore, do not retain their original prime farmland characteristics.

Table 3-4. Soil Types Mapped within Proposed Project Area

Soil Mapping Unit	Prime Farmland	Acres	Percent of Area
Proposed Permanent Use Area		**9.7**	
Paden Silt Loam	Yes	4.4	45.4%
Paden Silt Loam, eroded	No	5.3	54.6%
Laydown Areas		**11.1**	
Paden Silt Loam	Yes	7.6	68.5%
Paden Silt Loam, eroded	No	3.5	31.5%
Project Area		**85.4**	
Melvin Silty Clay Loam	No	0.1	0.1%
Wolftever Silty Clay Loam, compact	Yes	0.3	0.3%
Paden Silt loam, eroded	No	38.2	44.7%
Paden Silt Loam	Yes	45.7	53.5%
Taft Silt Loam	Yes, if drained	1.1	1.3%

The lands owned and operated by the steam customer are located immediately to the north of the proposed plant site. Due to the proximity, it is highly probable that soil types mapped in that area are similar to those at the JOF site. Similar to JOF, the lands owned and operated by the steam customer are already developed for heavy industry.

Although the soils within the proposed plant site and the steam customer's facility have the physical characteristics of prime farmland, the sites have been zoned and developed for industrial use, thereby removing them from the prime farmland category under the Farmland Protection Policy Act and its implementing regulations.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action

Under Alternative A, TVA would not supply steam to the steam customer; therefore there would be no ground-disturbing activities. As a result, no impacts to prime farmland would occur on TVA owned lands. However, under this alternative, the steam customer would provide their own steam and auxiliary boilers and related equipment would be constructed on previously developed lands owned by the steam customer. While there are likely soils

that are mapped as prime farmland on the lands owned by the steam customer, they are already likely disturbed and used for heavy industrial use. Therefore, impacts to prime farmland soils from construction and operation of this alternative at the steam customer facility would be negligible.

The steam customer would have to construct a new gas line up to 30 miles long to supply gas for auxiliary boilers. Given the length of the line, it is likely that prime farmland soils would be crossed by the gas line route and these soils would no longer support crop production.

3.4.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Alternative B would result in minor impacts to soils with prime farmland characteristics, but the proposed site and laydown areas are already developed for industrial use. Based on the proposed development plan, impacts from construction and operation of the new plant include 9.7 ac of permanent and 11.1 ac of temporary impacts, all located within the 85.4-ac project study area on the JOF site. Temporary impact areas would not include substantial ground disturbance activities, and the areas would be restored to the original condition upon construction completion.

Approximately 7,203 ac (14.3 percent) of the area within 5 mi have soils classified as prime farmland (USDA-NRCS 2014). Within Benton County, the most abundant prime farmland soil type is Lax silt loam and within Humphreys County, Paden silt loam is dominant. Any minor loss of on-site lands designated as having prime farmland is not significant when compared to the amount of land designated as prime farmland within the surrounding region.

3.5 Vegetation

3.5.1 Affected Environment

The JOF site is an intensely developed site (see Figure 3-1) that has been heavily disturbed by construction, maintenance, and operation of the facility. As a result of this wholesale alteration of the physical landscape, most areas within the JOF site are unvegetated, but a few very small locations do contain early successional vegetation dominated by non-native weeds. Previously disturbed sections of the steam customer's property that could be utilized for steam generation infrastructure presumably possess severely degraded habitat similar to that found on the JOF site.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action

Adoption of Alternative A would not result in impacts to the terrestrial ecology of the region. TVA property within the project area has no conservation value, and adoption of Alternative A would not change that situation; the property would remain in its current condition and no work would occur on TVA lands. The few vegetated areas on the parcel would continue to be dominated by non-native and early successional species indicative of disturbed habitats. Any changes occurring in the vegetation on-site would be the result of other natural or anthropogenic factors and would not be the result of adoption of Alternative A. Adoption of this alternative would, however, result in work occurring on the steam customer's property, but this work would not appreciably impact vegetation. Aerial photos suggest this site is heavily disturbed, contains a large proportion of non-native species, and is incapable of supporting plant communities with conservation value.

Construction, operation, and maintenance of steam generating infrastructure could result in permanent conversion of areas that are currently vegetated, but those habitats would most likely be comprised of early successional and non-native plant species that are common and well represented throughout the region.

Construction of the natural gas line would directly impact the vegetation within the line route. Given the length of the gas line, it is likely that there would be impacts to various plant communities within the proposed right of way including the permanent loss of forestland.

3.5.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Adoption of Alternative B would result in the construction of steam generating infrastructure on portions of TVA property that are currently heavily disturbed. These areas do not contain intact native plant communities, and adoption of this alternative would not change that situation. Impacts to vegetation may be permanent, but the vegetation found on site is comprised of non-native weeds and early successional plants that have no conservation value. Adoption of Alternative B would not negatively impact vegetation of the region.

3.6 Wildlife

3.6.1 Affected Environment

The proposed project at the TVA JOF is located along the east bank of Kentucky Reservoir near New Johnsonville, Tennessee. The project proposes to add and operate a HRSG to an existing CT, including duct firing and auxiliary boilers in order to continue steam production after the closure of the coal-fired units in December 2017 (see Subsection 2.1.2). The area evaluated for wildlife impacts incudes the existing CT area, adjacent coal facility structures and buildings, transmission lines and associated rights-of-ways, parking lots, mowed areas of grass, a recently cleared and hydroseeded area, and a small forested area. Terrestrial habitat within the project area includes a small (less than 1 ac) forested area (composed of pine and black cherry trees), a row of planted pine trees, and mowed grass fields.

Mowed herbaceous fields and manicured lawns offer little suitable habitat for rare wildlife species, but can be used by many common species especially when the landscape still retains a few trees. Birds that utilize these grassy areas include Canada goose, eastern phoebe, eastern kingbird, eastern meadowlark, killdeer, purple martin, red-tailed hawk, and rock dove. Mammals that can be found here are common mole, coyote, ground hog, least shrew, white-footed mouse, and white-tailed deer.

Birds that utilize planted trees and small patches of disturbed forest adjacent to industrialized areas include American robin, American goldfinch, blue jay, Carolina chickadee, Carolina wren, chimney swift, eastern towhee, osprey, red-headed woodpecker, tufted titmouse, northern cardinal, northern mockingbird, and yellow breasted chat. Mammals found in and around these industrialized areas include common raccoon, eastern gray squirrel, hispid cotton rat, and Virginia opossum.

Review of the TVA Regional Natural Heritage database in December 2014 indicates that no records of caves exist within 3 mi of the project area and none were found on the project area during field reviews on December 4, 2014. No other unique or important terrestrial habitats exist in the project area.

One osprey nest was observed on a lighting structure adjacent to the coal pile run-off pond. This nest is located approximately 350 ft from the potential water intake structure and immediately adjacent to the perimeter road around the coal pile and run-off pond. It is located in an area that undergoes routine disturbance from vehicular traffic and coal handling operations. This nesting pair appears to be acclimated to a substantial amount of human activity in the near vicinity of the nest.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate in its current configuration and would not supply steam to the steam customer following the closure of the coal-fired units at JOF in 2017. No construction activities would be undertaken by TVA. Under this alternative, the steam customer would be responsible for producing their own steam to continue their operation and may develop land for the construction of the steam generator. Land selected for this construction on the steam customer's property is likely to be previously developed. Construction actions taking place within such areas would likely temporarily displace any wildlife (primarily common, habituated species) currently using any of these disturbed areas. It is expected that this wildlife would return to temporary use areas upon completion of actions. Direct effects to some individuals that may be immobile during the time of construction may occur. This could be the case if construction activities took place during breeding/nesting seasons. In addition, habitat removal likely would disperse wildlife into surrounding areas in their attempt to find new food sources, shelter sources and to reestablish territories, potentially resulting in added stress or energy use. In the event that the surrounding areas are already overpopulated, further stress to wildlife populations could occur to those individuals presently utilizing these areas as well as those attempting to relocate. Considering the amount of similarly forested habitat and shoreline in the surrounding area, however, it is unlikely that the surrounding areas have reached levels of overpopulation and cannot absorb more individuals. Populations of common wildlife species likely would not be impacted by the proposed actions.

The steam customer would have to construct a gas line up to 30 miles long to provide natural gas to auxiliary boilers. Construction of the gas line may disturb wildlife species sheltering within or near the corridor. Additionally, clearing of vegetation along the gas line right of way may result in permanent habitat loss for wildlife. These impacts would be minimized if the gas line were routed to follow an existing right of way.

One osprey nest was observed near the coal pile run-off pond during field review of the JOF project area. The nest has remained active since at least 2009, indicating that this pair of osprey are very acclimated to the amount of disturbance currently present at the JOF site. Potential construction activities related to installation and operation of a water supply pipeline from the plant to the existing fire suppression system intake at the north end of the boat harbor would occur approximately 350 ft from this nest, and would not be noticeably more disruptive than current site activities. Due to the demonstrated tolerance of this pair of osprey and the minor amount of additional disturbance that would be generated by water supply pipeline construction, no impacts to this pair of osprey are anticipated to occur. Any actions or connected actions by the steam customer on TVA or other federal lands could require additional environmental surveys to ensure there are no impacts to aggregations of migratory birds protected under the Migratory Bird Treaty Act.

3.6.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under Alternative B, TVA would continue to provide steam power to the steam customer.

Under this alternative, the resident, common, and habituated wildlife found in the project footprint would continue to opportunistically use available habitats within the project area. Installation of the HRSG and auxiliary boilers may disturb wildlife species sheltering in the area, however these actions would not destroy any wildlife habitat. Actions may temporarily displace wildlife to similarly disturbed environments in surrounding areas. Wildlife is expected to return once actions are complete. The actions are not likely to affect populations of wildlife species common to the area under Alternative B.

3.7 Aquatic Ecology

3.7.1 Affected Environment

The TVA JOF is located in Humphreys County, Tennessee, in the Western Highland Rim subregion of the greater Interior Plateau ecoregion (Griffith et al. 2009). The proposed project area is located along the south bank of the Kentucky Reservoir (Figure 3-2) and lies within the Tennessee River 10-digit Hydrologic Unit Code watershed 0604000504.

The Western Highland Rim of the Interior Plateau is characterized by dissected, rolling terrain of open hills, with elevations of 400 to 1,000 ft. Soils in this region tend to be acidic, cherty, and moderate in fertility (Griffith et al. 2009). Streams in this region are relatively clear with moderate gradients, with substrates consisting primarily of course chert gravel and sand with some bedrock. Much of the region is heavily forested, with some agriculture in the stream and river valleys. A December 2014 desktop review of the proposed project area did not document any streams or water features. The JOF facility is located on the eastern shore (right descending bank) of Kentucky Reservoir at Tennessee River Mile (TRM) 100. The reach of the Tennessee River adjacent to JOF has been altered from its former free-flowing character by the presence of Kentucky Dam, located approximately 76 river miles downstream of JOF, and Pickwick Dam, located approximately 107 river miles upstream. TVA began a program to monitor the ecological conditions of its reservoirs systematically in 1990. Reservoir (and stream) monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated Vital Signs Monitoring Program (VSMP). Vital signs monitoring activities focus on (1) physical/chemical characteristics of waters; (2) physical/chemical characteristics of sediments; (3) benthic macroinvertebrate community sampling; and (4) fish assemblage sampling (Dycus and Baker 2001).

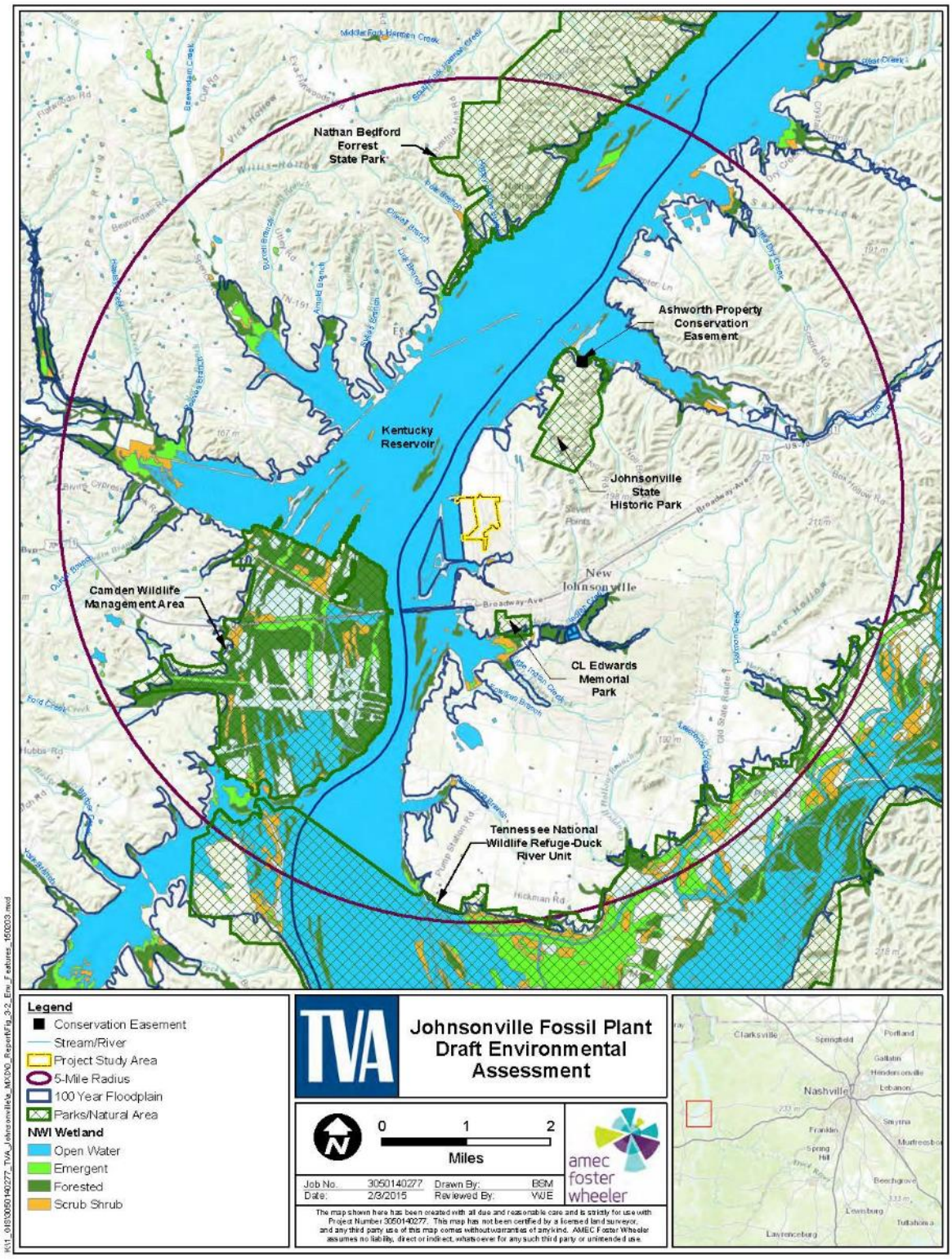

Figure 3-2. Water Resources and Wetlands in the Project Vicinity

Benthic macroinvertebrates are included in aquatic monitoring programs because of their importance to the aquatic food chain and because they have limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and

data analysis are based on seven parameters that include (1) species diversity, (2) presence of selected taxa that are indicative of good water quality, (3) occurrence of long-lived organisms, (4) total abundance of all organisms except those indicative of poor water quality, (5) proportion of total abundance comprised by pollution-tolerant oligochaetes, (6) proportion of total abundance comprised by the two most abundant taxa, and (7) proportion of samples with no organisms present. Compared to stations at other TVA run-of-the-river reservoirs, monitoring sites on Kentucky Reservoir have consistently scored "Fair" to "Excellent", with "Excellent" scores at TRM 85, the site closest to JOF and the proposed project area since 1997 (TVA 2011) (Table 3-5 and Table 3-6).

Table 3-5. Benthic Community Scores – TRM 23, 85 and 200*

Station	Inflow	Transition	Forebay
Site	TRM 200	TRM 85	TRM 23
1994	Good	Good	Good
1995	Fair	Good	Fair
1997	Good	Excellent	Good
1999	Fair	Excellent	Fair
2001	Fair	Excellent	Excellent
2003	Good	Excellent	Excellent
2005	Good	Excellent	Good
2007	Excellent	Excellent	Good
2009	Fair	Excellent	Good
2011	Good	Excellent	Excellent

* Collected as part of the VSMP in Kentucky Reservoir at TRM 23, 85 and 200 (1994-2011).

Table 3-6. Benthic Community Scores at TRM 106.3, 103.6, 98.2 and 94.3*

Station	Upstream	Upstream	Downstream	Downstream
Mile (TRM)	106.3	103.6	98.2	94.3
Year	2011	2011	2011	2011
Season	Summer	Summer	Summer	Summer
Score	33	31	33	31
Rating	Excellent	Excellent	Excellent	Excellent
Season	Fall	Fall	Fall	Fall
Score	31	33	33	33
Rating	Excellent	Excellent	Excellent	Excellent

* Collected as part of the VSMP in Kentucky Reservoir at TRM 106.3, 103.6, 98.2 and 94.3.

TVA initiated a study in 2001 to evaluate fish communities in areas immediately upstream and downstream of JOF using Reservoir Fish Assemblage Index (RFAI) multi-metric evaluation techniques. Electrofishing and gill netting sampling stations correspond to those described for benthic macroinvertebrate sampling (TVA 2011). Fish are included in aquatic monitoring programs because they are important to the aquatic food chain and because they have a relatively long life cycle which allows them to reflect conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Monitoring results for each sampling station are analyzed to arrive at a RFAI rating which is based primarily on fish community structure and function. Also considered in the rating is the percentage of the sample represented by omnivores and insectivores, overall number of

fish collected, and the occurrence of fish with anomalies such as diseases, lesions, parasites, deformities, etc. (TVA 1999). The VSMP fish community monitoring results are identified in Table 3-7. Overall results indicate that the Kentucky Reservoir fish assemblage has been consistently "Fair" or "Good" from 1993 to 2010, with the exception of the "Excellent" score at the inflow in 2011 (TVA 2011).

Table 3-7. Kentucky Reservoir Fisheries Assemblage Index Scores*

Station	Inflow	Upstream of JOF	Downstream of JOF	Transition	Forebay
Site (TRM)	200	105	97	85	23
1993	Fair	-	-	Good	Fair
1994	Fair	-	-	Good	Fair
1995	Fair	-	-	Good	Fair
1997	Fair	-	-	Good	Good
1999	Good	-	-	Good	Good
2001	Good	Good	Good	Good	Good
2003	Good	Good	Good	Good	Good
2005	Good	Good	Good	Good	Good
2007	Good	Good	Good	Good	Good
2009	Good	-	-	Good	Fair
2010	-	Good	Good	-	-
2011	Excellent	Good	Good	Good	Good

* Based on VSMP data at TRM 200, 105, 97, 85 and 23.

