Document Type:	EA-Administrative Record
Index Field:	Final Environmental Assessment
Project Name:	Allen Fossil Plant Emission Control Project
Project Number:	2013-33

ALLEN FOSSIL PLANT EMISSION CONTROL PROJECT FINAL ENVIRONMENTAL ASSESSMENT

Shelby County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
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August 2014

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Symbols, Acronyms, and Abbreviations

≥	Greater Than or Equal To
$/MMBTU	Dollar Per Million British Thermal Unit
AADT	Average Annual Daily Traffic
ac	Acre
ACS	American Community Survey
ALF	Allen Fossil Plant
APE	Area of Potential Effect
BMP	Best Management Practices
Btu	British Thermal Unit
CAA	Clean Air Act
CC	Combined Cycle
CCR	Coal Combustion Residuals
CD	Consent Decree
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
CWA	Clean Water Act of 1972
dB	Decibels
dBA	A-Weighted Decibel
DWTP	Davis Water Treatment Plant
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
FFCA	Federal Facilities Compliance Agreement
FGD	Flue Gas Desulfurization
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
gpm	Gallons Per Minute
HCl	Hydrochloric acid
HFC	Hydrofluorocarbon
Hg	Mercury
HRSG	Heat Recovery Steam Generator
Hz	Hertz
IRP	Integrated Resource Plan
IX	Ion Exchange
kV	Kilovolt
lb/MMBTU	Pounds Per Million British Thermal Units
lb/TBTU	Pounds Per Trillion British Thermal Units
Ldn	Day-Night Sound

Leq	Equivalent Sound Level
MMBTU	Million British Thermal Units
MGD	Million Gallons per Day
MLGW	Memphis Light, Gas, and Water Division
MSL	Mean Sea Level
mi^2	Square Miles
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMSZ	New Madrid Seismic Zone
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCB	Polychlorinated Biphenyl
PFC	Perfluorocarbons
PILC	Paper Insulated Lead Covered
PM	Particulate Matter
PSD	Prevention of Significant Deterioration
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act of 1976
RMP	Risk Management Plan
ROW	Right of Way
SC	Simple Cycle
SCR	Selective Catalytic Reduction
SEA	Supplemental Environmental Assessment
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SQG	Small Quantity Generator
STG	Steam-Turbine Generator
TCA	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
TL	Transmission Line
TMSP	Tennessee Multi-Sector Storm Water General Permit
TNM	Traffic Noise Model
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDOT	U.S. Department of Transportation
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
WWTP	Wastewater Treatment Plant

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Tennessee Valley Authority (TVA) is proposing to reduce sulfur dioxide emissions at its Allen Fossil Plant (ALF) in Shelby County, Tennessee, by retiring the coal units and constructing a natural gas power plant. The existing coal-fired units at ALF provide both real and reactive power for the Memphis area. To continue to reliably serve the area, generation resources must be located at or near ALF.

ALF was built in the 1950s by Memphis Light, Gas, and Water (MLGW). TVA purchased the plant and the property underlying it in 1984. The City of Memphis owns most of the property under plant ancillary facilities, including the plant's former and current ash management facilities. ALF has three coal-fired units which produce approximately 4.8 billion kilowatt-hours of electricity per year, enough to supply 340,000 homes. Biogas produced from the nearby wastewater treatment plant operated by the City of Memphis, Division of Public Works, is used to provide supplemental fuel for the existing coal units. A switchyard is located on site that provides connection to the local MLGW transmission grid. Additional generation at ALF is provided by a series of combustion turbine (CT) units that are used for peaking operations.