Results of summer and fall 2011 RFAI and reservoir macroinvertebrate benthic index data collected upstream and downstream of JOF with comparisons to RFAI data collected at these sites during previous years are presented in Table 3-5 and Table 3-6. Overall, the results report a healthy fish, benthic, and wildlife community downstream of the JOF thermal discharge. In addition, the heated JOF effluent apparently has not adversely impacted these communities (Warden 1981, TVA 1974, TVA 2011).

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate in its current configuration, and would not supply steam to the steam customer following the closure of the coal-fired units at JOF in 2017. Under this alternative, the steam customer would be responsible for producing their own steam to continue their operation. No construction activities would be undertaken by TVA as part of this alternative. Potential impacts associated with this alternative would be dependent upon the course of action employed by the steam customer to supply their own steam. Decisions regarding water supply to the steam generator by the steam customer would consider a range of options including use of potable water, use of groundwater, or construction of a new surface water intake. If the steam customer choses to develop a surface water supply to provide water for their use in producing steam, water withdrawal would invariably result in minor amounts of entrainment of aquatic life suspended within the water column. The steam customer would be subject to compliance with all local, state, and federal regulations, and be responsible for obtaining all applicable permits and minimization of impacts to aquatic life. Due to the industrial nature of the

steam customer facility and proximity to watersheds intersecting JOF which have experienced extensive past disturbance, impacts to aquatic resources are expected to be limited with adoption of the No Action Alternative. There would be no measurable impacts to Kentucky Reservoir on the Tennessee River; however, changes to aquatic ecology would likely occur within the watershed over the long term due to factors such as the continuation of agricultural activities and population growth.

The steam customer would have to construct a new gas line to provide natural gas to the auxiliary boilers. Direct impacts to aquatic life may be associated with habitat alteration from trenching activities, whereas indirect impacts may be associated with storm water runoff due to temporary construction activities.

3.7.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Following retirement of the JOF coal-fired units in December 2017, TVA would continue to provide steam to the steam customer from a cogeneration plant which would include the addition of a HRSG and two redundant auxiliary boilers to the existing CT Unit 20 at JOF. All major equipment would be placed on TVA property. Under this alternative, TVA would continue to withdraw water from the Tennessee River (Kentucky Reservoir) from either the existing clean water intake system of JOF or from the intake associated with the fire suppression system at the north end of the harbor (see Figure 2-1).

A December 2014 desktop review of the action area did not document any water features, therefore, neither an Aquatic Resource Alternation Permit nor US Army Corps of Engineers Section 404 Permit are needed for this action. Appropriate BMPs would be implemented during construction, operation, and maintenance of the proposed plant to minimize runoff to receiving waters. Water withdrawal would invariably result in minor amounts of entrainment of aquatic life suspended within the water column. However, because water would be withdrawn through the existing clean water intake system at JOF or the existing intake structure associated with the fire suppression system, and because the volume of water is low, no measurable impacts to aquatic ecology in watersheds intersecting JOF or the Tennessee River (Kentucky Reservoir) are anticipated.

3.8 Threatened and Endangered Species

3.8.1 Affected Environment

The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or their designated critical habitat. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes.

The State of Tennessee provides protection for species considered threatened, endangered or deemed in need of management within the state other than those federally listed under the ESA. The listing is handled by the TDEC; additionally, the Tennessee Natural Heritage Program and TVA both maintain databases of aquatic animal species that are considered threatened, endangered, special concern or tracked in Tennessee.

A review of the TVA Regional Natural Heritage database and the U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System for species of conservation concern potentially present with the project area was conducted in December 2014 (Table 3-8).

Table 3-8. Species of Conservation Concern[1]

Common Name	Scientific Name	Status[2]	
		Federal	State (Rank[3])
Birds			
Bald eagle	*Haliaeetus leucocephalus*	DM	NMGT (S3)
Little blue heron	*Egretta caerulea*	--	NMGT(S2B,S3N)
Piping plover	*Charadrius melodus*	LT	TRKD (S2)
Fish			
Coppercheek darter	*Etheostoma aquali*	--	THR (S2S3)
Golden darter	*Etheostoma denoncourti*	--	NMGT (S2)
Highfin carpsucker	*Carpiodes velifer*	--	NMGT (S2S3)
Pygmy madtom	*Noturus stanauli*	LE	END (S1)
Saddled madtom	*Noturus fasciatus*	--	THR (S2)
Slenderhead darter	*Percina phoxocephala*	--	NMGT (S3)
Mammals			
Northern long-eared bat	*Myotis septentrionalis*	LT	--
Indiana bat	*Myotis sodalis*	LE	END (S1)
Mussels			
Clubshell	*Pleurobema clava*	LE	END (SH)
Orange-foot pimpleback	*Plethobasus cooperianus*	LE	END (S1)
Pink mucket	*Lampsilis abrupta*	LE	END (S2)
Purple lilliput	*Toxolasma lividum*		TRKD (S1S2)
Ring pink	*Obovaria retusa*	LE	END (S1)
Rough pigtoe	*Pleurobema plenum*	LE	END (S1)
Slabside pearlymussel	*Pleuronaia dolabelloides*	LE	TRKD (S2)
Smooth rabbitsfoot	*Quadrula cylindrica*	LT	TRKD (S3)
Spectaclecase	*Cumberlandia monodonta*	LE	TRKD (S2S3)
Reptiles			
Alligator snapping turtle	*Macrochelys temminckii*	--	NMGT(S2S3)
Northern pine snake	*Pituophis melanoleucus*	--	THR(S3)
Western pigmy rattlesnake	*Sistrurus miliarius streckeri*	--	THR(S2S3)
Plants			
Hairy umbrella-sedge	*Fuirena squarrosa*	-	SPCO(S1)
Smaller mud-plantain	*Heteranthera limosa*	-	THR(S1S2)
Lamance iris	*Iris brevicaulis*	-	END(S1)
Virginia rose	*Rosa virginiana*	-	SPCO(SH)

[1] Documented in Humphreys County, Tennessee, and/or within 5 mi (terrestrial animals, plants) or 10 mi (aquatic animals) of the JOF project area; Source: TVA Natural Heritage Database, accessed December 2014; USFWS Environmental Conservation Online System on-line database, accessed December 2014.
[2] Status Codes: END = Endangered; LE = Listed Endangered; LT = Listed Threatened; SPCO = Listed Special Concern; S-CE =Special Concern-Commercially Exploited; NMGT = In Need of Management; PE = Proposed Endangered; THR = Threatened; TRKD = Tracked by the Tennessee Natural Heritage Program
[3] Status Ranks: S1 = extremely rare and critically imperiled; S2 = Very rare and imperiled; S3 = Vulnerable; S4 = apparently secure, but with cause for long-term concern; SH = Historic in Tennessee; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

The JOF site includes the permanent use area in the vicinity of CT Unit 20, adjacent coal facility structures and buildings, transmission lines and associated rights-of-ways, parking lots, mowed areas of grass, and a small forested area. As identified in Section 3.6.1, terrestrial habitat within the project footprint (primarily within the laydown areas) includes a small (less than 1 ac) forested area (composed of pine and black cherry trees), a row of

planted pine trees, and mowed grass fields. Mowed herbaceous fields and manicured lawns offer little suitable habitat for rare wildlife species.

Listed terrestrial animal species documented to occur within 3 mi of JOF include:

- One federally listed threatened species (piping plover)
- One federally listed protected species (bald eagle)
- Four Tennessee state-listed species (little blue heron, alligator snapping turtle, northern pine snake, and western pigmy rattlesnake)
- No designated critical habitat for federally listed terrestrial species is present within the project area.

The project footprint falls within the range of:

- One federally listed endangered species (Indiana bat)
- One federally listed threatened species (northern long-eared bat)

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This species is associated with large, mature trees capable of supporting its massive nests. These are usually found near large waterways where the eagles forage (Turcotte and Watts 1999). Records document the occurrence of four bald eagle nests in Humphreys County with three being within 10 mi of the project footprint. The closest of these recorded nests is approximately 4.8 mi from the project area. No bald eagle nests or resident bald eagle pairs were observed during a field review at JOF on December 4, 2014. Suitable nesting habitat for bald eagle may exist off the JOF site along the shoreline and in forests to the west, north, and east of JOF. However, no suitable nesting or foraging habitat for bald eagles exists in the project area on the JOF site nor that of the adjacent customer.

Little blue herons are found in a variety of calm, shallow bodies of water including marshes, ponds, lakes, wet meadows, mudflats, and streams. They nest in trees and shrubs over water often with large groups of other herons, and egrets (NatureServe 2014, Turcotte and Watts 1999). One little blue heron record occurs approximately 1.8 mi from the project area in Benton County, Tennessee. Suitable habitat for little blue herons may exist in undeveloped lands to the north and east of the project suite, but it does not exist in the developed areas associated within the project area at the JOF site nor that of the adjacent customer.

Piping plovers forage in exposed sand flats, mudflats, sandy beaches, stream shorelines, and ephemeral ponds (USFWS 2003). The populations of piping plover that can be found in the Tennessee Valley Region are rare fall and spring migrants (Robinson 1990, Palmer-Ball 2003, Henry 2012). The frequency of observance of this species within this region has been less than annual, with time spent averaging two days per stay at interior stopover sites. Piping plovers are routinely observed on islands in the Mississippi River near Memphis. Individuals also have been observed at TVA fossil plants and along the Kentucky Reservoir (Henry 2012). The closest record of piping plover is from an island directly across the Kentucky Reservoir from JOF, approximately 0.7 mi from the project footprint. Suitable habitat for piping plover may exist along the immediate shoreline of Kentucky Reservoir, east of the main JOF complex and the steam customer's industrial facility. However, suitable habitat for the piping plover does not exist in the project area at the JOF site nor that of the adjacent customer.

Alligator snapping turtles inhabit slow-moving, deep waters in rivers, sloughs, oxbows, and canals or lakes associated with rivers, as well as swamps, bayous, and ponds connected to rivers (NatureServe 2014, Buhlmann et. al. 2008). Preferred microhabitat incudes log jams, undercut banks, rock shelters, and deep holes (Jensen 2008). The nearest alligator snapping turtle record occurs approximately 1.9 mi from the project footprint. Suitable habitat for alligator snapping turtles does not exist in developed areas associated within the proposed area on the JOF site, but may exist in wet areas adjacent to JOF, the steam customer and the Kentucky Reservoir.

The Northern pine snake is a large, nonvenomous snake typically found in sandy, well-drained upland pine or pine-oak woodlands. Northern pine snakes spend the majority of their time underground, but they are often encountered aboveground during spring and late summer to early autumn (Tennant 2003, Tuberville and Mason 2008). The nearest northern pine snake record occurs approximately 2.2 mi from the project area in Humphreys County. Suitable habitat for northern pine snake may exist in undeveloped areas to the north and west of the JOF site but does not exist in the developed areas associated within the proposed project footprint of the JOF complex or that of the steam customer.

The Western pigmy rattlesnake is a small venomous snake found in habitats ranging from dry sandhills and longleaf pine forests to wet hammocks (Glaudas 2008). This animal is extremely secretive and seldom encountered as it spends the day hidden beneath ground cover (Tennant 2003). The nearest western pigmy rattlesnake record occurs approximately 2.2 mi from the project footprint. Suitable habitat for western pigmy rattlesnakes may exist in undeveloped areas to the north and west of the JOF site but does not exist in the developed areas associated within the proposed project footprint of the JOF complex or that of the steam customer.

Two heron rookeries have been reported within 3 mi of JOF (approximately 1.1 and 1.8 mi distant). During field reviews, no heron rookeries or bald eagle nests were observed in the project area on the JOF site or in the immediately surrounding area.

Indiana bats hibernate in caves in winter and use areas around them for swarming (mating) in the fall and staging in the spring, prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead snags and living trees in mature forests with an open understory and a nearby source of water (Pruitt and TeWinkel 2007, Kurta et al. 2002). Indiana bats are known to change roost trees frequently throughout the season, while still maintaining site fidelity, returning to the same summer roosting areas in subsequent years (Harvey and Saugey 2001). Although less common, Indiana bats have also been documented roosting in buildings (Butchkoski and Hassinger 2002). No known caves exist within 3 mi of the project area and none were identified during a field visit on December 4, 2014. The nearest documented cave record occurs just over 13.0 mi away in Benton County.

In April 2014, female Indiana bats were tracked to an area approximately 12 mi northwest of the project area near the Benton County/Henry County line. The bats remained in the project area until the start of the maternity season, suggesting that a maternity roost exists in close proximity to these records. Within the JOF site project footprint, there is a small forested area and a row of pine trees along the southern end of the project footprint. These areas may provide a small amount of foraging habitat for Indiana bats; however, none of this vegetation offers suitable summer roosting habitat for Indiana bat. Areas with trees outside of the JOF project site also may provide suitable summer roosting habitat for

Indiana bat. Buildings within the proposed project footprint may offer temporary roosting habitat for Indiana bat if they are unused and provide necessary roost characteristics.

The northern long-eared bat was listed as federally threatened on April 2, 2015. In winter, this species roosts in caves or cave-like structures (such as buildings and mines), while summer roosts are typically in cave-like structures as well as live and dead trees with exfoliating bark and crevices. Northern long-eared bats tend to forage within the mid-story and canopy of upland forests on hillsides and ridges (USFWS 2014). Species range maps from the Tennessee Bat Working Group indicate there are no past records in Humphreys County; however there are records of northern long-eared bats from adjacent counties (Hickman, Houston, and Perry). According to the USFWS, this species has the potential to exist statewide in Tennessee (USFWS 2014) and, therefore, has the potential to occur within the project area. No caves have been documented within 3 mi of the project area. Habitat assessments of forested areas on the JOF complex determined that the small forested area and the row of pine trees along the southern end of JOF may provide foraging habitat, but does not offer suitable summer roosting habitat for the northern long-eared bat. However, areas with trees outside of the JOF complex footprint may provide suitable summer roosting habitat. Buildings on JOF and the steam customer's property may also offer temporary roosting habitat for northern long-eared bat if they are seldom unused and provide necessary roost characteristics.

Listed aquatic animal species documented as occurring within the Tennessee River 10-digit HUC watershed (HUC 0604000504) and within a 10-mi radius of the proposed JOF steam supply project area (see Table 3-8) in Humphreys County, Tennessee include:

- Four federally listed mussel species (pink mucket, slabside pearlymussel, smooth rabbitsfoot, and spectaclecase). These species are known to occur only in Kentucky Reservoir (mainstem Tennessee River) and in the Duck River in Humphreys County.
- One federally listed threatened species (pygmy madtom) is reported from the Duck River in Humphreys County
- Four additional federally listed endangered species (clubshell, orange-foot pimpleback, ring pink and rough pigtoe) are either historical or extirpated records and no longer considered extant in this portion of the Tennessee River.
- No federally designated critical habitat for these species is present within Humphreys County, Tennessee.

The four federally listed mussel species that are considered extant in this portion of the Tennessee River (pink mucket, slabside pearlymussel, smooth rabbitsfoot, and spectaclecase) were not observed in recent surveys adjacent JOF (Third Rock Consultants 2010).

The pygmy madtom is an extremely rare fish which only occurs in limited reaches of the lower Duck River in in this portion of the Tennessee River system and does not occur in the mainstem of the Tennessee River adjacent to JOF (Etnier and Starnes 1993).

As with the federally listed species, none of the state listed species reported from Humphreys County (coppercheek darter, golden darter, highfin carpsucker, saddled madtom, slenderhead darter, purple lilliput, and ornate rocksnail) are known from the

project area. A December 2014 desktop review of the proposed project area did not document any streams or water features within the project footprint.

A December 2014 query of the TVA Heritage database and USFWS Environmental Conservation Online System data indicates that no federal listed and four state listed plant species (hairy umbrella-sedge, smaller mud-plantain, Lamance iris, and Virginia rose) are known within 5 mi of the proposed project area (see Table 3-8). No federally listed plant species have been previously reported from Humphreys County, Tennessee, where the project would be located. A field review of the JOF site indicates that no habitat for federal or state listed plant species occurs in the potential affected area. The habitat on site has been severely degraded and is populated primarily with non-native species. Aerial photography suggests that the steam customer's property has been similarly disturbed and that any areas where steam generation infrastructure would be located would be incapable of supporting rare plants. No designated critical habitat for plants occurs in the proposed project area.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A: No Action

Under the No Action Alternative, TVA would continue to operate in its current configuration and would not supply steam to the steam customer following the closure of the coal-fired units at JOF in 2017. No construction activities would be undertaken by TVA. Under this alternative, the steam customer would be responsible for producing their own steam to continue their operation and may develop land for the construction of the steam generator and water supply (potentially a water intake located at the shoreline of Kentucky Reservoir). With the exception of the water supply, land selected for this construction is likely to be previously developed lands to the north and west of the core facility along the river or some other previously disturbed areas on site.

Under Alternative A, there would be no TVA-related activities that would impact wildlife species or their habitats as no construction activities would take place. However, reasonably foreseeable actions taken by the steam customer to produce their own steam may cause disturbance. These activities potentially include construction of a water intake and supply line to Kentucky Reservoir, or connection to an existing potable water source, and construction of a natural gas line to supply gas for auxiliary boilers. Any construction activities undertaken by the steam customer within the current industrial footprint of the steam customer's facility or any off-site areas would be subject to appropriate state and federal permits, and would likely temporarily displace any wildlife (primarily common, habituated species) currently using any of these disturbed areas. It is expected that this wildlife would return to these areas upon completion of actions.

No heron rookeries were observed along the shoreline during field review of the JOF project area. Any actions or connected actions by the steam customer on TVA or other federal lands would require environmental surveys to ensure that there are no impacts state or federally listed species. If resources are identified, suitable avoidance and minimization measures would be developed by the steam customer. Protected terrestrial animals and their habitats otherwise would not be affected by any project-related actions.

Because no state or federally listed terrestrial species are known from the project area, there would be no direct, indirect, or cumulative effects to federal or state listed endangered or threatened aquatic species or critical habitats by TVA project-related actions. If previously undisturbed areas are to be affected for construction of a water supply serving

this facility, the steam customer would be required to abide by all appropriate state and federal regulations to avoid, minimize or mitigate impacts to protected resources.

Adoption of the No Alternative would not result in direct, indirect or cumulative impacts to the terrestrial ecology of the region (including state- and federally listed plant species) from TVA activities. TVA property would remain in its current condition and no work would occur. The few vegetated areas on the parcel would continue to be dominated by non-native and early successional species indicative of disturbed habitats. Any changes occurring in the vegetation on-site would be the result of other natural or anthropogenic factors and would not be the result of adoption of the No Action Alternative.

Adoption of this alternative would result in work occurring on the steam customer's property, but this work would not appreciably impact vegetation. Aerial photos suggest this site is heavily disturbed, contains a large proportion of non-native species, and is incapable of supporting plant communities with conservation value. Construction, operation, and maintenance of steam generating infrastructure could result in permanent conversion of areas that are currently vegetated, but those habitats would most likely be comprised of early successional and non-native plant species that are common and well represented throughout the region. Construction and operation of water supply to this facility would be subject to further state and federal permitting actions. It is not anticipated that development of a customer-owned and operated water supply would affect vegetation in the area.

Impacts associated with construction of the new natural gas line may include construction phase related disturbance to protected species and temporary or permanent habitat loss. Construction of the new gas line may disturb wildlife species sheltering within or near the corridor. Additionally, clearing of vegetation along the gas line right of way may result in permanent habitat loss for protected species. The steam customer would be required to abide by all appropriate state and federal regulations to avoid, minimize or mitigate impacts to protected resources.

3.8.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under this alternative, the resident, common, and habituated wildlife found in the project footprint would continue to opportunistically use available habitats within the project area. Construction of the cogeneration plant may disturb wildlife species sheltering in the area, however these actions would not destroy any wildlife habitat. Actions may temporarily displace wildlife to similarly disturbed environments in surrounding areas. Wildlife is expected to return once actions are complete. The actions are not likely to affect populations of wildlife species common to the area under Alternative B. No suitable habitat for Indiana bat, gray bat, northern long-eared bat, alligator snapping turtle, little blue heron, northern pine snake, piping plover or western pigmy rattlesnake would be directly, indirectly, or cumulatively affected by construction and operation of this equipment.

No bald eagles or bald eagle nests were observed along the shoreline during field review of the JOF site footprint, and no nests are known in the vicinity of the steam customer's facility. Bald eagles have been observed incidentally at the JOF site, but there is no indication of bald eagle nests or important wintering aggregations of bald eagles on the JOF site. If actions are limited to previously disturbed areas, impacts to bald eagles are not anticipated.

This alternative is not anticipated to alter any watercourses or water features within the project area, and no impacts would occur in areas potentially inhabited by sensitive

species. Construction activities, including construction of a water supply pipeline running from the existing fire suppression system intake at the north end of the boat harbor to the plant permanent use area, would not cross any streams or watercourse. Because water withdrawals would occur at an existing structure and withdrawal volumes would not represent a significant proportion of water available in Kentucky Reservoir, no measureable effects on aquatic communities (including state and federally listed aquatic species) are anticipated to result from construction and operation of a new water supply.

Blowdown from the plant would be conveyed to the coal pile runoff pond and then pumped to the ash pond. Consequently, there would be no direct discharges from the project to the Tennessee River. Discharge constituents are not expected to exceed current NPDES permit requirements and no measurable effects to water quality or aquatic habitat (including that occupied by state- or federally listed species) is anticipated to occur.

Furthermore, there is no designated critical habitat within the Tennessee River 10-digit HUC watershed (HUC 0604000504) or a 10-mi radius of the proposed project area. Though suitable mussel habitat is present in the mainstream of the Tennessee River adjacent to JOF, recent surveys did not document any federally threatened or endangered species in the project vicinity (Third Rock Consultants 2010). Therefore, no direct, indirect, or cumulative impacts to state or federally listed aquatic species or federally designated critical habitats are anticipated to occur.

Adoption of Alternative B would result in the construction of steam generating infrastructure on portions of TVA property that are currently heavily disturbed. These areas do not contain intact native plant communities and adoption of this alternative would not change that situation. Impacts to vegetation may be permanent, but the vegetation found on site is comprised of non-native weeds and early successional plants that have no conservation value and no state- or federally listed plants are present within the project area. Adoption of Alternative B would not negatively impact vegetation of the region (including state or federally listed plant species or their habitats).

3.9 Geology

3.9.1 Affected Environment

JOF is located along the eastern bank of the Tennessee River within the Western Valley physiographic province (Hardeman 1966). The site is underlain by alluvium and terrace deposits varying in thickness from less than 20 ft along the tributary stream banks up to more than 100 ft within the floodplain of the Tennessee River. Underlying bedrock consists of the Lower Mississippian age Fort Payne Formation and Devonian age Chattanooga Shale and Camden Formations. The Camden Formation is the principal aquifer in the region (TVA 2009).

The primary earthquake hazard source to the site is the New Madrid Seismic Zone (NMSZ). The NMSZ is located in the central Mississippi Valley and extends from northeastern Arkansas to northwestern Tennessee and southeastern Missouri. Although the majority of the events emanating from this zone are too small to be felt at the surface, the NMSZ has produced several damaging earthquakes, including the sequence of very large earthquakes and aftershocks in 1811-1812.

There are two general categories of earthquake hazards: primary and secondary. Primary hazards include fault ground rupture and strong ground shaking. If an earthquake is larger than about magnitude 5.5, ground rupture may occur on the fault. The amount of displace-

ment generally increases with the magnitude of the earthquake. Structures, including structure foundations and pipelines, located on a fault, can be displaced or damaged by fault ground rupture. The best mitigation for potential fault ground rupture to structures is to accurately locate the fault and set back structures a safe distance from the fault. Where structures and other facilities cannot be located to avoid faults, there are several geotechnical and structural design measures that can be implemented to mitigate the potential for fault ground rupture.

Secondary hazards include liquefaction/lateral spreading, landsliding, and ground settlement. Liquefaction is essentially loss of strength in generally granular, saturated materials, including alluvial and fluvial deposits subjected to ground shaking. Liquefaction can result in ground settlement, and where there is a free face, such as river bank, can result in ground spreading toward the free face. Liquefaction can damage foundation, pavement, and pipelines and underground utilities, and can be mitigated, if present, by various geotechnical and structural design measures, including ground improvements and foundation design. Earthquake-induced landsliding can occur were landslides are present or where colluvial deposits or unstable materials are present on slopes. Potential landslides can be mitigated, if present, with adequate siting and with various geotechnical and structural design measures. Ground settlement can occur in soft, weak materials, including non-engineered fill, due to ground shaking, and can be mitigated, if present, by various geotechnical and structural design measures, including ground improvements and adequate foundation design.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action

Under the No Action Alternative, construction activities would not be undertaken by TVA. Consequently, no impacts to geological resources are expected. However, it is reasonably foreseeable that the steam customer would provide their own steam, and construction activity would occur on a developed site in proximity to the current steam customer location.

Impacts to geological resources are associated with construction related excavation activities. Although the excavation of water supply lines, gas supply lines, and auxiliary boiler construction would be dependent upon the actual construction activities defined by the steam customer, it is expected that each of these activities would result in relatively shallow site excavation and would therefore have limited effects on geological resources.

Operational impacts would be associated with the potential impact of earthquakes on the proposed steam operations.

The 1811-1812 sequence of earthquakes in the NMSZ formed a fault scarp (Reelfoot fault) immediately west of Reelfoot Lake in northwest Tennessee. The Meeman-Shelby/Porters Gap fault has been mapped north of Memphis, and may be a southwest extension of faulting associated with the NMSZ (Cox et al. 2002). The fault is projected to pass significantly south and west of proposed customer site.

No other faults or folds believed to be sources of higher magnitude earthquakes during the most recent geologic period (Quaternary) are mapped at or near the existing steam customer site (USGS 2006). Therefore, the potential for surface fault rupture is considered to be low.

Actual conditions at the steam customer's project site would be investigated during detailed design and, if warranted, seismic considerations may be incorporated into final design of steam facilities.

3.9.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Proposed construction of a HRSG onto existing CT Unit 20 and redundant auxiliary boilers may require excavation below the existing ground surface to establish a sub-base and foundation. A shallow excavation (5-ft trench) would also be necessary for the construction of the proposed water lines. In addition, excavation may also be necessary for reconnection of the existing steam supply line to the new HRSG. Each of these activities is expected to result in relatively shallow site excavation and is expected to have limited effects on geological and soil resources. As described above, geology of the proposed plant site and off site areas is composed of alluvial materials. Site excavation and foundation construction is expected to be limited to these horizons and not expected to disrupt bedrock geology. Potential effects to alluvial groundwater systems are described further in Section 3.11.2.

Given the proximity of the JOF site to the steam customer's site, operational impacts are expected to be similar to those described for the steam customer's potential action above. However, TVA would consider earthquake loads (and the secondary effects of strong ground shaking) as part of the design of new facilities at the project site. These design considerations are expected to mitigate the potential seismic risk of impact to the proposed plant and associated structures such that impacts from earthquake hazards are not significant.

3.10 Wetlands

3.10.1 Affected Environment

Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, and wet meadows. Wetland fringe areas are also found along the edges of most watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits including flood/erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

The proposed project lies within the Interior Plateau ecoregion and Tennessee Western Valley (Kentucky Reservoir) watershed. Compared to middle and eastern Tennessee, wetlands in the project area are much more common due to the topography. Land use/land cover data shows that wetlands comprise less than 1 percent of the overall land use within the Tennessee Western Valley watershed (TDEC 2005).

Wetlands within the vicinity of the project are identified on the National Wetland Inventory maps and are shown on Figure 3-2. A desktop review of National Wetland Inventory maps and aerial photography indicated that there are no wetlands present within areas north and east of the site. A site survey would be required to verify the desktop review. A field survey conducted in December 2014 concluded there are no wetlands present within the proposed project area.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action

Under this alternative, TVA would continue to operate in its current configuration and the steam customer would provide their own steam by another means. No construction activities would be undertaken by TVA as part of this alternative. It is assumed that the footprint of land use/disturbance associated with this option at the steam customer's developed complex would be similar to those associated with the TVA plant construction.

There are no National Wetland Inventory wetlands present within the boundaries of the developed lands within the interior of the steam customer's developed complex. If undeveloped lands to the east and north of the facility are selected for development, environmental surveys would be required to verify the presence/absence of wetlands. If site surveys determine that wetlands are present, any wetland impacts would be addressed via state and federal wetland regulatory requirements. Wetland impacts associated with this option would be insignificant.

Construction of the natural gas line could impact wetlands located within or adjacent to the proposed route. While the location of the proposed corridor is not known, it is expected that direct and indirect impacts to wetlands may occur. Wetland functional values may be impacted by direct habitat alteration or indirectly through construction related erosion and sedimentation.

3.10.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

There are no wetlands present within the boundaries of the proposed project area. Therefore, there would be no wetland impacts associated with this option.

3.11 Ground Water Resources

3.11.1 Affected Environment

JOF is underlain by thick alluvium and terrace deposits ranging up to 45 ft in thickness from the floodplains of the Tennessee River and nearby Trace Creek (Boggs 1980). These deposits consist of layers of clay, silt, sand, and gravel. Bedrock underlying the site consists of, in descending stratigraphic order, the Fort Payne Formation (Lower Mississippian age), Chattanooga Shale (Devonian age), and the Camden Chert Formation (Devonian age). The Fort Payne Formation is comprised of cherty limestone in the upper portion and interbedded green shale and cherty limestone in the lower sections. Thickness of the Fort Payne Formation ranges up to 40 ft along the eastern boundary of the plant, but thins and becomes completely absent over the western part near Kentucky Reservoir. Underlying the Fort Payne Formation is a layer of Chattanooga Shale ranging from 7 to 75 ft in thickness across the plant site (Kellberg 1948). This layer acts as a barrier to the downward migration of groundwater towards the Camden Formation beneath. The Camden Formation is the principal aquifer in the region and consists of thin beds of cherty limestone interbedded with softer clay layers. Local groundwater movement at the site is generally from east to west toward Kentucky Reservoir. Recharge occurs by local infiltration of precipitation at the surface and laterally from upland areas east of the site. Groundwater passing beneath the site ultimately discharges to Kentucky Reservoir.

No public wells or spring water supplies exist within 2 mi of JOF (Boggs 2000). All of the off-site wells are positioned upgradient (east) of the plant. Six wells are operated by the steam customer, but five are no longer in use.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate in its current configuration, and no changes would occur to TVA lands that could affect groundwater use or groundwater quality. Consequently, no significant impacts to groundwater resources are expected from TVA actions. However, under this alternative it is expected that other actions would be undertaken by the steam customer to supply water for steam production. As such, the No Action Alternative would require the steam customer to consider a range of options regarding water supply to the steam generator including use of potable water, use of groundwater, purchase of water from TVA, or construction of a new surface water intake. In addition, the steam customer would have to construct a new natural gas line to supply gas to the steam generator. The construction of the gas line would require shallow excavation and in some locations groundwater may be encountered that would require dewatering of the excavation area.

Should the steam customer use groundwater as a source for the proposed steam generator, potential feasibility would have to be evaluated by determining well production rates, assessing groundwater quality, needs for treatment prior to use, and determining the effect of water use on nearby wells (on-site and off-site). Groundwater well development and operation would have to be permitted in accordance with the requirements of the TDEC Division of Water Resources.

3.11.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Proposed construction of a the cogeneration plant would include adding a HRSG onto existing CT Unit 20 and may require excavation below the existing ground surface to establish a sub-base and foundation. Shallow excavation may also be necessary for reconnection of the existing steam supply line to the new HRSG. The closest upgradient waste disposal area is an ash dredge cell which was closed in 2012 and is in post-closure. The permitted landfill was designed with a clay bottom liner and has a geomembrane cap. Groundwater results over the last 10 years indicate that there have not been any exceedances of USEPA maximum contaminant levels, therefore, groundwater meets drinking water standards for the parameters analyzed. Groundwater reports submitted to the TDEC reflect that groundwater flow direction is away from the planned project and generally toward Kentucky Reservoir. Additionally, the use of appropriate environmental management practices and BMPs to prevent the release of pollutants (oils, solvents, etc.) would mitigate the risk of groundwater contamination during construction of the plant.

In some locations, groundwater may be encountered that would require dewatering of the excavation area. Groundwater levels immediately north of the project study area, vary from 13.45 ft below surface to 30 ft below surface. Any groundwater diverted during the construction phase would be conveyed to the coal pile runoff pond where it would be pumped to the ash pond for containment and treatment. The impact of any dewatering activities on groundwater levels or quality, if groundwater is encountered, would be localized and limited to the construction phase. Therefore, the impacts of this alternative on water resources are expected to be minor.

3.12 Surface Water

3.12.1 Affected Environment

JOF is located on the east bank of Tennessee River near New Johnsonville, Tennessee. This reach of the lower Tennessee River is part of the Kentucky Reservoir, the largest reservoir in the eastern U.S. The reservoir extends for 184 mi and drains the entire Tennessee Valley watershed. The reservoir is a major recreational destination that includes the Land Between the Lakes National Recreation Area, the Tennessee National Wildlife Refuge, two state wildlife management areas, and four state parks as well as numerous marinas, boat docks, and launching ramps.

JOF withdraws water from Kentucky Reservoir from a bay located on the south side of the plant. As described in Section 1.1, the coal-fired units at JOF will be retired in December 2017, but the cooling water intake structure would remain in place and be available for use by the proposed project. Under current operations, site stormwater, runoff from the coal pile, and ash are conveyed via pipeline to an ash pond located on an island in the reservoir. Sluiced fly ash, bottom ash/boiler slag, sluice water, storm water, and plant processing water are discharged to the eastern side of the island near the causeway; whereas runoff from the coal pile and northern portion of the site are discharged to the northern portion of the ash pond. Ultimately, the water is discharged from Outfall 001 at the southernmost pond through six 30-inch diameter pipes into Kentucky Reservoir. Water discharges at the spillway outlet are monitored according to NPDES Permit requirements. Surface water features are shown on Figure 3-2.

The lower Tennessee River is not listed in the 2012 TDEC 303(d) List, nor the proposed list for 2014; therefore, it is not considered impaired and is assumed to fully meet its designated uses.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would not supply steam to the steam customer following the closure of the coal-fired units JOF in 2017. Under this alternative, the steam customer would be responsible for producing their own steam to continue their operation. No construction activities would be undertaken by TVA as part of this alternative. However, under this alternative it is expected that other actions would be undertaken by the steam customer to supply water for steam production. As such, the No Action Alternative would require the steam customer to consider a range of options regarding water supply to the steam generator including use of potable water, use of groundwater, purchase of water from TVA, or construction of a new surface water intake.

Should the steam customer decide to provide water by developing a new surface water intake structure, impacts to surface water associated with this alternative may be expected to be notably greater than those associated with Alternative B. Under this scenario, the steam customer would design and permit a new surface water supply intake system consisting of a shoreline intake structure, pumps, demineralization plant, and associated pipelines to supply the steam generator with appropriate process water. Surface water impacts to the Kentucky Reservoir would occur during construction in conjunction with excavation and in-stream construction activities that would alter the shoreline and result in temporary increase in turbidity and sedimentation. Additionally, operational impacts would occur in conjunction with localized modification of near shore flow regimes (due to pumping). However, because the volume of water needed is relatively small (800 gpm) and

the source water body is large, impacts associated from operation are expected to be minor.

The construction and operation of an intake structure on Kentucky Reservoir would be subject to permitting of an Aquatic Resource Alteration Permit for alteration to a stream, river, lake or wetland by TDEC, permitting under Section 404 of the Clean Water Act by the U.S. Army Corps of Engineers, and issuance of a Section 401 Water Quality Certification by TDEC.

Other construction and operational impacts from this alternative including storm water runoff and discharge from operations are expected to be controlled and managed in a manner similar to Alternative B in accordance with the provisions of the steam customer's existing NPDES permit.

The steam customer would have to construct a new natural gas line, up to 30 miles long to supply natural gas for auxiliary boilers. While the location of the proposed corridor is not known, it would likely cross one or more surface water bodies. Direct impacts to surface water may be associated with habitat alteration from trenching activities, whereas indirect impacts may be associated with construction related erosion and sedimentation.

3.12.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Following the closure of the JOF coal-fired units in December 2017, TVA would continue to provide steam to the steam customer under this alternative.

Impacts associated with construction of the plant would consist of stormwater runoff from construction areas that would be directed to the coal yard runoff ditch/pond located directly west of the study area and eventually to the ash pond complex where it would be discharged via permitted Outfall 001. The impacts associated with construction are expected to be limited given the industrial nature of the site and extensive past disturbance.