In April 2011, TVA and the U.S. Environmental Protection Agency (USEPA) entered into a Federal Facilities Compliance Agreement (FFCA) to resolve a dispute over how the Clean Air Act (CAA)'s New Source Review program applied 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 (1) the Sierra Club, (2) the National Parks Conservation Association, and (3) Our Children's Earth Foundation. The consent decree is substantively similar to the FFCA. These agreements (collectively the "EPA Clean Air Agreements") require TVA to reduce emissions across its coal-fired generating system and take other actions at its coal plants, including retiring some of the units. Specifically at ALF, TVA agreed to reduce sulfur dioxide (SO_2) emissions by either installing flue gas desulfurization (FGD or "scrubber") systems or retiring the three coal units by December 2018.

1.2 Decision to be Made

TVA must decide whether to proceed with the proposed action or some other alternative that would meet the Purpose and Need of the proposed action. 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

The Purpose and Need for the proposed action is to:

- Reduce SO_2 emissions at ALF in order to comply with the EPA Clean Air Agreements consistent with TVA's mission to provide reliable and affordable power.
- Achieve and maintain a balanced portfolio of generation resources.

Achieving and maintaining a balanced portfolio was a goal established by TVA's 2011 Integrated Resource Plan (IRP). This EA tiers off of TVA's Final EIS for the 2011 IRP. TVA is in the process of updating its 2011 IRP and will prepare a Supplemental EIS to support the updated IRP.

1.4 Summary of Proposed Action

TVA proposes to replace the existing coal-fired plant by constructing and operating a natural gas-fired plant (Figure 1-1). The proposed action is summarized below and described in detail in Chapter 2.

1.4.1 Gas Plant Construction and Operation

The proposed action is to construct and operate a new facility fueled by natural gas. This action would replace all ALF coal-fired generation. The natural gas-fired facility would be located just south of ALF on a 73.3-acre (ac) site that TVA currently leases. While a final configuration for the new plant has not yet been determined by TVA, possible configurations for the gas-fired facility include:

1. Combustion Turbine (CT) plant that would include three or four natural gas-fired CT generators having a total generating capacity of 600 to 800 megawatts (MW), or
2. Combined Cycle (CC) plant with a generating capacity of 800 to 1,400 MW that would include:
    - Either a 2-on-1 or 3-on-1 CC plant consisting of two or three natural gas-fired CT generators and one steam-turbine generator (STG) with the operational flexibility to operate in either simple or combined cycle mode.
    - Two or three heat recovery steam generators (HRSGs) (one per combustion turbine), a mechanical draft cooling tower, and a water-cooled condenser.
    - Aqueous ammonia systems for the selective catalytic reduction (SCR) system.
    - Auxiliary boilers to provide start-up steam for the new CC plant.
    - Connection of CC plant process water supply and/or discharge systems to adjacent wastewater treatment plant (WWTP).

Both natural gas-fired CT and CC configurations would include:

- Construction of a new natural gas pipeline and gas system upgrades to existing infrastructure to connect the plant to an existing gas pipeline.
- Pond(s) for holding storm water flows from the site.
- Construction of multiple 161-kilovolt (kV) transmission lines (TL) from the proposed natural gas-fired facility to the existing ALF switchyard.
- Installation of reciprocating engines to combust biogas from the adjacent bio-waste lagoons and produce power.
- Fuel oil backup tanks and associated backup fuel systems (if required).