Operational impacts associated with Alternative B would be related to on-going use of water from Kentucky Reservoir and discharges from activities associated with operation of the HRSG (i.e., blowdown).

Surface water would provide the needed water for the HRSG operation using the existing cooling water intake structure and the existing demineralization facility as well as the existing fire suppression intake and a proposed new demineralization facility. Because the volume of water needed is relatively small (approximately 800 gpm) and is a minor volume relative to the designed and permitted capacity of the existing JOF intake facility, potential impacts of water use on Kentucky Reservoir are very minor.

Periodic discharges resulting from blowdown of the facility during operations would be to the coal yard runoff pond, which is eventually pumped to the ash pond complex. The blowdown would depend on the boiler's steam generating capacity, the amount of solids present, and the maximum permissible concentration of solids inside the boiler drum. The impact associated with blowdown from the HRSG is expected to be up to 30 gpm (0.04 MGD), which is notably lower than the 32 MGD being discharged to the ash pond under the existing JOF operations. Stormwater runoff, sanitary wastewater, and process water generated by the construction and operation of the HRSG would all be directed to the coal yard runoff pond where it would be pumped to the ash pond for final treatment prior to release within the limits of the existing NPDES permit issued by TDEC. An existing steam

line with steam traps would be used to direct steam to the steam customer. Therefore, impacts to surface water associated with this alternative would be minor.

3.13 Natural Areas, Parks, and Recreation

3.13.1 Affected Environment

Natural areas include managed areas, ecologically significant sites, and Nationwide Rivers Inventory streams. This section addresses natural areas that are on, immediately adjacent to (within 0.5 mi), or within the region of the project area (5 mi radius).

Review of the TVA Natural Heritage database indicates that no natural areas are present within the proposed project site. The 3,700 ac Camden State Wildlife Management Area is located 1.9 mi west of the proposed project area and is managed for small game and waterfowl hunting. Johnsonville State Historic Park is 1.2 mi north of JOF. The park consists of 2,000 ac, and commemorates the site of the Battle of Johnsonville and the historic town site that existed from 1864-1944 prior to the formation of Kentucky Reservoir. The Ashworth Property Conservation Easement is located 2.1 mi from JOF. This site easement was acquired by the Land Trust of Tennessee to protect the viewshed of the Johnsonville State Historic Park Visitor Center.

As illustrated on Figure 3-3, several public and commercial recreation areas are located in the general vicinity (within 5 mi) of the proposed project. Public parks include Johnsonville State Historic Park, Nathan Bedford Forrest State Park, Eva Beach Park, and CL Edwards Memorial Park. Commercial recreation areas within 5 mi of the site include Anchor Harbor Marina, Pebble Isle Marina, and Beaver Dam Resort. All of these public and commercial recreation areas are located more than 1 mi from the project site.

Kentucky Reservoir is a major focal point for outdoor recreation, and most of the recreation areas in the vicinity of the project include water-based or water-oriented recreation services and facilities such as boat launching ramps, boat moorage and fueling, and shoreline camping and picnic facilities. Kentucky Reservoir surface water recreational activities include general boating, fishing, and swimming.

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action

Under this alternative. TVA would continue to operate in its current configuration and the steam customer would provide their own steam by another means. No construction activities would be undertaken by TVA as part of this alternative

Under the No Action Alternative, it is assumed that the steam customer would develop their own steam supply on previously developed lands within their existing property. The proposed development is an industrial use that would be consistent with other industrial uses on the steam customer's property. There are no natural areas or parks on the steam customer's property and the parks and natural areas identified in Figure 3-3 are located greater than 0.5 mi distant from the steam customer facility. Given the distance between the developed recreation areas and the proposed project site, and taking into account the existing industrial nature of the steam customer's property, no direct impacts to natural areas or parklands would occur as a result of construction of a steam generator at this site.

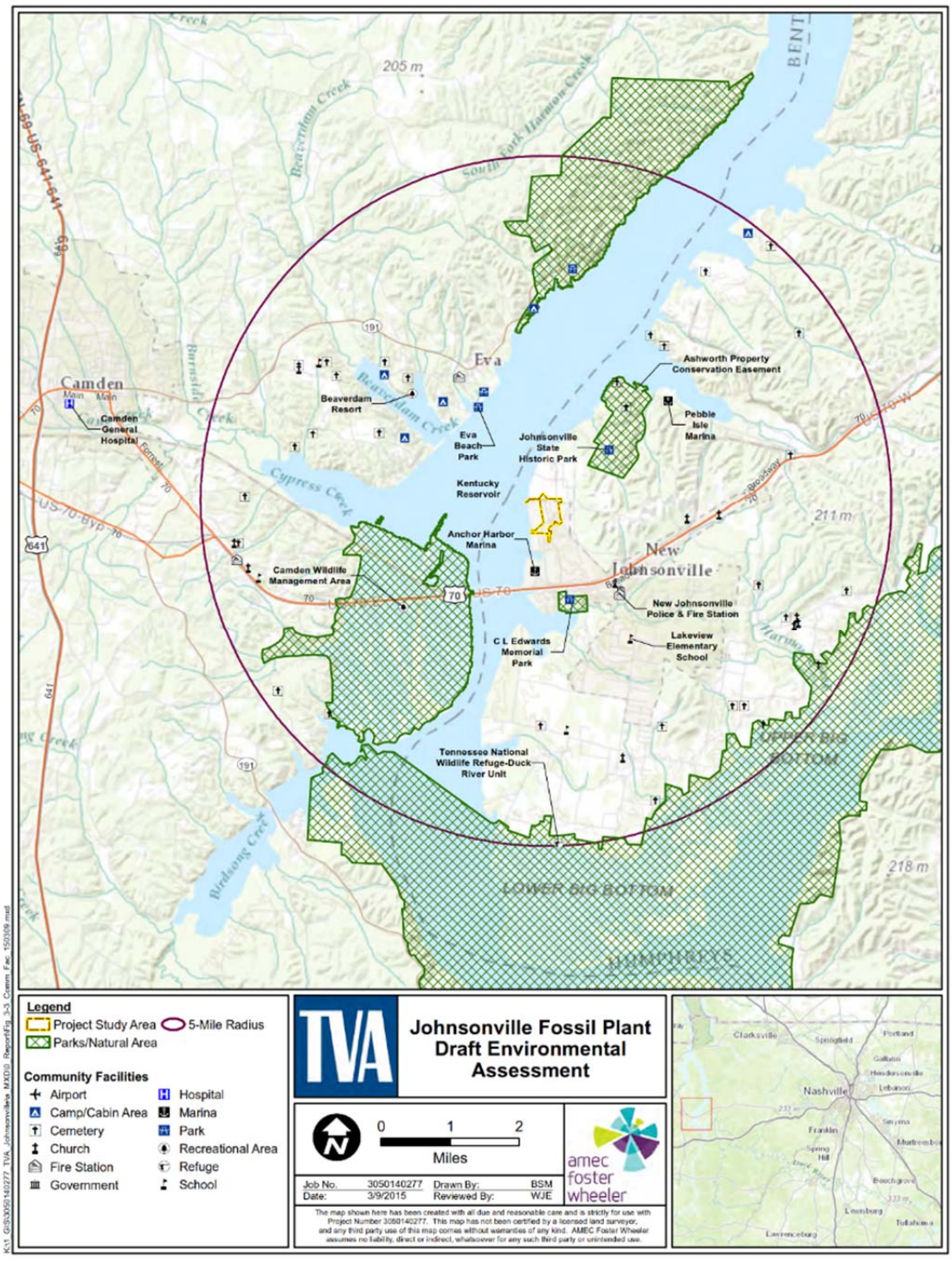

Figure 3-3. Community Facilities in the Project Vicinity

Indirect impacts to natural areas and parklands are anticipated to be minor. As described in Section 3.18, indirect impacts associated with off-site operational noise levels at the boundary of the Johnsonville State Historic Park would be minor. Likewise, impacts on reservoir surface water recreation use patterns associated with construction on the steam customer's industrial complex would be minor.

The steam customer would have to construct a new gas line up to 30 miles long to supply natural gas to auxiliary boilers. While the exact location of the gas line corridor is not known, given the large number of parks and recreational facilities in the surrounding area, it is possible that direct or indirect impacts to natural areas or parkland could occur. Recreationists utilizing these facilities may experience minor, temporary noise and/or visual impacts during construction.

3.13.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under Alternative B, TVA would construct the project in an area that is an existing industrial use. Additionally, the parks and natural areas identified in Figure 3-3 are located greater than 0.5 mi away from the proposed project site. Because of the distance between the developed recreation areas and the proposed project site, and taking into account the existing industrial nature of the project location, no direct impacts to natural areas or parklands would occur with this alternative.

Indirect impacts to natural areas and parklands are anticipated to be minor. As described in Section 3.18, indirect impacts associated with off-site operational noise levels at the boundary of the Johnsonville State Historic Site would be minor. Likewise, no notable impacts on reservoir recreation use patterns in the general area around the project are expected.

3.14 Cultural and Historic Resources (Historic Properties)

Federal agencies are required by the NHPA and by NEPA to consider the possible effects of their undertakings on cultural resources that qualify as historic properties. Undertaking means any project, activity, or program, and any of its elements that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. Cultural resources include, but are not limited to: 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 in, or considered eligible for inclusion in, the National Register of Historic Places maintained by the National Park Service are called *historic properties*. To be included or considered eligible for inclusion in the National Register of Historic Places, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association. In addition, the resource must meet at least one of four criteria of significance: (a) associated with important historical events; (b) associated with the lives of significant historic persons; (c) embody distinctive characteristics of a type, period, or method of construction or represent the work of a master, or have high artistic value; or (d) have yielded or may yield information important in history or prehistory. Criteria a, b and c are commonly applied to above ground (architectural) properties. Criterion d is most often applied to archaeological sites and refers to their scientific value.

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 an undertaking's possible effects on historic properties is accomplished through a four-step review process: (1) initiation (defining the undertaking and the area of potential effects [APE], and identifying the consulting parties); (2) identification (studies to determine whether cultural resources are present in the APE and whether they qualify as historic properties); (3) assessment of adverse effects (determining whether the undertaking would result in damaging the qualities that make the property eligible for the National Register of Historic Properties); and (4) resolution of adverse effects (by avoidance, minimization, or mitigation). Throughout the process the agency must consult with the appropriate State Historic Preservation Officer (SHPO), federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

A project 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 undertaking's effect 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 60.4), the effect is said 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 structure's integrity of feeling or setting. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects, or planting visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific 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 undertakings.

Area of Potential Effect (APE)

Under Alternative A - No Action, TVA would continue to operate in its current configuration and the steam customer would develop their own steam generation facility. As TVA does not know the location or size of the areas that would be affected by the steam customer's actions, no definitive APE can be identified for Alternative A. However, as discussed in Section 2.1.1, for this assessment the APE under the No Action alternative is expected to consist of previously developed and disturbed lands on the steam customer's property and the area within the natural gas line.

TVA defined two APEs for Alternative B: one for archaeological resources (below ground) and another for historic architectural resources (above ground). The archaeological APE is defined as the project footprint, as this is the area within which ground disturbance may occur. The architectural APE is defined as a one-half mile radius surrounding the permanent use areas within the proposed project area (see Figure 2-1), as this is the area within which direct or indirect effects could occur to historic architectural properties.

3.14.1 Affected Environment

Four archaeological investigations (Kerr 1996 and 1999, Ezell 2000, McKee 2001) have been carried out previously within the vicinity of the APE for Alternative B. Table 3-9. summarizes these studies and their findings. None of the studies resulted in the identification of archaeological sites within the project footprint.

Table 3-9. Cultural Resources Surveys in the Vicinity of the APE

Author/Year	Area surveyed	Findings
Kerr 1996	19,949 ac of Kentucky Reservoir shoreline	882 archaeological sites identified, none within JOF reservation
Cable 1999	Three proposed gas line routes, including portions on JOF reservation	Nine archaeological sites were identified, but none are located on or near the JOF reservation
Ezell 2000	(a) 30-ac tract on TVA property at the north end of the rail loop; (b) 19-ac tract on customer property adjacent to a TVA transmission line right-of-way.	No archaeological sites
McKee 2001	40 ac located near the main entrance to JOF	No archaeological sites

Given the degree of ground disturbance that has taken place within the Alternative B archaeological APE during the construction and maintenance of JOF, TVA determined that this APE has a low probability for the presence of significant, intact archaeological sites.

TVA recently completed an architectural assessment of JOF (Karpynec and Weaver 2015) in connection with the currently proposed actions. Based on the results of this study, TVA has determined that JOF is ineligible for listing in the National Register as an historic structure or historic district. TVA has also determined that there are no historic architectural properties within the Alternative B architectural APE.

Accordingly, TVA has determined that there are no historic properties within the archaeological or architectural APE of the proposed project. These findings were coordinated with the Tennessee SHPO under Section 106 of the NHPA and a concurrence letter was received on February 23, 2015. The correspondence is included in Appendix A.

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – No Action

No APE has been identified for Alternative A, and impacts to historic properties are not precisely known. However, because it is likely that the auxiliary boilers used to provide steam constructed by the steam customer would be located on a previously developed site in proximity to the current customer location, no impacts to archaeological resources associated with construction of the boilers are expected. Since the potential visual impacts associated with construction and operation by the steam customer would be similar to those associated with the construction and operation of the cogeneration plant by TVA, no impacts to historic architectural properties are expected.

However, under this alternative the steam customer would have to construct a new gas line up to 30 miles long to supply gas for auxiliary boilers. While the exact location of the gas line corridor is not known, there may be direct and indirect impacts to archaeological and/or historic sites. These impacts may include construction related noise or visual impacts.

3.14.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

There would be no impacts to historic properties under Alternative B because there are no intact archaeological sites within the APE, and there are no historic architectural properties within the architectural APE that are included or eligible for inclusion in the National Register of Historic Places. TVA findings of no impact to historic properties was coordinated with the Tennessee SHPO's office under Section 106 of the NHPA. In a letter dated February 23, 2015, the Tennessee SHPO concurred with this finding. The correspondence is included in Appendix A.

3.15 Visual Resources

3.15.1 Affected Environment

This assessment provides a review of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. Visual resources are evaluated based on a number of factors including existing landscape character and scenic integrity. Landscape character is an overall visual and cultural impression of landscape attributes and scenic integrity is based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality (scenic attractiveness) and sense of place is dependent on where and how it is viewed.

For this analysis, the affected environment is considered to include the proposed 85-ac project area, which encompasses both permanent and temporary impact areas, as well as the physical and natural features of the landscape. The project area is located entirely within the existing JOF facility in western Tennessee. The surrounding topography ranges from relatively flat near the banks of Kentucky Reservoir to moderately sloping at Johnsonville State Historic Park to the north. Industrial activities including the steam customer's facility to the north and a sand and gravel mining operation to the south are visible from the project area. Forested areas within Johnsonville State Historic Park (see Figure 3-3) are visible to the east and northeast. Low-density residential areas with similar topographical relief to the adjacent state park exist to the west of the project area, across Kentucky Reservoir.

The visual landscape at the steam customer's facility is dominated by industrial facilities on the site and nearby. The facility is developed for heavy industrial use and is located immediately to the north of JOF. Dominant elements in the landscape include the facility's main buildings, vertical tank facilities, rail yards, and other developed structures. Visible elements from the facility include the adjacent JOF, the Johnsonville State Historic Park, open space, and Kentucky Reservoir. The viewscape of the steam customer's facility include broadly horizontal buildings and industrial equipment. Therefore, scenic attractiveness of the area is minimal and scenic integrity ranges from low to very low.

Components of the existing JOF facility are dominant elements in the landscape and include the switchyard, powerhouse and the 600-ft high emissions stack. Other major visual components of the industrial site include the existing CT units, transmission lines, and coal piles. Most of the project area is devoid of any vegetation, although there are some small patches of grassed areas within the site. The viewscape of the project area includes broadly horizontal buildings and industrial equipment and the existing emissions stack. Therefore, scenic attractiveness of the area is minimal and scenic integrity ranges from low to very low.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action

Under Alternative A, no new facility would be constructed by TVA, resulting in no changes to the existing environment. It is assumed that the steam customer would install the necessary equipment to provide their own steam and all construction activity at the steam customer site would be on a previously developed site in proximity to the current location.

The steam customer's facility would continue to be classified as having minimal scenic attractiveness and low to very low scenic integrity. During the construction phase, there would be slight visual discord from the existing visual conditions due to an increase in personnel and equipment at the site. However, this change would be temporary and would not alter the existing developed visual landscape. During operations, the landscape character of the steam customer's facility would be similar to the existing character. Therefore, visual impacts resulting from construction of a steam generation facility on the steam customer's complex would be negligible.

The steam customer would have to construct a natural gas line to supply the steam generator at the steam customer facility. The gas line may cause temporary visual impacts related to construction activities. Additionally, during operation the pipe may be discernable from the existing scenery and negatively impact sensitive visual receptors.

3.15.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under Alternative B, during the construction phase of the proposed plant there would be slight visual discord from the existing conditions due to an increase in personnel and equipment in the area. Impacts from additional vehicular traffic are expected to be insignificant as the roads are already predominately used for industrial activity. This small increase in visual discord would be temporary and only last until all activities have been completed by TVA. Additionally, since the scenic attractiveness is already of low quality, any discord resulting from the construction activity is not anticipated to result in a change in the scenic quality.

The new facility would be mainly seen by employees and visitors to the neighboring industrial facilities. The outlet stack for the HRSG would be the tallest feature on the cogeneration plant and would be less than 150 ft high, which would be notably shorter than the existing stack at JOF (600 ft). The dominant shapes in the existing landscape include the vertical lines of existing transmission structures and stacks of existing facilities against the horizon. The proposed plant components would be visually similar to other industrial elements present in the current landscape. Therefore, the plant would generally be absorbed by existing JOF components and would become visually subordinate to the overall landscape character associated with the plant site.

Sensitive visual receptors surrounding the project area are identified in Table 3-10.

There are no sensitive visual receptors within a mile of the proposed facility. Johnsonville Historic State Park, which is 1.2 mi to the northeast, would be the closest sensitive visual receptor. However, due to the hilly terrain and forested land cover at the park, the site is not expected to be visible to recreational users from most areas in the park. Overall, the proposed facility is not expected to be discernible from the existing scenery nor would it contrast with the overall landscape due to the distance of the viewing receptors.

Table 3-10. Nearest Sensitive Visual Receptors to the Project Area

Sensitive Visual Receptor	Miles	Cardinal Direction
Nearest Park - Johnsonville State Historic Park	1.2	Northeast
Nearest Residence – Southeast corner of Fish Hook Drive and US Highway 70 (Broadway Street). New Johnsonville, Tennessee	1.3	Southeast
Local Park – CL Edwards Memorial Park	1.5	South
Nearest Church – Johnsonville Church of Christ	1.5	Southeast
Nearest Cemetery – Crockett	1.8	Northeast
Nearest School – Lakeview Elementary School	2.3	Southeast

Permanent impacts would include minor discernible alterations that would be viewed in the foreground of plant operations. In more distant views, the new outlet stack would likely merge with the taller existing vertical components. Overall, the construction, operation, and maintenance of the cogeneration plant would have insignificant, negligible visual impacts for area residents, motorists, recreational users, and JOF employees and visitors. There may be some minor visual discord during the construction and subsequent post-construction maintenance period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until all areas have been restored using standard construction and restoration BMPs.

The JOF site would continue to be classified as having minimal scenic attractiveness and low to very low scenic integrity. The landscape character of this highly disturbed industrial site would be similar to the existing character. Therefore, visual impacts resulting from implementation of Alternative B would be negligible.

3.16 Hazardous Materials and Hazardous Waste

Hazardous materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act (EPCRA), the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and Toxic Substances Control Act (TSCA).

Regulations implementing the requirements of EPCRA are codified in 40 CFR Part 355, 40 CFR Part 370, and 40 CFR Part 372. Under 40 CFR Part 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity are required to provide reporting information to the State Emergency Response Commission, Local Emergency Planning Committee, and local fire department. Inventory reporting to the indicated emergency response parties is required under 40 CFR Part 370 for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges of certain toxic chemicals under 40 CFR Part 372. TVA applies these requirements as a matter of policy.

The federal law regulating hazardous wastes is RCRA and its implementing regulations codified in Title 40 CFR Parts 260-280. The regulations define what constitutes a

hazardous waste and establish a “cradle to grave” system for management and disposal of hazardous wastes.

Subtitle C of RCRA also includes separate, less stringent, regulations for certain potential hazardous wastes. Used oil, for example, is regulated as hazardous waste if it is disposed of, but is separately regulated if it is recycled. Specific requirements are provided under RCRA for generators, transporters, processors, and burners of used oil that are recycled. Universal wastes are a subset of hazardous wastes that are widely generated. Universal wastes include batteries, lamps and high intensity lights, and mercury thermostats. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special less stringent provisions.

CERCLA, often referred to as Superfund, was promulgated to address contaminated sites resulting from releases of hazardous substances. None of the project activities involve CERCLA sites. However, certain connected actions have some limited potential to encounter contaminated environmental media that would possibly come under the TDEC’s Division of Remediation regulations that implement a state level program corresponding to the federal CERCLA program.

3.16.1 Affected Environment

JOF is an active power plant that consists of ten coal fired, electric power generation units. JOF planned to idle six of those coal burning units by 2015 with the remainder idled by the end of 2017. In addition to the coal-fired units, JOF has a total of 20 CT units that were added between the 1970s and 2000. The CT units can burn either natural gas or fuel oil.

Various hazardous wastes are generated at the plant. In 2013, JOF was classified under RCRA as a Conditionally Exempt Small Quantity Generator (CESQG).

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action

Under the No Action Alternative, the steam customer would install the necessary equipment to provide their own steam within their existing complex. It is assumed that construction-related wastes, similar to those described in Section 3.16.2 would result from these activities. The primary operational hazardous wastes generated by the steam customer would be limited quantities of paint, adhesives, lubricating oils, oily rags and sorbents, degreasing solvents, aerosol spray paints and degreasers, batteries, and lamps. It is expected that the steam customer would manage these materials in accordance with RCRA requirements and existing environmental management measures in place at the steam customer facilities. Accordingly, impacts associated with hazardous waste with this alternative are expected to be insignificant.

Under this alternative, the steam customer would have to construct a natural gas line up to 30 miles long. Construction of the proposed gas line would entail site preparation (vegetation removal and grading activities) and construction activities that would generate typical construction debris but only a very limited generation of hazardous wastes.

3.16.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

As part of this alternative, TVA would utilize existing intake systems to provide water to the proposed HRSG unit. Boiler make-up water could be treated using the demineralization plant or by constructing a small demineralization facility in the permanent use area. Steam would be conveyed to the steam customer using the existing pipeline.

3.16.2.2.1 Construction

Under implementation of Alternative B, the proposed construction activities would result in a potential increase in generation of hazardous waste as compared to current operations of the existing cogeneration facility. Various hazardous wastes, such as fuels, lubricating oils, solvents, paints, adhesives, compressed gases, and other hazardous materials could be produced during construction. Table 3-11 identifies representative hazardous wastes that are typically generated during construction. These wastes would be temporarily stored in properly managed hazardous waste storage areas on site. Appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented to protect construction and plant workers, the public, and the environment. Historic information has indicated that a diesel spill previously occurred in a limited portion of the permanent use area. Soils contaminated with diesel fuel from that area would not be expected to exhibit the Toxicity Characteristic and would not be considered hazardous contaminated soils. However, any contaminated soils encountered during construction would be considered special wastes and if present, would managed separate from other excavated materials.

A permitted hazardous waste disposal facility would be used for ultimate disposal of the wastes. Once construction is completed, the generation of hazardous waste during operations would be similar to the current waste generation rates.

Appropriate spill prevention, containment, and disposal requirements for hazardous materials would be implemented to protect construction and plant workers, the public, and the environment. Management of hazardous materials and wastes shall be in accordance with regulatory requirements and existing TVA environmental control measures. Consequently, impacts of hazardous wastes during construction are low.

Table 3-11. Representative Hazardous Wastes Generated During Construction

Waste	Origin	Composition or Characteristic	Disposal Method
Used and waste lubricating and hydraulic oils	Construction vehicles and equipment	Hydrocarbons	Recycle at a permitted treatment, storage, and disposal facility (TSDF)
Oily rags, oily sorbent	Cleanup of small spills	Hydrocarbons	Dispose at a permitted TSDF
Fuels, absorbents and soils contaminated by gasoline or diesel	Construction equipment	Ignitable, benzene, other hydrocarbons	Dispose at a permitted TSDF or recycle
Spent welding, soldering, brazing materials	Construction activities	Lead, chromium, silver	Dispose at permitted TSDF or Class I landfill
Solvents, paint, adhesives	Construction activities, equipment cleaning	Ignitable solvents; solvents paints, adhesives containing	Recycle or dispose at a permitted TSDF

Table 3-11. Representative Hazardous Wastes Generated During Construction

Waste	Origin	Composition or Characteristic	Disposal Method
		constituents identified as characteristic hazardous waste (40 CFR 261 Subpart C); Solvents listed under 40 CFR 261 Subpart D	
Solvent and fuel contaminated rags	Construction activities, equipment cleaning	See above	Recycle or dispose at a permitted TSDF
Miscellaneous acids and alkalies	Construction activities	Corrosive hazardous wastes	Dispose at a permitted TSDF
Spent lead acid batteries	Construction machinery	Lead, sulfuric acid	Manage as universal wastes
Spent lithium and Ni/Cd batteries	Equipment construction machinery	Heavy metals	Manage as universal waste
Fluorescent, mercury vapor and high intensity (sodium vapor) lamps	Lighting equipment	Mercury and other metals	Recycle or dispose offsite as universal waste
Contaminated environmental media	Site preparation	Varies	Dispose at permitted TSDF or Class I landfill

3.16.2.2.2 Operation

The potential hazards associated with the storage of hazardous or acutely hazardous materials at the proposed plant include: (1) fire and explosion from the use of natural gas, and other gases; and (2) accidental release of aqueous ammonia.

It is anticipated that the proposed plant would be a CESQG during operation and as such, would generate less than 220 pounds of hazardous waste per month. CESQGs are exempt from most RCRA requirements provided that the facility's wastes are shipped to a properly permitted hazardous waste facility or a solid waste disposal facility permitted to receive those wastes. Although CESQGs are essentially exempt from RCRA requirements, the potential for spills or other releases would continue to be mitigated by implementation of TVA BMPs. Due to the limited quantities of materials that would be handled during operation, the potential impacts related to spills or releases is also limited.

Table 3-12 summarizes the types of hazardous wastes anticipated to result from operation of the proposed facility.

Operation of the plant would also generate limited quantities of universal wastes (batteries and lamps). These wastes would also be generated in conjunction with this alternative and would continue to be managed in accordance with RCRA requirements and TVA BMPs. Only small quantities of paints, oils, solvent, pesticides and cleaners typical of those packaged for retail consumer use are or would be present during operation of the facility. No adverse environmental impacts are anticipated related to other hazardous materials used at the facility.

Limited quantities of used oils would be generated during operation of the proposed HRSG from pumps, compressors and other machinery. Limited quantities of used oil would also be generated in the case of self-generation by the steam customer.

The proposed plant would also require the transport, handling, storage, use, and disposal of hazardous materials. The majority of these hazardous materials would be handled in limited quantities and there is very limited potential for significant impacts related to their handling.

TVA would manage all hazardous wastes generated from operation of the proposed plant in accordance with established procedures and requirements. Hazardous wastes would be managed as required by applicable State regulations following procedures outlined in TVA's current Environmental Procedures and BMPs such that impacts of plant operation related to hazardous waste generation are not significant.

3.17 Solid Waste

3.17.1 Affected Environment

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated environmental media, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances). The solid waste generated from the proposed activities would be from construction, operation, and/or maintenance activities. This section analyzes the solid waste impacts of the proposed project and recommends mitigation measures to reduce the amount of solid waste going to landfills.

In Tennessee, requirements for management of solid wastes are focused on solid waste processing and disposal under Rules 0400-11-.01. These rules generally do not specify requirements for on-site solid waste management. Under Rule 0400-11-.01-.01, special wastes include sludges, bulky wastes, pesticide wastes, industrial wastes, combustion wastes, friable asbestos, and certain hazardous wastes exempted from RCRA Subtitle C requirements. Additionally, the Tennessee Multi-Sector Storm Water General Permit (TMSP) establishes requirements to minimize contact between regulated materials and precipitation and storm water runoff to reduce pollution in storm water related discharges. As such, the Tennessee Multi-Sector Storm Water General Permit mandates the implementation of certain BMPs for various industry sectors. Requirements pertaining to steam electric power generating plants are under Section O of the TMSP.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action

Under the No Action Alternative, no solid wastes would be generated by TVA activities. However, the steam customer would generate solid nonhazardous wastes from both construction and operations. These waste streams potentially include construction and demolition wastes, recyclables, special waste (e.g., boiler water clarification sludges), and general refuse as described below for Alternative B. In addition, construction of the natural gas line would generate typical construction debris including wood, paper, glass, plastic, metals, cardboard, and landscaping wastes. Any soils of concern based on historic evidence or visible or olfactory evidence of potential contamination encountered during construction would be characterized and managed appropriately.

The proper management of these materials is expected to be performed in accordance with established procedures. Solid wastes would continue to be managed in accordance with the steam customers established procedures and applicable State regulations.

Table 3-12. Typical Hazardous Wastes Generated During Operation

Waste	Origin	Characteristics or Constituents	Disposal Method
Lubricating oil	Small leaks and spills from pumps, compressors, and other machinery	Used oils, metals	Cleaned up using sorbent and rags, disposed of by certified oil recycler
Lubricating oil filters	Small leaks and spills from pumps, compressors, and other machinery	Used oils, metals	Recycled by certified oil recycler
Oily sorbents	Maintenance	Used oils, metals	Dispose at a permitted TSDF
Oily and solvent contaminated rags	Cleanup of small spills	See above	Recycle or dispose at a permitted TSDF
Waste solvents	Parts maintenance degreasing painting equipment, and cleanup	Ignitable solvents; solvents listed under 40 CFR 261 Subpart D	Recycle or dispose at a permitted TSDF
Paints, adhesives containing constituents identified as characteristic hazardous waste (40 CFR 261 Subpart C) or U listed 40 CFR 261Subpart D	Maintenance	Ignitability, hazardous constituents listed under 40 CFR 261 Subpart D	Dispose at a permitted TSDF
Acids and alkalies	IX regeneration	Corrosive hazardous wastes	Dispose at a permitted TSDF or elementary neutralization
Photographic solutions	NDI testing	Corrosive, silver	Silver recovery, neutralization
Sandblasting waste	Cleaning and painting equipment	Solid	Recycle or dispose at a permitted TSDF
Spent lead acid batteries	Construction machinery	Lead, sulfuric acid	Manage as universal wastes
Spent lithium and Ni/Cd batteries	Equipment construction machinery	Heavy metals	Manage as universal waste
Fluorescent, mercury vapor and high intensity (sodium vapor) lamps	Lighting equipment	Mercury and other metals	Manage as universal waste
Spent welding, soldering, brazing materials	Maintenance activities	Lead, chromium, silver	Dispose at permitted TSDF or Class I landfill

3.17.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

3.17.2.2.1 Construction

The primary waste streams resulting from construction would be solid nonhazardous waste. However, some nonhazardous liquid waste would also be generated. During construction, the primary solid nonhazardous wastes generated would be paper, wood, plastic refuse, scrap metal, construction rubble, landscaping wastes, scrap metals, and soils as briefly summarized below:

- Paper, wood, glass, and plastics would be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers during project construction.
- Scrap metal would result from welding, cutting, framing and finishing operations, electrical wiring, disposal of packing materials and empty nonhazardous chemical containers.
- Construction rubble would result from land clearing operations, removal of paving, and disposal of excess material.
- Land clearing wastes would result from grubbing, vegetation removal, and grading operations.
- Soils would result from land clearing, grading, and excavation.

In addition to these larger nonhazardous waste streams, limited quantities of nonhazardous solvents, paints and adhesives, spill absorbent, oil and solvent contaminated rags, and empty containers would be generated. Typical nonhazardous wastes generated during construction are identified in Table 3-13.

The TDEC Division of Solid Wastes considers soils that contain hazardous constituents at levels above background or residential risk screening levels to be contaminated. Such soils must be disposed of as special wastes. Soil excavated from the area of the historic diesel spill may require management as special wastes. Soils excavated from that area should be tested for Toxicity Characteristic constituents and petroleum related constituents. If the concentration of the petroleum related constituents exceeds USEPA Regional Screening Levels, TDEC would consider those soils to be special wastes. These special wastes would not be generated as part of the No Action Alternative. Other soil determined to be nonhazardous could be suitable for reuse at a construction site or disposal at a regional disposal facility, depending on the chemical quality.

Nonhazardous solid waste generated during construction would be collected in on-site dumpsters and picked up periodically in accordance with TVA BMPs. Such waste would be subsequently transported to an appropriately permitted solid waste disposal facility. For special wastes, the generator must obtain special waste approval from TDEC Division of Solid Waste with respect to estimation of the generation rates, characterization of the special waste, and pre-disposal management requirements (such as stabilization) before disposal at the permitted landfill can occur. Additionally, the special waste approval process requires identification and approval of the receiving landfill. These requirements would be implemented through TVA BMPs. Recyclable materials can be segregated and transported by construction contractors or other private haulers to an area recycling facility.

Table 3-13. Typical Nonhazardous Wastes Generated During Construction

Waste	Origin	Composition	Disposal
Scrap wood, steel, glass, plastic, paper, insulation	Construction activities	Normal refuse	Recycle and/or dispose of in a Class I landfill
Construction rubble	Construction activities	Solids	Dispose of in a Class III or IV landfill
Land clearing wastes	Construction activities	Solids	Dispose of in a Class III or IV landfill
Contaminated soils	Construction activities	Various hazardous constituents	Dispose of in a Class I Landfill as special wastes
Scrap metals	Construction activities	Parts, containers	Recycle and/or dispose of in a Class I landfill
Empty hazardous material containers	Operations and maintenance of plant	Containers less than5 gallon	Recycle or dispose of in a Class I landfill
Waste oil filters	Construction equipment and vehicles	Solids	Recycle at a permitted TSDF
Oil fuel, and solvent rags,	Cleanup of small spills, cleaning and degreasing operations	Hydrocarbons	Dispose at a Class I landfill as special wastes
Non-hazardous solvents, paint, adhesives	Construction activities, Equipment cleaning	Solvents paints, adhesives that are not characteristic or listed hazardous waste	Dispose at a Class I landfill as special waste
Sanitary waste	Portable toilet holding tanks	Solids and liquids	Remove by contracted sanitary service

TVA would manage all solid wastes generated from construction of the proposed facility in accordance with established procedures. Solid wastes would be managed as required by applicable State regulations following procedures outlined in TVA's current environmental procedures and BMPs such that impacts of plant construction related to solid waste generation are not significant.

3.17.2.2.2 Operation

Operating the plant would require emission monitoring and controls. Reduction of NO_x emissions would be achieved through dry low-NO_x combustion and low-NO_x burners combined with an SCR system for additional NO_x reduction. SCRs are ceramic honeycomb structures, plates or beads that use vanadium, tungsten, palladium, and/or platinum as the catalyst. Infrequent but periodic replacement of these systems is required. SCR materials destined for disposal are special wastes that require TDEC approval prior to offsite management. The frequency and quantity of generation of these wastes cannot be determined until design is completed.

The proposed plant would use water from the Tennessee River as make-up for the boiler system. Sludge would be generated as a result of the initial clarification step by chemical addition such as lime-soda (sodium carbonate) softening.

TVA would manage all solid wastes generated from operation of the proposed facility in accordance with established procedures. Solid wastes would continue to be managed as required by applicable State regulations following procedures outlined in TVA's current environmental procedures and BMPs such that impacts of plant operation related to solid waste generation are not significant.

3.18 Noise

3.18.1 Affected Environment

Sound is the physical disturbance in a medium, such as air, that is capable of being detected by the human ear. Sound waves in the air are caused by variations in pressure above and below the static value of atmospheric pressure. Sound is measured in units of decibels (dB) on a logarithmic scale. The "pitch" (high or low) of the sound is a description of frequency, which is measured in Hertz (Hz). Most common environmental sounds are composed of a composite of frequencies. A normal human ear can usually detect sounds that fall within the frequencies from 20Hz to 20,000 Hz. However, humans are most sensitive to frequencies between 500 Hz to 4,000 Hz.

Given that the human ear cannot perceive all pitches or frequencies in the sound range, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel, or the dBA. A scale weighting reflects the fact that a human ear hears poorly in the lower octave-bands. It emphasizes the noise levels in the higher frequency bands heard more efficiently by the ear and discounts the lower frequency bands. Common indoor and outdoor noise levels are listed in Table 3-14.