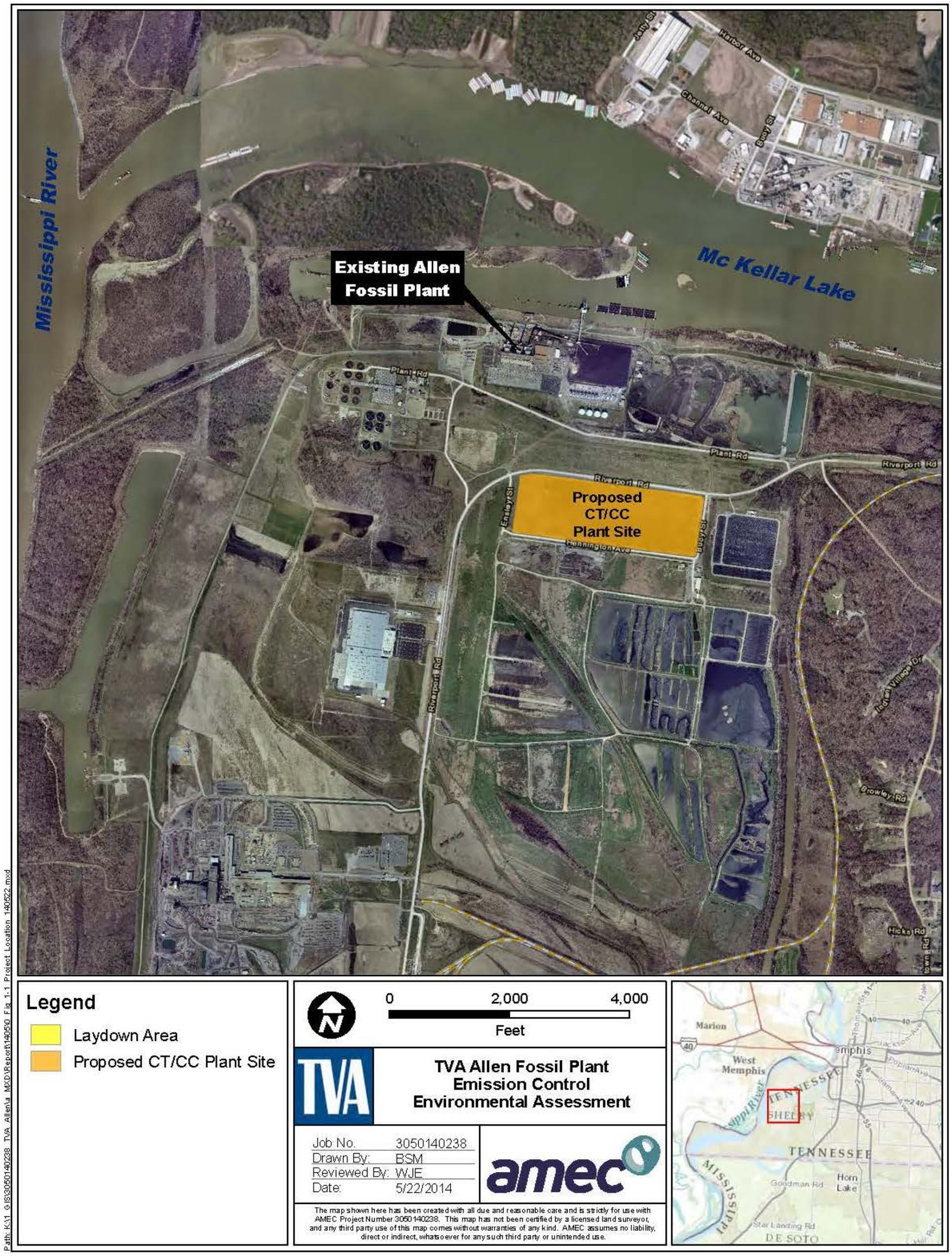

Figure 1-1. Project Location

The proposed action would also result in the retirement of all ALF coal-fired units as described in Section 2.1.2. Depending on final gas plant electrical output, some or all of the existing CT units at ALF would continue to be used for peaking operations. Long-term actions related to this retirement, such as the potential demolition of the units, are outside the scope of this EA and will be addressed by TVA in the future should the proposed action be implemented.

1.4.2 Gas Pipeline Construction and Operation

Operation of the proposed CT/CC facility would require construction and operation of a new natural gas pipeline that would be owned by MLGW. Construction and operation of the pipeline is considered a connected action for this National Environmental Policy Act (NEPA) analysis.