The equivalent sound level, or Leq, is intended as a single number indicator to describe the mean energy or intensity level over a specified period of time during which the sound level fluctuated. It averages the fluctuating noise heard over a specific time period as if it had been a steady sound (FHWA 1995). The day-night sound level (Ldn) is the 24-hr equivalent noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased annoyance during this period and the fact that most people are more sensitive to noise while they are sleeping.

Although there are no federal, state, or local regulations for community noise in Humphreys County, USEPA (1974) guidelines recommend that Ldn not exceed 55 dBA for outdoor residential areas.

The existing JOF, the proposed cogeneration plant, and the adjacent customer facility are located along the east bank of Kentucky Reservoir and are zoned industrial areas. Noise generating sources in the vicinity of the project site include periodic barge operations on the river, railroad operations, and routine vehicle operations at the project site and the adjacent industrial facility. Sensitive noise receptors in the vicinity include residences, hospitals, schools, churches, cemeteries, and recreational areas. The closest sensitive receptors to the proposed plant site include the homes located approximately 1.3 mi to the southeast in the town of New Johnsonville and the Johnsonville State Historic Park, located approximately 1.2 mi north of the site (see Figure 3-3). Densely forested areas of Johnsonville State Historic Park separate public use areas within the park from the proposed site.

Table 3-14. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band (15 ft)
Jet Fly-over (1000 ft)	100	
Gas Lawn Mower (3 ft)	90	Food Blender (3 ft)
Diesel Truck (50 ft)	80	Garbage Disposal (3 ft)
Gas Lawn Mower (100 ft)	70	Vacuum Cleaner (10 ft)
Heavy Traffic (300 ft)	60	Normal Speech (3 ft)
Typical Urban Daytime	50	Dishwasher Next Room
Urban Nighttime	40	Library
	30	Bedroom at Night
Rural Nighttime	20	Whisper
	10	
	0	Threshold of Hearing

Source: Arizona DOT 2008

3.18.2 Environmental Consequences

3.18.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would not supply steam to the steam customer. The steam customer is expected to provide its own steam by constructing auxiliary boilers on vacant, previously disturbed lands within its site and build a natural gas line up to 30 miles long to supply the boilers.

Equipment expected to be used to construct the new facility include bulldozers, cranes, lifts, hand tools, generators, compressors, and other miscellaneous equipment. Under this alternative, it is expected that most construction activities would occur during the day on weekdays. Typical noise levels from construction equipment used are listed in Table 3-15 and are expected to be 85 dBA or less. To estimate the operational noise emissions, it was estimated that noise emissions from the auxiliary boilers were limited to 85 dBA at 3 ft.

Based on straight line noise attenuation, it is estimated that noise levels associated with construction equipment would attenuate to approximately 28.5 dBA at the boundary of the Johnsonville State Historic Park. Construction activities would also temporarily increase traffic on US Highway 70 in New Johnsonville, which may increase intermittent noise at some residences and businesses immediately adjacent to the roadway. However, the duration of noise emissions associated with construction equipment and traffic would be intermittent and short term.

Because predicted attenuated noise levels do not exceed USEPA recommended guidelines of 55 dBA for Ldn and are reduced to background noise levels typically characteristic of undeveloped open lands, noise impacts associated with construction and operation at these nearby off-site receptors is expected to be minor and temporary.

Table 3-15. Typical Construction Equipment Noise Levels

Equipment	Noise Level (dBA) at 50 ft
Dump Truck	84
Bulldozer	85
Scraper	85
Grader	85
Excavator	85
Compactor	80
Concrete Truck	85
Boring-Jack Power Unit	80
Backhoe (trench)	80
Flatbed Truck	84
Crane (mobile)	85
Generator	82
Air Compressor	80
Pneumatic Tools	85
Welder/Torch	73
Paver	85

Source: FHWA 2014.

The steam customer would have to construct a new gas line to provide natural gas to auxiliary boilers. General site excavation and construction activities are expected to occur only during daylight hours. Due to the temporary nature of noise impacts anticipated from gas line construction, noise impacts would be minor. Operational long term noise levels would be intermittent and only related to periodic right of way maintenance activities. Consequently, noise impacts of operation and maintenance of the gas line are also expected to be minor and not significant.

3.18.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Under the Action Alternative B, most construction activities would occur during the day on weekdays. The nearest noise sensitive receptors to the temporary use areas identified on the project site (see Figure 2-1) are located in New Johnsonville and include a residence immediately south of US Route 70 (0.8 mi) and the CL Edwards Memorial Park (1.0 mi). As described above for the No Action Alternative, typical noise levels from construction equipment used at the plant site are listed in Table 3-15 and are expected to be 85 dBA or less. Based on straight line noise attenuation from the nearest laydown area, it is estimated that construction phase noise levels would attenuate to 46.6 dBA at the nearest residence and to 44.7 dBA at the park. Construction activities could occur at night or on weekends, if necessary. Construction activities would increase traffic on roads near the plant, which would also increase intermittent noise at some nearby residences. Consequently, noise impacts associated with construction at these nearby off-site receptors is expected to be minor and temporary.

Due to the temporary and intermittent nature of construction, and the attenuating effects noise levels over distance, construction phase impacts to sensitive noise receptors are minor and not significant.

Based on straight line noise attenuation of the highest operational noise levels (HRSGs: 62 dBA at 400 ft), the estimated noise level is 39.6 dBA at the nearest residence and 38.0 dBA at the C.L. Edwards Memorial Park. These values do not exceed USEPA recommended guidelines of 55 dBA for Ldn. Therefore, noise from the proposed facility is not expected to cause any significant impact.

3.19 Transportation

3.19.1 Affected Environment

The JOF is served by highway, railway and waterway modes of transportation. US Route 70/State Highway 1 is the primary arterial roadway serving the JOF site (see Figure 3-3). Traffic generated by JOF is expected to be composed of a mix of cars and light duty trucks (such as a Fedex truck), as well as medium duty (larger delivery trucks) to heavy duty trucks (semi-tractor trailers).

There are three points of access to JOF from US 70/State Highway 1. The eastern-most access is a service interchange to State Highway 929 (DuPont Access Road). This interchange has a diamond configuration on the westbound ramps and a directional ramp/cloverleaf serving the eastbound ramps. This is the primary employee entrance to JOF. Approximately 1,725 ft west of Highway 929 is an at-grade intersection at North Street. The western access is 0.85 mi west of North Street and consists of an at-grade intersection on the south side of US 70, which serves a driveway that curves back to the north and crosses over US 70 into the JOF site.

The 2012 Average Annual Daily Traffic (AADT) counts for key roadways that serve JOF are presented in Table 3-16.

Table 3-16. Primary Routes with 2012 Average Annual Daily Traffic Counts

Roadway	Average Daily Vehicle Use (AADT)
US 70/State Highway 1 east of JOF	7,346
State Highway 929	1,845
US 70/State Highway 1 west of JOF	6,332

Sources: TDOT 2013a and TDOT 2013b.

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate in its current configuration, and would not supply steam to the steam customer following the closure of the coal-fired units at JOF in 2017. Under this alternative, the steam customer would be responsible for producing their own steam to continue their operation. No construction activities would be undertaken by TVA as part of this alternative. Some additional traffic would result from normal plant outages, but that would be infrequent and would have insignificant effect on the local road network. Consequently, there would be no change of effect on the adjacent transportation network from TVA actions.

However, under this alternative, it is assumed that the steam customer would produce their own steam on previously developed lands at the current customer site. It is also assumed that traffic-related impacts associated with facility construction and operation by the steam customer would be similar to those associated with Alternative B (see below). Accordingly, expected impacts to the roadway network associated with the construction and operation of the steam customer's steam facility are similar to those of Alternative B and are negligible.

Under this alternative the steam customer would have to construct a new natural gas line to supply auxiliary boilers. It is reasonable to assume that traffic would be temporarily affected by the construction of the proposed gas line due to increased vehicles on the roadways. Once constructed, there would be no impact to the transportation network during operation.

3.19.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Existing traffic volume at JOF and traffic generated by the construction workforce is summarized in Table 3-17 and is the controlling factor in assessing impacts to the local roadway network. Construction phase traffic would be present in addition to the existing traffic generated by the operating JOF (Table 3-18). Therefore, this condition is considered to reflect the maximum potential impact on transportation. Once construction is completed, traffic associated with operation of the plant would be much lower than the traffic generated during construction and there would be significantly fewer heavy vehicles than what would be present during construction. The plant would require three people per shift over three shifts per day for operation once the system is installed.

Table 3-17. Traffic Volume Associated with the Current Configuration and the Proposed Cogeneration Plant

Phase	Employment	Average Daily Vehicle Use Generated (AADT)[1]
Construction Phase		
Existing JOF Operations[2]	37	90
Proposed Plant Construction	200	440
Operations Phase		
Existing JOF Operations[3]	17	40
Proposed Plant Operation	10	30

[1] Based on vehicle occupancy rate of one worker per vehicle
[2] JOF fossil plant plus existing CT site
[3] Existing CT site only

Table 3-18. Traffic Impacted Associated with Construction of the Proposed Cogeneration Plant

Roadway	Existing Traffic (AADT)	Construction Phase Traffic (AADT)	Traffic Increase (Percent)
US 70/State Highway 1 east of JOF	7,346	7,654	4.2
State Highway 929	1,845	2,285	23.8
US 70/State Highway 1 west of JOF	6,332	6,464	2.1

The construction work force would be up to 200 workers. Based on an assumed vehicle occupancy rate of one worker per vehicle, the construction phase traffic on State Highway 929 is expected to result in an increase of 440 vehicles per day (23.8 percent), which would be readily accommodated by the existing roadway. The construction period is expected to extend for about 18 months, with the peak period being between April 2016 and October 2016. The maximum service flow rate on a two-lane highway can range from about 1,400 to 1,900 vehicles per hour per lane (TRB 2000). Even with the increase of construction traffic, the volume on State Highway 929 during peak construction would be 2,285 vehicles *per day* for both directions of traffic. This is well under the service flow rate for a two-lane highway; therefore, effects of construction traffic on State Highway 929 are not expected to adversely impact traffic conditions.

The effects of construction traffic on US 70 are also expected to be minor as the increases in traffic are only 4.2 percent (east of JOF) and 2.1 percent (west of JOF) and short term in duration. This assumes a distribution of 30 percent of the traffic would travel to and from

the west of JOF and 70 percent would travel to and from the east along US 70. On-site parking would be provided by means of a gravel parking lot using one of the temporary use areas. Construction materials and components would primarily be delivered by truck (with the exception of the heavy components of the plant, which would be delivered by barge). Additional truck traffic would occur on the public roadways (State Highway 929 and US 70) during construction. This truck traffic would be intermittent and infrequent throughout the construction period. An estimated two semi-tractor trailers per week are expected at the site during the construction period.

Because the existing roadway network is expected to have sufficient capacity to absorb the expected construction traffic increase and because the construction phase is short term, potential impacts of construction on roadway transportation are expected to be minor and temporary.

After construction, the operations phase of JOF is expected to result in a decrease in traffic on the local road network. With the closure of JOF in 2017, operation of the cogeneration plant would require up to ten workers per day over three shifts in addition to the 17 workers already employed to operate the CT units. This very low number would have basically no effect on the local roadway network.

The heavy components of the new plant would be transported by barge direct to JOF through three barge deliveries. No public roads are affected by the transport of the plant components.

No large components or construction materials would be delivered by rail.

3.20 Socioeconomics and Environmental Justice

3.20.1 Affected Environment

Socioeconomic characteristics of resident populations are assessed using 2010 Census and 2009-2013 American Community Survey (ACS) 5-year estimates. Employment and housing information is provided by the 2009-2013 ACS.

The appropriate geographic scale for the analysis of socioeconomic impacts is the census-designated tract for the City of New Johnsonville, Tennessee and the surrounding community (defined as Census Tract 1305). This geographic area provides an appropriate context for analysis of the socioeconomic conditions in the vicinity of the proposed action. Additionally, Humphreys County and the state of Tennessee are included as appropriate secondary geographic areas of reference. Comparison at multiple scales provides a more effective definition for socioeconomic factors that may be affected by the proposed action including minority and low income populations.

3.20.1.1 Demographics

Demographic characteristics of the study area are summarized in Table 3-19. New Johnsonville has a resident population of 1,908. A majority (66 percent) of the population of the community surrounding the project site (2,882 persons) live within New Johnsonville city limits. New Johnsonville and the surrounding community comprise 15.7 percent of the population of Humphreys County (U.S. Census Bureau [USCB] 2014). However, Humphreys County (18,392 residents) represents only 0.3 percent of the total population of Tennessee (6,402,387). Since 2000, the population around New Johnsonville has decreased by 5.9 percent. During this same period, Humphreys County also lost some of

its population (approximately 1 percent), while the state of Tennessee grew by approximately 1 percent.

Age characteristics of study area are comparable to Humphreys County and Tennessee. Persons under the age of 5 and under the age of 18 are similar to the reference areas. There are fewer older persons (greater than 65 years) in New Johnsonville proper, but the surrounding community reflects county and state rates.

Table 3-19. Demographic Characteristics

	City of New Johnsonville	Census Tract 1305	Humphreys County	State of Tennessee
Population				
Population, 2013 estimate	1,908	2,882	18,392	6,402,387
Population, % change, 2010 to 2013	-2.2%	-5.9%	-0.8%	0.9%
Population, 2010	1,951	3,061	18,538	6,346,105
Persons under 5 years, 2013	6.0%	6.1%	5.4%	6.3%
Persons under 18 years, 2013	25.1%	22.3%	22.8%	23.3%
Persons 65 years and over, 2013	11.5%	15.3%	17.8%	13.9%
Female persons, 2013	44.5%	48.8%	50.4%	51.3%
Racial Characteristics				
White, 2013[1]	94.8%	96.6%	95.5%	78.2%
Black or African American, 2013[1]	0.9%	0.6%	3.3%	16.8%
American Indian and Alaska Native, 2013[1]	0.4%	0.3%	0.0%	0.3%
Asian, 2013[1]	0.5%	0.3%	0.2%	1.5%
Native Hawaiian and Other Pacific Islander, 2013[1]	0.0%	0.0%	0.0%	0.0%
Two or More Races, 2013	1.8%	1.2%	0.6%	1.8%
Hispanic or Latino, 2013[2]	2.1%	1.4%	1.8%	4.7%
White, not Hispanic or Latino, 2013	94.2%	96.1%	93.3%	75.3%
Economic Characteristics				
Per capita income in past 12 months (2013 dollars), 2009-2013	$26,208	$25,955	$22,183	$24,409
Median household income, 2009-2013	$55,000	$53,036	$42,846	$44,298
Persons below poverty level, 2009-2013	9.0%	8.2%	13.9%	17.6%
Housing				
Housing units, 2013	806	1,353	8,869	2,821,797
Homeownership Rate, 2009-2013	81.7%	80.6%	77.8%	67.8%
Median value of owner-occupied housing units, 2009-2013	$100,800	$96,400	$108,000	$139,200
Households, 2009-2013	726	1,154	7,396	2,475,195
Persons per household, 2009-2013	2.63	2.50	2.46	2.52
Other Demographic Characteristics				
Living in same house 1 year and over, 2009-2013	89.2%	89.7%	89.0%	84.6%
Foreign born persons, 2009-2013	2.0%	1.3%	0.5%	4.6%
Language other than English 2009-2013	3.1%	2.1%	2.0%	6.6%
High school graduate or higher (age 25+), 2009-2013	46.3%	49.3%	84.2%	84.4%
Bachelor's degree or higher (age 25+), 2009-2013	15.3%	13.7%	12.4%	23.8%
Veterans, 2009-2013	164	198	1,525	484,901

[1]Includes persons reporting only one race.
[2]Hispanics may be of any race, so also are included in applicable race categories.

Table 3-19. Demographic Characteristics

	City of New Johnsonville	Census Tract 1305	Humphreys County	State of Tennessee

USCB 2014a

Racial characteristics in the study area are predominantly white with very few representatives of other racial or ethnic groups. Whites make up 96.6 percent of the New Johnsonville population (94.8 percent in the city limits). Correspondingly, minority populations in the study area are smaller. Minorities in the study area include: black or African American (0.6 percent), Asian (0.3 percent), Native American (0.3 percent), or two or more races (1.2 percent). Aside from black and African American, minority populations are consistent with Humphreys County and Tennessee. Black or African American populations, however, are slightly lower than the rest of the county (3.3 percent) and much lower than the state (16.8 percent). Hispanic and Latino ethnic groups are present in the study area, but are at or below comparative rates for Humphreys County and Tennessee.

3.20.1.2 Economic Conditions

3.20.1.2.1 Economy and Regional Employment

The community surrounding New Johnsonville (i.e., Census Tract 1305) contains a total employed labor force of 1,217 workers (Table 3-20). Manufacturing provides the greatest employment (23 percent) followed closely by education and healthcare professions (22 percent). The sector that includes TVA's employees (i.e., transportation, warehousing, and utilities) employs 15 percent of the workforce. Retail (10 percent), service industry (8 percent), public administration (6 percent), and construction jobs (5 percent) round out the other top employing industries in the study area.

Unemployment rates in the study area are above comparison geographies. In the study area, 1,420 are in the civilian labor pool of which 1,217 are employed. Unemployment within the study area is 8.7 percent of the eligible population and 14.3 percent of the civilian labor force. Unemployment rates are higher relative to the unemployment rates of Humphreys County (7.2 percent) and the State of Tennessee (6.2 percent) (Table 3-21).

Table 3-20. Largest Employers by Industry within New Johnsonville, Tennessee

Sector	Number of Employees	Percent
Manufacturing	281	23%
Education and healthcare	262	22%
Transportation, warehousing, and utilities	185	15%
Retail trade	118	10%
Arts, entertainment, recreation, accommodation, and food services	92	8%
Public administration	67	6%
Construction	58	5%
Subtotal	**1,063**	**87%**
Total Employed	**1,217**	**100%**

Source: USCB 2014a

Table 3-21. Employment Characteristics of the Resident Labor Force

Employment Status	Population		
	Surrounding Community[1]	Humphreys County	Tennessee
Population >16 years	2,328	14,714	5,078,433
Civilian Labor Force			
Employed	1,217	7,483	2,806,948
Unemployed	203	1,063	316,682
Subtotal	1,420	8,546	3,123,630
Unemployment			
% of Total Population	8.72%	7.22%	6.24%
% of Civilian Labor Force	14.30%	12.44%	10.14%

[1]Census Tract 1305
Source: USCB 2014a

Despite the higher unemployment rates, for those that are employed, incomes in the study area are greater than incomes in Humphreys County and Tennessee (Table 3-19). Median household income is $53,036 in the study area ($55,000 in New Johnsonville) which is roughly $10,000 greater than median household income in Humphreys County and $9,000 greater than the State. Per capita income for the project area is $25,955 ($26,208 in New Johnsonville), whereas the per capita incomes for Humphreys County and Tennessee are $22,183 and $24,409, respectively (see Table 3-19). Poverty rates in the study (8.2 percent) are half the poverty rates for Tennessee (17.6 percent).

3.20.1.2.2 Tax Revenue

As a federal entity, TVA is exempt from taxes, including sales, property or income taxes. To compensate state and local governments, the TVA Act requires that TVA make annual tax equivalent payments to states and counties where it does business. The payments are based on TVA power operations in those states. TVA also makes payments to counties where TVA acquired properties that were once owned and operated by another utility company and had been subject to local property taxes. As such, operation of the existing CT units at JOF contributes revenue to support local governments.

3.20.1.3 Housing

Housing in the study area is available and at a relatively lower cost than surrounding areas. There are 1,353 total housing units to serve 1,154 households in the study area (see Table 3-19). Vacancies make up 14.7 percent of the total housing units in the study area, which is in the range of rates seen in Humphreys County (16.6 percent) and Tennessee (12.3 percent). The number of persons per household are comparable to the study area. Homeownership is approximately 80 percent, which is greater than rates in Humphreys County (77.8 percent) and Tennessee (67.8 percent). Median home values in the study area are roughly $10,000 less than Humphreys County and roughly $40,000 less than the state.

Transient housing options for a migratory workforce include 7 hotels within 15 mi of the project site (HotelGuides 2014). Hotels closest to the proposed project are outside of New

Johnsonville in Camden, Hurricane Mills, and Holladay, Tennessee. Maximum capacity of the 7 closest hotels is 377 units.

3.20.1.4 Community Facilities and Services

3.20.1.4.1 Educational Facilities

Existing public facilities and community services in the study area include schools, emergency services, and community centers. Schools, churches, cemeteries and other community facilities are identified in Figure 3-3. Lakeview Elementary is the only public school in the project area and is part of the Humphreys County Schools System (HCSS 2014).

3.20.1.4.2 Healthcare and Emergency Services

The closest healthcare and emergency service that serves the study area and surrounding communities is Camden General Hospital: a 25-bed community hospital that has an emergency department (West Tennessee Healthcare 2014). Camden General is part of the West Tennessee Healthcare system that has 5 additional emergency care hospitals in the region. Both ground and air emergency medical transport is provided by the Medical Center EMS (West Tennessee Healthcare 2014).

Other emergency services include the New Johnsonville Fire Department and Police Department. The New Johnsonville Fire Department is a volunteer force that has 19 volunteer firefighters and 2 volunteer support staff (FEMA 2012). The New Johnsonville Police Department employs 4 officers (City of New Johnsonville 2014). The police and fire stations are located in the same building, approximately 1.7 mi from the proposed project site.

3.20.1.5 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low income Populations*. EO 12898 mandates some federal agencies to consider Environmental Justice (EJ) as part of the NEPA. EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (USEPA 2014a) and ensures that minority and low income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. While TVA is not subject to EO 12898, TVA assesses EJ impacts for federal actions as a matter of policy.

Guidance for addressing EJ is provided by the CEQ's *Environmental Justice Guidance Under the National Environmental Policy Act* (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997). Low income populations are based on annual-statistical poverty thresholds also defined by the USCB.

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.

- The ratio of minority population is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

For this analysis "meaningfully greater" was considered to be greater than or equal to 20 percent. If the study area has a minority percentage that exceeds 50 percent, then it is identified as containing a minority population. If the study area has a minority percentage exceeding the corresponding minority percentage for Humphreys County or Tennessee by more than 20 percentage points, then a minority population is determined to exist in the study area. Areas where minority populations exceed 50 percent of the population or are meaningfully greater than the racial demographics of the geographic area should be included in all assessments.

Low income populations are those with incomes that are less than the poverty level (CEQ 1997). An approach similar to the guidelines provided by the Nuclear Regulatory Commission is used for these analyses. The study area is considered low income if either of the following two conditions is met:

- The low income population exceeds 50 percent of the total number of households.
- The ratio of low income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic area of analysis (NRC 2004).

The study area does not meet the specified criteria as EJ minority populations or low income populations (see Table 3-19). Therefore, no further analysis regarding Environmental Justice is required.

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would not supply steam to the steam customer and the steam customer is expected to install the necessary equipment to provide their own steam. All construction activity would occur on vacant, previously disturbed lands within its site. The steam customer would also have to construct a new natural gas line to supply auxiliary boilers. The line could be up to 30 miles long and may impact EJ populations.

Under this alternative it is assumed that construction at the steam customer's facility would not as readily be integrated into the existing infrastructure of the steam customer's operational facility as compared to Alternative B. Increased engineering effort and complexity would likely be required to modify infrastructure (gas lines, utility lines, roadways), and other on-site and off-site components to accommodate the new infrastructure required to develop the steam supply. Therefore, it is expected that this alternative would require somewhat larger labor force, higher capital costs, and longer construction duration as compared to Alternative B.

Somewhat higher construction complexity would likely result in a larger workforce and increased construction duration that would place additional demands on temporary housing and community services. Tax revenue generated by income tax and sales tax from these workers would benefit the local economy. Additionally, the hospitality and service industries would potentially benefit from the demands brought by this new workforce. The potential impacts of this alternative are expected to be greater than Alternative B due to the additional infrastructure requirements.

3.20.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

3.20.2.2.1 Demographic and Employment Impacts

Demographic characteristics of the project area are expected to change temporarily in response to the in-migration of a transient construction workforce, but not significantly. Construction of the HRSG and related steam facilities is expected to extend for approximately 18 months. On site construction workforce would range from 100 to 200 workers. Up to 10 additional workers would be required to support long-term maintenance of auxiliary boilers and the HRSG. During construction, workers could be drawn from the labor force that currently resides in the study area. However, specialty craft workers and laborers not available within the area would be expected to temporarily relocate to the project area to support construction. The size of the workforce needed during peak construction would only increase the local (i.e., Census Tract 1305) population by 7 percent (from 2,882 to 3,082). Additionally, because of the short-term duration of construction, no long-term or significant impacts to local demographics are expected.

3.20.2.2.2 Economic Impacts

Potential economic impacts associated with the proposed project relate to direct and indirect effects of a large capital construction project and the long-term operation and maintenance of the proposed plant. Construction activities would entail a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services. Capital costs associated with the proposed action would therefore have direct economic benefits to the local area and region. Revenue generated by income tax and sales tax from new workers would benefit the local economy. TVA is and would continue to provide tax equivalent payments annually to state and local governments in the region as determined by power sales revenue in the previous year and property ownership. Additionally, significant beneficial secondary impacts to the economy are also expected in conjunction with the multiplier effects of large capital construction activities. For example, the hospitality and service industries would benefit from the demands brought by the influx of construction workforce.

3.20.2.2.3 Housing

According to this analysis, there is enough temporary housing within the region to accommodate the increase of between 100 to 200 workers. Based on the expected vacancy rate of the available housing in the area, and the capacity of nearby hotels, no significant effects on housing are expected with the proposed action.

3.20.2.2.4 Community Facilities and Services

Potential impacts to community facilities and services relate to the potential for additional demands that exceed capacity and the loss of revenues that support public services. Under Alternative B, the potential for increased demand for services is related to demands of the workforce and of the facility during operations. Increased workforce demands and potential changes in the local demography reflect an incremental increase in need for police protection, fire/ambulance emergency services, and educational services (assuming workers move to the area with school-aged children). However, community facilities in the study area (e.g., emergency services, parks, and churches) should be able to support a temporary increase in population of less than 7 percent. Existing service levels and infrastructure capacities are already in place to meet the demands of transient workers, therefore, additional impacts on community facilities or services would be expected to be minor during construction.

3.21 Public Health and Safety

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. OSHA is the main statute protecting the health and safety of workers in the workplace. OSHA regulations are presented in Title 29 *CFR* Part 1910 (29 *CFR* 1919), *Occupational Safety and Health Standards*. A related statute, 29 *CFR* 1926, contains health and safety regulations specific to the construction industry. The Tennessee Department of Labor and Workforce Development has adopted federal OSHA standards contained in 29 *CFR* Parts 1910 and 1926 pursuant to Tennessee Code Annotated (TCA) Section 50-3-201. Additionally, the Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 contains health and safety regulations to confirm the commitment to the Integrity Management Program (IMP) and other programs enacted in the 2002 legislation (*Pipeline Safety Improvement Act of 2002*) for natural gas lines.

3.21.1 Affected Environment

The routine operations and maintenance activities at the existing JOF reflect a safety-conscious culture and are performed consistent with OSHA and TCA standards and requirements and specific TVA guidance. Personnel at JOF are conscientious about health and safety having addressed and managed operations to reduce or eliminate occupational hazards through implementation of safety practices, training, and control measures. This culture of emphasizing health and safety is reflected in the JOF's safety record.

The JOF Hazardous Communications Program requires personnel training regarding potential chemical-related exposures and hazards and also requires that a chemical inventory and Material Safety Data Sheet is made available for each chemical utilized.

JOF has an anhydrous ammonia system that is subject to the OSHA Process Safety Management standard (29 *CFR* 1910.119) and USEPA's Risk Management Program rules (40 CFR Part 68). The JOF has a Process Safety Management program to minimize the potential for the accidental release of ammonia stored on site at JOF. A Risk Management Plan (RMP) is in place and implemented to prevent an accidental release of ammonia. The release prevention program in the plan includes the following sections:

- Process Safety Information
- Process Hazard Analysis
- Operating Procedures
- Training
- Mechanical Integrity
- Management of Change
- Pre-Start Up Safety Review
- Compliance Audits
- Incident Investigations
- Employee Participation
- Contractors
- Emergency Response Plan (ERP)
- Analyses of Off Site Consequences.

The RMP also contains a detailed preventive maintenance program and inspection program for the entire ammonia system. The worst-case impact scenario is defined as well as an ERP. The ERP includes all aspects of ERP requirements, including adequate first aid and medical treatment, safe shelter-in-place locations, notification of local emergency response agencies and the public, and qualified contractor responder for post-incident decontamination of affected areas. Periodic emergency response drills are conducted to keep employees, contractors, and local responders familiar with the plan. The applicable chemical accident prevention measures required under 40 CFR Part 68 also are implemented.

The potential off-site consequences and emergency response plans are coordinated with local emergency management agencies. These programs are audited by TVA no less than once every three years and by USEPA periodically. The RMP must also be revalidated at five-year intervals and a synopsis of the program resubmitted to USEPA. JOF has developed an RMP that describes the overall management structure, all the risks, and all the physical and operational methods designed to minimize the likelihood of an accidental ammonia release. Implementation of proper engineering and equipment design, administrative controls such as employee training, and compliance with regulatory requirements related to storage of ammonia, insure that the risks associated with the ammonia remains low and a low probability exists for accidents or malfunctions resulting in a significant health risk.

Health hazards are also associated with emissions and discharges from the plant as well as accidental spills/releases at the plant and/or along gas lines. Mitigative measures are used to ensure protection of human health which includes the workplace, public and the environment. Applicable regulations and attending administrative codes that prescribe monitoring requirements may include those associated with emergency management, environmental health, drinking water, water and sewage, pollution discharge, air pollution, hazardous waste management and remedial action.

Additionally, wastes generated by operation of the plant can pose a health hazard. Wastes including solid wastes, liquid wastes, discharges and air emissions are managed in accordance with applicable federal, state and local laws and regulations and all applicable permit requirements. Furthermore, waste reduction practices are employed including recycling and waste minimization. TVA is committed to complying with all applicable regulations, permitting, and monitoring requirements.

3.21.2 Environmental Consequences

3.21.2.1 Alternative A – No Action

The operations and maintenance activities at the existing JOF would continue to be applied within the safety-conscious culture and activities currently performed in accordance with applicable standards or specific TVA guidance. JOF would continue to address and manage reduction or elimination of occupational hazards through implementation of safety practices, training, and control measures. JOF's safety conscious efforts would continue such that worker and public health and safety at JOF would be maintained and impacts would be minimized.

TVA assumes that under this alternative, the steam customer would be responsible for producing their own steam to continue their operation, and that all activities in support of this action would be consistent with standards as established by OSHA and TCA requirements which would minimize impacts to public health and safety.

During construction by the steam customer, it is assumed that customary industrial safety standards as well as the establishment of appropriate BMPs and job site safety plans would describe how job safety would be maintained during the project. These BMPs and site safety plans address:

- the implementation of procedures to ensure that equipment guards, housekeeping, and personal protective equipment are in place;
- the establishment of programs and procedures for lockout, right-to-know, confined space, hearing conservation, forklift operations, excavations, and other activities;
- the performance of employee safety orientations and regular safety inspections; and
- the development of a plan of action for the correction of any identified hazards.

All these measures should ensure that safety and risk management measures are properly implemented and that no unusual job site safety risks would be expected from construction activities.

3.21.2.2 Alternative B – Supply Steam to the Steam Customer from a Cogeneration Plant

Activities in support of the proposed construction of the plant and related steam facilities at JOF would be performed consistent with standards as established by OSHA and TCA requirements. During construction, customary industrial safety standards as well as the establishment of appropriate BMPs and job site safety plans would describe how job safety would be maintained during the project. These BMPs and site safety plans address:

- the implementation of procedures to ensure that equipment guards, housekeeping, and personal protective equipment are in place;
- the establishment of programs and procedures for lockout, right-to-know, confined space, hearing conservation, forklift operations, excavations, and other activities;
- the performance of employee safety orientations and regular safety inspections; and
- the development of a plan of action for the correction of any identified hazards.

All these measures should ensure that no unusual job site safety risks would be expected from construction activities.

The operation of the proposed plant and associated facilities at JOF would adhere to TVA guidance and be consistent with standards established by OSHA and TCA requirements. TVA would implement health and safety practices that would address and manage the reduction or elimination of occupational and public health hazards. Therefore, worker and public health and safety during project operation would be maintained and impacts would be minor.

3.22 Unavoidable Adverse Environmental Impacts

Construction and operation of the proposed plant and water line have the potential to cause unavoidable adverse effects to several environmental resources. TVA has reduced the

potential for adverse effects during the planning process. In addition, TVA would implement mitigation measures (Section 2.3) to further reduce potential adverse effects to certain environmental resources.

Construction activities would temporarily impact 11.1 ac of developed lands for the laydown areas for the plant, however additional laydown areas could be utilized on any of the previously disturbed areas within the project study area.

Unavoidable localized increases in air and noise emissions would also occur during construction activities. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, noise, and vibration that may potentially impact both on-site workers and nearby off-site residences and parks. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the site. Emissions from construction activities and equipment are minimized through implementation of mitigation measures, including proper maintenance of construction equipment and vehicles.

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

This EA focuses on the analyses and resulting conclusions associated with the environmental impacts from activities during the new cogeneration plant construction and operation. These activities are considered short-term uses for purposes of this section. In this section, the long term is considered to be initiated with the closure of JOF. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project site.

The principal change in short-term use of the project area would be the temporary land use during construction. The acreage disturbed during construction of the plant is larger than that required for the actual structures because of the need for construction parking areas, and construction material staging and laydown areas. Laydown areas are located exclusively on the TVA-owned lands at the JOF site which is heavily disturbed. Preparation of these on-site areas coupled with noise from construction activities, may displace some wildlife currently using these disturbed areas and alter existing vegetation. Once the new facility is completed, the areas not needed for operations would be expected to be returned to pre-existing conditions.

The proposed actions occur within an area already subject to on-going human disturbance and maintenance, therefore the short-term use of the land for the plant and water line is not expected to significantly alter long-term, productivity of wildlife or other natural resources. However, after the closure of the coal-fired units at JOF, the cogeneration plant would remain in place, therefore limiting any other industrial and non-industrial uses of the land.

Construction and operation of the proposed plant and water lines have the potential to cause unavoidable adverse effects to several environmental resources. TVA has reduced the potential for adverse effects during the planning process. In addition, TVA would implement mitigation measures (Section 2.3) to further reduce potential adverse effects to certain environmental resources.

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result in varying amounts of dust, air emissions, noise, and vibration that may potentially impact both on-site workers and nearby off-site residences and parks. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the site. Emissions from construction activities and equipment are minimized through implementation of mitigation measures, including proper maintenance of construction equipment and vehicles.

3.24 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used in the new facility construction and operation. The term irreversible commitments of resources describes environmental resources that are potentially changed by the new facility construction or operation and that could not be restored at some later time to the resource's state prior to construction or operation. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road right of way as long as the road remains. Irretrievable commitments of resources are generally materials that are used for the new facility in such a way that they could not, by practical means, be recycled or restored for other uses. For example, mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored.

The land used for the proposed plant is not irreversibly committed because once the unit ceases operations and the facility is decommissioned, the land supporting the facilities could be returned to other industrial or non-industrial uses. Similarly, the right of way for the water line would be committed irretrievable while in use, but the right of way could be returned to other uses upon retirement of the line.

The materials used for the construction of the proposed facility would be committed for the life of the facility. Some building materials may be irrevocably committed, however some metal components and structures could be recycled.

3.25 Cumulative Effects

This section supplements preceding analyses that include in some degree the potential for cumulative adverse impacts to the region's environment that could result from construction and operation of the proposed cogeneration plant. The CEQ regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC 4321 et seq.) define cumulative impact as:

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7).

A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and either explicitly or implicitly already have cumulated the impacts of past and present actions with those of the proposed action.

3.25.1 Scoping for Cumulative Effects Analysis

TVA evaluated a full range of environmental resource issues for inclusion in the cumulative effects analysis. The proposed action and its connected actions would occur on lands already used for heavy industrial use (i.e., the existing JOF site). The surrounding landscape is already subject to extensive environmental stressors associated with pre-existing disturbances and continuing industrial operations. Consequently, as has been described in prior subsections of this EA, the existing quality of environmental resources potentially directly or indirectly affected by project activities is generally low.

This analysis is limited to only those resource issues potentially adversely affected by project activities at the proposed site or its connected actions. Accordingly, geology/soils, prime farmland, hazardous materials/waste, floodplains, sensitive species, visual effects, noise, land use, safety, cultural resources and environmental justice are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be minimal or beneficial. Primary resource categories specifically considered in this supplemental cumulative effects assessment include surface water, wetlands/aquatic ecosystems, air quality, and terrestrial ecology.

3.25.2 Geographic Area of Analysis

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, two general geographic areas were considered appropriate for consideration in this analysis.