The proposed gas pipeline system overview map is shown on Figure 1-2 and identifies the approximate route of a primary supply line that would be up to 30 inches (in) and built within an existing MLGW gas pipeline corridor right-of-way (ROW) from the MLGW's gate station near Airways Boulevard to the west and then north approximately 13 miles (mi) to the proposed CT/CC site. This EA is based on the assumption that the proposed pipeline can be fully constructed within MLGW's existing ROW.

1.4.3 Water Requirements

Operation of the proposed gas plant would require the supply of approximately 7 to 10 million gallons per day (MGD) of water for condenser cooling. Rather than using water from naturally occurring source water bodies (e.g., McKellar Lake), TVA proposes to use gray water provided by the Maxson WWTP located west of ALF. To provide this water, the City of Memphis Department of Public Works would construct a water supply line (and return water line) extending from the existing WWTP to the project site. This water supply line would be owned and operated by the City of Memphis and is considered a connected action for this NEPA analysis. Potable water from an existing MLGW water line adjacent to the proposed site may be utilized for evaporative cooling and demineralized water production needs. The potable water line would also provide an emergency supply of water to the plant.

1.4.4 Transmission System

TVA would construct and operate two new 161-kV TL and the existing 161-kV switchyard associated with the proposed CT/CC facility. The proposed TLs would be located between the existing switchyard at ALF and the CT/CC facility location and would provide a connection to MLGW's regional transmission system.

Additional off site transmission improvements may also be required depending on the type and size of the plant TVA may decide to construct and external analyses of the need for improvements to the transmission infrastructure by MLGW. TVA's decision would determine the electric output of the facility. Based upon that decision, TVA would coordinate with MLGW which would conduct detailed studies to evaluate needed improvements to its regional transmission system to maintain system stability and integrity. Final planning, design, and construction of any needed transmission improvements would be conducted by MLGW. This EA provides available information about the kinds of impacts typically associated with such TL upgrades. Prior to conducting any necessary TL upgrades, however, site-specific reviews would be conducted to further investigate potential effects to the environment. If warranted, tiered NEPA documentation would be prepared.