1. *Lands within Humphreys and Benton Counties in the Vicinity of the Proposed Plant Facility and Water Line*. This geographic area provides an appropriate framework for the consideration of potential cumulative effects to air quality and terrestrial vegetation. This geographic area includes near off site areas and the 10-mi radius within Humphreys and Benton counties and encompasses lands on the proposed plant site, near off site areas proposed for use as laydown during construction, and the proposed water line right-of-way.

2. *Waters and Wetlands within Kentucky Reservoir and Surrounding Tributaries*. This geographic area contains surface water resources affected by existing plant operations (intake/discharge operations), surface waters potentially receiving runoff from the proposed plant site, and wetland/aquatic resources potentially modified by the gas line construction. Wetland complexes and aquatic ecosystems are hydrologically and physically contiguous with similar resources potentially affected by the proposed project.

3.25.3 Identification of "Other Actions"

Past, present, and reasonably foreseeable future actions that are appropriate for consideration in this cumulative analysis are listed in Table 3-22. These actions were identified within the geographic areas of analysis as having the potential to, in aggregate, result in larger, and potentially significant adverse impacts to the resources of concern.

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

Table 3-22. Summary of Other Past, Present or Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Project

Actions Description	Description	Timing and Reasonable Foreseeability
Operations of adjacent industrial facilities	Operations of facilities adjacent to JOF including the DuPont Chemical Plant, OxyChem Plant, and the Herbet Sangravel facility	Past, Present, Reasonably Foreseeable Future
Closure of coal-fired facility at JOF	TVA will retire all 10 coal-fired units at the JOF per the EPA Clean Air Agreements	Reasonably Foreseeable Future
Dike stabilization at JOF	Modifications to a dike that supports ash storage area at JOF	Past
OxyChem barge terminal and outfall	Modifications to dock facility and installation of waste water outfall	Past

3.25.3.1 Operations of the Adjacent Industrial Facilities

The JOF site is bordered by other industrial facilities along the eastern bank of the Kentucky Reservoir. To the north, JOF is adjacent to the DuPont chemical plant and OxyChem plant. The two facilities work under an agreement to utilize raw materials and services provided by each other. The facilities also include a shared barge docking facility and waste water outfall in the reservoir. To the south of JOF is a sand and gravel mining facility, Herbet Sangravel. This facility includes material stockpile areas, various supporting buildings, and a barge docking facility. These facilities around JOF collectively are part of the base condition characterized by each of the environmental resources evaluated above and contribute to the previously developed elements of the environmental setting for this EA and on-going disturbance.

3.25.3.2 Closure of Coal-fired Units at JOF

As described in Section 1.1 of this EA, the existing JOF plant has 10 coal-fired units which produce approximately 6 billion kilowatt-hours of electricity per year. As part of the EPA Clean Air Agreements, TVA agreed to retire all 10 coal-fired units at JOF by December 31, 2017. The closure of these coal-fired units would result in a decrease of air pollutants emitted from the facility. Upon the closure of JOF, the proposed plant and water line would remain in place to continue to supply steam to the steam customer.

3.25.3.3 Dike Stabilization at JOF

In 2010, TVA made improvements to a dike that supports the northeast side of an ash storage area located at JOF. The improvements were made to enhance the stability of approximately 1,600 linear feet of the dike by extending the thickness of the dike wall both above and below the normal summer and winter pool elevations. The proposed project area included a high-quality mussel bed, which was monitored for three years post-construction for any impacts on potential sensitive species. Maintenance along the dike includes mowing and herbicide treatment along the perimeter to maintain overgrown vegetation.

3.25.3.4 OxyChem Barge Terminal and Outfall

In 2013, the barge terminal at the DuPont chemical plant was modified to support the adjacent Oxychem plant. The modifications included installing equipment to allow for the

unloading of rock salt, as well as for loading of liquid caustic into barges for transport to customers. OxyChem also installed a waste water outfall in the Kentucky Reservoir approximately 625 feet downstream of an existing outfall for DuPont. These modifications were performed per approval of TVA under Section 26a of the TVA Act, and USACE under Section 404 of the CWA.

3.25.4 Analysis of Cumulative Effects

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

Surface Water. The potential for cumulative effects to surface waters and their associated water quality are largely driven by the variety of uses of and inputs into the Kentucky Reservoir. As is described in Subsections 3.13.1 and 3.14.1, the reservoir is a major focal point for water-related outdoor recreation, including boating, fishing, and swimming. Additionally, in the area around JOF there are a number of other industrial facilities that discharge into the reservoir, therefore contributing to the cumulative surface water quality.

The potential for cumulative effects on surface water resources may be evaluated by assessing the additive effects of the proposed action and other identified past, present, and reasonably foreseeable future actions in contributing to the existing impaired conditions. Among the other identified actions within the geographic area on-going operations of the DuPont, OxyChem, and the Herbet Sangravel facilities have the potential to contribute to additional impacts to water quality. Additionally, past actions including the new OxyChem outfall have contributed to the current surface water conditions. Future planned closure of the coal-fired units at JOF would be expected to result in improved water quality conditions due to the cessation of discharge from the coal-fired units and reduced intake of surface water for operations.

Under the proposed action, no surface waters would be directly impacted by construction of the proposed plant facility or the associated laydown areas. Stormwater runoff from construction areas would be directed to the coal yard runoff ditch/pond and eventually to the ash pond complex. Discharge into the Kentucky Reservoir from the ash pond complex would be through the permitted Outfall 001. Surface water would be required during operations and would be taken using the existing intake structures at JOF and/or the proposed new demineralization facility. Periodic discharges related to stormwater runoff, sanitary wastewater, and process water would all be directed to the coal yard runoff pond where it would be pumped to the ash pond for final treatment prior to release within the limits of the existing NDPES permit issued by TDEC. Therefore, the use of BMPs during construction and treatment of water prior to discharge during operations would reduce any effects and the cumulative impacts are not significant.

Overall, the proposed plant would not directly impact water resources. The proposed action would not result in changes to current discharges from other facilities within the Kentucky Reservoir that may be currently affecting surface water quality. Furthermore, the lower Tennessee River (which includes the Kentucky Reservoir) is not listed in the 2012 TDEC 303(d) list, therefore it is not considered impaired and is assumed to fully meet its

designated uses. In conclusion, no adverse cumulative effects to surface water would occur as a result of the proposed action.

Wetlands/Aquatic Ecosystems. Among the other identified actions within the geographic area on-going operations of the DuPont, OxyChem, and the Herbet Sangravel facilities do not have the potential to contribute to additional impacts to wetlands and aquatic ecosystems. On-going operations of these facilities and the related stresses on the aquatic environment are considered part of the existing environmental setting and are not expected to increase in the foreseeable future. Future development within the industrial area may result in unavoidable adverse effects to these resources, however those actions are not in the foreseeable future. Additionally, it is assumed that any potential impacts would be addressed via state and federal regulatory requirements. Past actions at JOF and the OxyChem barge facility had minor impacts on the aquatic ecosystems, including high-quality mussel beds. Impacts from these projects were minimized by BMPs during construction and post-construction monitoring.

As described in Section 3.10, proposed construction and operation activities do not have the potential for impacting wetlands and aquatic ecosystems. Because impacts of the proposed plant are insignificant, and because any additional potential future development within the industrial region is not foreseeable, cumulative effects to wetlands are not expected to be significant.

On-going activities at the various facilities in the vicinity of JOF would have continuing stressors on the local aquatic ecosystem. However, use of raw water and the related impingement and entrainment of fishes for the current operations would be discontinued with the future closure of the coal-fired units at JOF, resulting in a minor beneficial effect on the aquatic resources of the Kentucky Reservoir. Therefore, a minor beneficial cumulative effect would occur to aquatic ecosystems from the proposed action.

Air Quality. Among the other identified actions within the geographic area on-going operations of the DuPont, OxyChem, and the Herbet Sangravel facilities do not have the potential to contribute to additional impacts to air quality. On-going operations of these facilities and the related impacts to air quality are considered part of the existing environmental setting and are not expected to increase in the foreseeable future. Future development within the industrial area may result in unavoidable adverse effects to air quality; however, those actions are not in the foreseeable future. Furthermore, it is assumed that any potential impacts from future development would be addressed during the permitting process.

As described in Section 3.1, operation of the plant would result in minor increases in local and regional air emissions. However, any specific strategies necessary to protect ambient air quality would be defined through the PSD permitting process, therefore air quality impacts would be insignificant. Because impacts of the proposed plant are insignificant, and because any additional potential future development within the industrial region is not foreseeable, cumulative effects to air quality are not expected to be significant.

On-going activities at the various facilities in the vicinity of JOF would continue to contribute to the local and regional air quality conditions. However, emissions from the coal-fired units at JOF would cease when the units are retired, resulting in a minor beneficial effect on the air quality. Therefore, a minor beneficial cumulative effect would occur to air quality from the proposed action.

Terrestrial Ecology. Issues typically evaluated in the context of cumulative effects to terrestrial ecosystems include the potential for habitat fragmentation/degradation and the potential to enhance dispersal of invasive species. The proposed construction activities would have temporary effects to laydown areas. However, terrestrial ecosystems within these impacted areas and the surrounding lands within industrial region are generally previously disturbed and of low quality (see Section 3.5). Because all proposed construction activities would occur exclusively on the TVA-owned lands at the JOF site which is heavily disturbed, no cumulative effects would occur related to habitat fragmentation.

Furthermore, because these environments are previously disturbed and already are suspected of containing established populations of adventive and invasive species, the floristic quality of the lands potentially affected by construction is considered to be relatively poor. The proposed project would entail construction phase disturbance of plant communities that are common or of relatively low quality. Habitats disturbed by construction activities would be restored to minimize establishment of invasive plant species. Consequently, the proposed action is not expected to contribute to a cumulative effect on vegetation and floristic quality.

CHAPTER 4 – LIST OF PREPARERS

4.1 NEPA Project Management

Name:	**Ashley Farless, PE, AICP (TVA)**
Education:	B.S. Civil Engineering
Project Role:	TVA Project Manager
Experience:	Professional Engineer and Certified Planner, 14 years in NEPA Compliance

Name:	**Andrea Crooks (TVA)**
Education:	M.S., Materials Engineering
Project Role:	Environmental Program Manager
Experience:	22 years in environmental management

Name:	**Bill Elzinga (Amec Foster Wheeler)**
Education:	M.S. and B.S., Biology
Project Role:	Project Manager, NEPA Coordinator
Experience:	30 years experience managing and performing NEPA analyses for electric utility industry, and state/federal agencies; ESA compliance; CWA evaluations.

4.2 Other Contributors

Name:	**Daniel T. Tibbs (TVA)**
Education:	B.S., Mechanical Engineering
Project Role:	Project Development and Conceptual Design
Experience:	20 years in Power Plant Engineering, Maintenance Planning, Project Management and Conceptual Design

Name:	**Steve Strunk (TVA)**
Education:	BSE, Engineering
Project Role:	Air Permits, Compliance, and Monitoring
Experience:	Environmental Systems Engineer, Air Permitting Compliance and Monitoring

Name:	**Adam Dattilo (TVA)**
Education:	M.S., Forestry
Project Role:	Vegetation, Threatened and Endangered Plants
Experience:	10 years botany, restoration ecology, threatened and endangered plant monitoring/surveys, invasive species control, as well as NEPA and Endangered Species Act compliance

Name:	**Andrew Henderson (TVA)**
Education:	M.S., Fisheries (Conservation), B.S. Fisheries
Project Role:	Aquatic Ecology, Threatened and Endangered Species
Experience:	10 years in aquatic monitoring, rare aquatic species surveys

Name	**Karen Utt (TVA)**
Education:	B.A., Biology, J.D.
Project Role:	Climate Change
Experience:	21 years of experience with environmental compliance, specializes in corporate carbon risk management and climate change adaptation planning for TVA

Name:	**Stephanie Miller (Amec Foster Wheeler)**
Education:	M.S., Biology and B.S., Marine Biology
Project Role:	Land Use and Prime Farmland, Visual Resources
Experience:	8 years experience in visual assessment, land use, aquatic and terrestrial ecology

Name	**Liz Hamrick (TVA)**
Education:	M.S., Wildlife, B.S. Biology
Project Role:	Terrestrial Ecology (Animals), Terrestrial Threatened and Endangered Species
Experience:	17years conducting field biology, 12 years technical writing, 8 years compliance with NEPA and ESA

Name	**Bo Baxter (TVA)**
Education:	M.S. and B.S., Zoology
Project Role	Aquatic Ecology/Threatened and Endangered Species
Experience:	23 years in Protected Aquatic Species Monitoring, Habitat Assessment, and Recovery; 14 years in Environmental Review

Name:	**Kelvin Campbell (Amec Foster Wheeler)**
Education:	B.S., Geology, Geological Science, Hydrogeology
Project Role:	Geology
Experience:	25 years experience in geology and seismic assessment

Name	**Wayne Ingram P.E. (Amec Foster Wheeler)**
Education	B.S., Civil Engineering and B.S., Physics
Project Role	Surface Water
Experience:	30 years' experience in surface water engineering and analysis including drainage, stormwater management, water quality assessment, erosion and sedimentation, sediment transport, stream restoration

Name:	**Carrie Mays, P.E. (TVA)**
Education:	B.S. and M.S., Civil Engineering
Project Role:	Floodplains, Natural Areas, Parks and Recreation
Experience:	1 year Floodplains, 3 years River Forecasting, 7 years compliance monitoring

Name:	**Steve Cole (TVA)**
Education:	Ph.D. and M.A., Anthropology,
Project Role:	Cultural and Historic Resources
Experience:	38 years, cultural resource management

Name:	**William Teichert (Amec Foster Wheeler)**
Education:	M.S. and B.S. Chemical Engineering
Project Role	Solid and Hazardous Waste
Experience:	30 years experience in the development of waste minimization programs and the design of waste minimization and recycling alternatives for a variety of industrial processes

Name:	**Brad Loomis (Amec Foster Wheeler)**
Education:	M.S. and B.S., Civil Engineering
Project Role:	Transportation
Experience:	10 years experience in civil engineering design including roadway and highway; storm and sanitary sewer; airport, airport facilities, and site design; railroad design; federal and military facilities, and permitting

Name:	**Steve Coates, PE (Amec Foster Wheeler)**
Education:	B.S., Civil Engineering
Project Role:	Transportation
Experience:	25 years experience in conceptual design of urban and rural highway projects, environmental compliance and stormwater management and civil site design, and NEPA compliance.

Name:	**Linda Hart**
Education:	B.S. Management/Biology
Project Role:	Technical Editor
Experience:	30 years experience in production of large environmental documents including formatting, technical editing and assembling.

Name:	**Virginia Hayes (Amec Foster Wheeler)**
Education:	MLA, Landscape Architecture and MLA, Urban Studies
Project Role:	Visual Resources
Experience:	30 years experience as a visual impacts principal investigator and NEPA compliance

Name:	**Richard Hart (Amec Foster Wheeler)**
Education:	A.S. of Applied Science
Project Role:	Noise Analysis
Experience:	20 years experience in Computer-Aided Design Technology, baseline noise measurements and noise modeling using TNM

Name:	**Chris Musselman (Amec Foster Wheeler)**
Education:	B.S., Biology
Project Role:	Socioeconomics and Environmental Justice
Experience:	Experience in GIS analysis and database management necessary for the collection and interpretation of complex datasets such as census and economic data

Name:	**Jon Omvig (Amec Foster Wheeler)**
Education:	M.S, City and Regional Planning; B.A., Local and Urban Affairs
Project Role:	Socioeconomics and Environmental Justice
Experience:	28 years of experience as a project manager on NEPA documents, with an area of specialization in socioeconomic impact analysis, community planning, and cost benefit studies

Name:	**Lana Smith (Amec Foster Wheeler)**
Education:	M.S., Biology; B.S., Environmental Biology
Project Role:	Public Health and Safety
Experience:	21 years in Health and Safety, Hazard Analysis Assessment and Health and Safety Plan development

Name:	**Karen Boulware (Amec Foster Wheeler)**
Education:	M.S., Resource Planning, B.S., Geology
Project Role:	Environmental Specialist, Report Coordinator
Experience:	25 years of professional experience in NEPA.

Name:	**Kim Pilarski-Hall (TVA)**
Education:	M.S., Geography, Minor Ecology
Project Role:	Wetlands, Natural Areas
Experience:	20 years expertise in wetland assessment, wetland monitoring, watershed assessment, wetland mitigation, restoration as well as NEPA and Clean Water Act compliance

Name:	**Robert Marker (TVA)**
Education:	B.S., Outdoor Recreation Resources Management
Project Role:	Parks and Recreation
Experience:	40 years in outdoor recreation resources planning and management.

CHAPTER 5 – AGENCIES/TRIBES THAT RECEIVED NOTIFICATION OF THE DRAFT EA

5.1 Federally Recognized Tribes

The following federally recognized Tribes were contacted regarding the availability of this EA:

- Absentee Shawnee Tribe of Oklahoma
- Alabama-Quassarte Tribal Town
- Cherokee Nation
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town
- Muscogee (Creek) Nation of Oklahoma
- Shawnee Tribe of Oklahoma
- The Chickasaw Nation
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians in Oklahoma

5.2 State Agencies

- Jessie Wallace, Humphreys County Mayor, Waverly, Tennessee
- Marry Barnett, Benton County Mayor, Camden, Tennessee
- Office of U.S. Senator Bob Corker
- Office of U.S. Senator Lamar Alexander
- State Senator Frank Niceley

In addition, a news release regarding the EA was released to more than 500 media outlets in the TVA service area.

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Appendix A – Public and Agency Comments Received on the Draft EA and TVA's Response to Comments

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A draft of the EA was released for public review and a 30-day comment on April 20, 2015. The availability of the Draft EA was announced in the News Democrat, the newspaper that serves Humphreys County, Tennessee and copies of the Draft EA were made available in the Humphreys County Public Library in Waverly, Tennessee. The Draft EA was also posted on TVA's website. TVA accepted comments through an electronic comment form on the project website, by mail and by email.

TVA received one comment on the draft EA: This comment pertained to the discussion of surface water.

Comment: Section 3.12 only presents the existing situation without acknowledging that the current surface water discharge will be eliminated. This section should address not only the initial surface water discharges from the cogeneration facility through the current ash pond outfall, but also the future discharge situation following closure of the coal-fired facility in 2017. (Commenter: TDEC, Division of Water Resources)

Response: The cogeneration facility will be in service prior to the retirement of the coal-fired units at JOF and the current NPDES discharge pathways will be available for use for this project. Changes in discharge associated with the retirement of JOF will be assessed as part of that action.