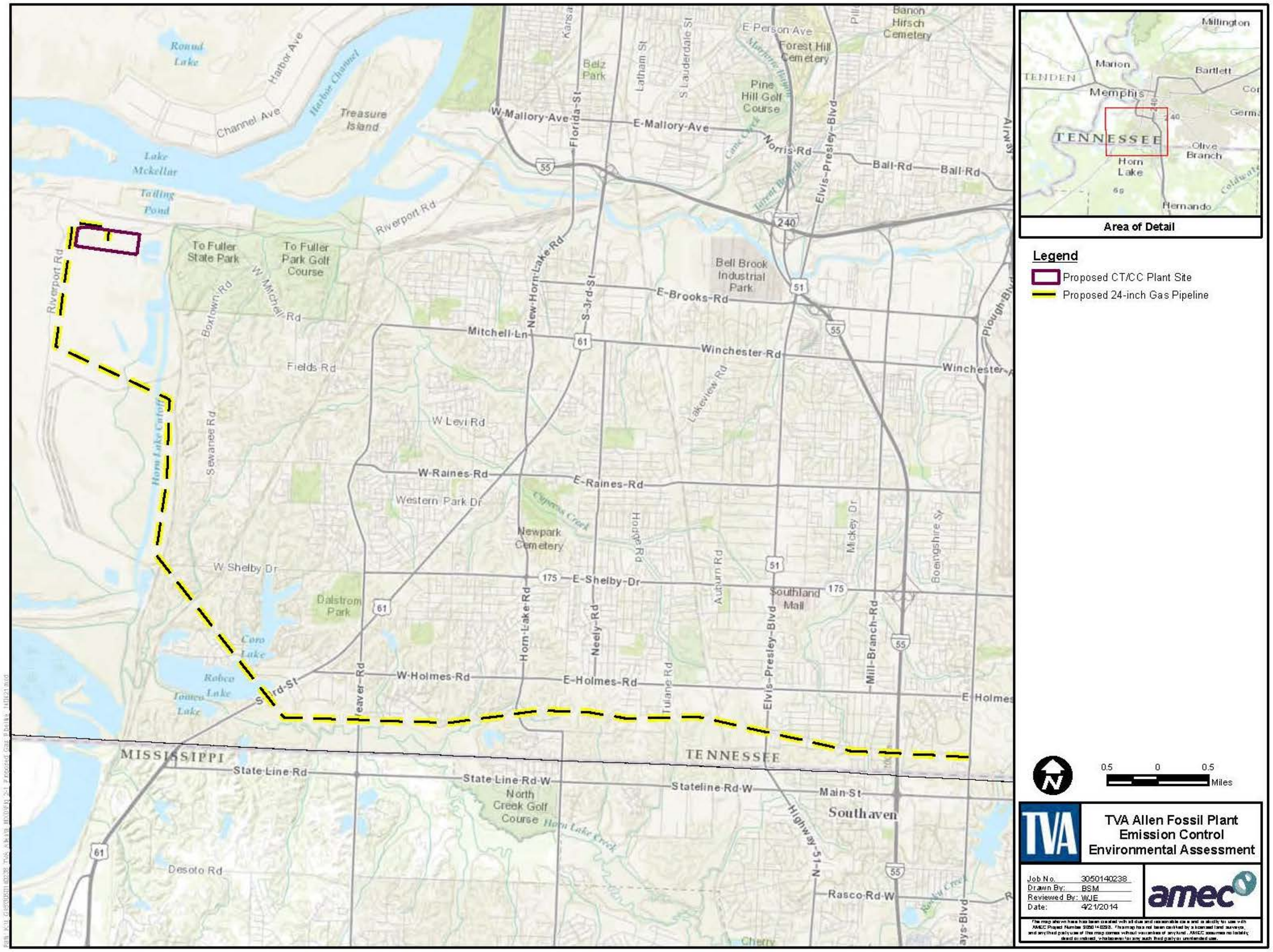

Figure 1-2. Proposed Natural Gas Pipeline Location

1.5 Related Environmental Reviews and Consultation Requirements

Several environmental reviews have been prepared for actions related to the proposed construction and operation of a CT/CC facility and the construction of the associated gas pipeline system:

> *Environmental Impact Statement and Record of Decision, TVA's Integrated Resource Plan*, April 2011 (TVA 2011). This EIS details how TVA would meet demands for electric power in its service area for the next 20 years while fulfilling its mission of providing low-cost reliable power, environmental stewardship, and economic development.
>
> *Environmental Assessment of Development of Ash Management Strategy Allen Fossil Plant* (TVA 2006a). This EA evaluates the impacts of alternatives for utilization or disposal of the ash at the existing coal-fired plant. This document is relevant to TVA's discussion concerning installation of scrubbers and continued operation at ALF.
>
> *Supplemental Environmental Assessment (SEA) of Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control At Allen Fossil Plant Units 1, 2, and 3* (TVA 2006c). This SEA assesses the impacts of operating SCR units at higher ammonia injection rates while still meeting the environmental requirements for nitrogen dioxide (NO_x) reduction in the permit and the Clear Air Interstate Rule.

The findings in these documents related to this EA are summarized in Chapter 3 for each environmental resource and incorporated by reference as appropriate.

1.6 Scope of the Environmental Assessment

The geographic scope of this analysis includes the proposed 73.3-ac facility site located immediately south of ALF (see Figure 1-1) and up to approximately 150 ac of associated off site temporary use areas (including lands used to accommodate the extension of water supply and return lines from the Maxson WWTP) and lands to accommodate new 161 kV TLs to the ALF switchyard.

This EA also addresses the potential impacts of the natural gas pipeline that would be a necessary component of a new CT/CC facility. The final route of the pipeline is expected to be subject to engineering design and permitting pursuant to Section 401/404 of the Clean Water Act of 1972 (CWA). The pipeline construction activities would affect up to an additional 427 ac of land (see Figure 1-2). Temporary impacts would occur to these disturbed and regularly managed lands within existing MLGW ROW. Permanent impacts would be limited to an approximate 50-foot (ft) wide area (92 ac) entirely contained within the MLGW ROW.

TVA prepared this EA to comply with the 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
- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Noise
- Visual Resources
- Geology
- Water Resources
- Wetlands
- 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 of 1966, Endangered Species Act of 1973 (ESA), CWA, and CAA.

1.7 Public and Agency Involvement

Appendix D provides an overview of the NEPA review process used by TVA in its evaluation of this project. In accordance with this process, 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 newspapers that serve the Shelby County area: *Memphis Business Journal, Memphis Flyer, The Commercial Appeal, The Daily News* and the *Tri-State Defender*. Copies of the draft EA were made available in the Memphis Main Library. The draft EA was also posted on TVA's Web site. TVA's agency involvement includes circulation of the draft EA to local, state, and federal agencies and federally recognized tribes as part of the review. A list of agencies and tribes notified of the availability of this draft EA is provided in Chapter 5. TVA also made available for public comment its draft Finding of No Significant Impact (FONSI) on July 18, 2014 to August 8, 2014, assuming TVA concludes after completing the EA that potential environmental impacts are insignificant. The EA provides the foundation for the significance determinations summarized in the FONSI and comments on the draft EA were considered comments on the FONSI as appropriate. A response to public and agency comments is provided in Appendix E. Additional agency correspondence from representative agencies is provided in Appendix F.

1.8 Necessary Permits or Licenses

TVA holds the permits necessary for the operation of ALF. Depending on the decisions made respecting the proposed actions, however, TVA (or MLGW depending on the permit) may have to obtain or seek amendments to the following permits:

- Air construction permit for new emissions sources.
- Modification of ALF's existing air operating permit to reflect the new plant configuration and associated emissions.
- National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit for storm water runoff from construction activities.
- Modification of ALF's existing NPDES permit to reflect the new plant configuration and any discharges associated with industrial activities.
- Industrial Wastewater Discharge Permit (pre-treatment permit) for wastewaters discharged to the WWTP.
- Clean Water Act Section 401/404 permit for crossings of jurisdictional streams and wetlands.
- Tennessee Department of Environment and Conservation (TDEC) Aquatic Resource Alteration Permit for physical alteration of surface waters of the state (streams, wetlands, reservoirs, etc.).
- Modifications to the Integrated Pollution Prevention Plan would be made for the addition of new surface ponds, switchyards, and fuel tanks.
- A Risk Management Plan (RMP) would be developed for the addition of new ammonia handling facilities required for SCR operations.
- Modification to the Tennessee Multi-Sector Permit for Industrial Storm Water discharges would be made for the addition of new storm water outfalls.
- Hydrostatic testing permit application would be submitted, if necessary, for pipe system integrity testing.
- ALF's Storm Water Pollution Prevention Plan would be revised to include management of precipitation into secondary containment for ammonia tanks.

Note: Permits associated with construction of the natural-gas pipeline would be the responsibility of MLGW.

CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

This chapter describes the alternatives TVA evaluated in this review. Alternatives evaluated in detail include:

- Alternative A – Continue Operation of ALF Units 1-3 with No Additional Controls (No Action Alternative)
- Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC) (TVA's proposed action)

This chapter also discusses the alternatives that TVA considered, but rejected from detailed analysis because they did not meet the Purpose and Need of TVA's proposed action or were otherwise unreasonable.

2.1.1 Alternative A – No Action Alternative

ALF consists of three coal-fired, electric power generation units with a nominal maximum rating of 330 MW each; coal handling process; ash handling facilities; power transmission switchyard; and ancillary support operations. Under the No Action Alternative, TVA would continue to operate Units 1 through 3 at ALF to provide generation needed to meet the real and reactive power needs of the Memphis area.

TVA would continue to control emissions of regulated air pollutants at ALF. The plant currently operates SCR units to reduce NO_x emissions and electrostatic precipitators to control particulate matter (PM) emissions. Units 1 through 3 burn low-sulfur coal to reduce SO_2 emissions.

After April 16, 2015, the units at ALF will be required to comply with the USEPA Mercury and Air Toxics Standards of:

- 0.030 pounds per million British thermal units (lb/MMBTU) PM
- 0.002 lb/MMBTU hydrochloric acid (HCl)
- 1.2 pounds per trillion BTU (lb/TBTU) mercury (Hg).

To meet HCl and Hg emission limits, TVA would use limestone and bromide in the pretreatment process of the Powder River Basin coal burned at ALF. If the coal plant continued to operate, TVA would continue using these emission control devices and measures and would limit emissions of SO_2 by controlling the sulfur content of the fuel accepted.

ALF would continue with its current method of heat removal for the system. It operates with a "once through condenser" circulating water system. Approximately 300,000 gallons per minute (gpm) of water flows from McKellar Lake through the plant for condenser cooling (heat removal) on all three units. The cooling water is discharged via permitted outfall into the Mississippi River.

Operations at the plant would continue transport of fly ash and bottom ash via the established wet sluicing system to designated wet pond areas. Fly ash comprises approximately 25 percent of the total ash, whereas bottom ash constitutes 75 percent. In addition to the fly ash/bottom ash removal, the plant has associated drains in the powerhouse that drain effluents to the stilling pond and eventually from the permitted discharge into the Mississippi River. All sanitary sewage discharge would continue to be sent off site for treatment by the City of Memphis, Division of Public Works.

Continuing to operate ALF in this configuration would not comply with the EPA Clean Air Agreements discussed in Chapter 1.1 and would not meet the Purpose and Need for this proposed action. However, this alternative is used as a benchmark or baseline to compare the environmental effects of the proposed action alternatives.

2.1.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

2.1.2.1 Retire ALF

Following completion of construction of the proposed CT/CC facility, the three ALF coal units would be retired. Virtually all coal unit operational measures would be discontinued and the coal plant would be subject to basic care and maintenance measures. Primary operational measures that would be discontinued include daily coal barge operations, coal pile management, pumping and use of water from McKellar Lake for condenser cooling, and thermal discharges to the Mississippi River. The plant would discontinue discharging fly ash and bottom ash to designated wet pond areas, but ash ponds would be maintained until closure plans are proposed and implemented. Routine plant deliveries would also be discontinued. The existing switchyard would be maintained for use in future operations associated with the proposed CT/CC facility. Employment at the plant would be reduced.

Long-term actions related to the retirement of ALF, such as the potential demolition of the coal units, are outside the scope of this EA and would be addressed by TVA in the future should this alternative be implemented.

2.1.2.2 Components of the CT/CC Facility

Under Alternative B, TVA would construct and operate a new natural gas-fueled CT/CC facility just south of the existing coal plant on a 73.3-ac site currently leased by TVA. The proposed CT/CC facility would not only provide the real power to meet area loads, but also serve as major sources of dynamic reactive power for the area that is needed to rapidly respond to changes in demand. This alternative includes construction of a new gas pipeline lateral connecting the plant to an existing gas interstate pipeline that has adequate transportation capacity to supply the plant. The new gas pipeline lateral would be constructed and operated by MLGW.

> ***What is a gas pipeline lateral?***
>
> In this context, it is a high pressure pipeline capable of meeting the entire needs of a new gas plant at ALF.

A natural gas plant's environmental and physical footprint are much smaller than other major power generating facilities (coal-fired and nuclear plants) built by TVA.

To ensure reliability for TVA's system, back-up fuel oil systems are sometimes designed for power generation facilities. Alternative B includes two choices for a back-up fuel oil system: (1) upgrades could be made to existing ALF back-up fuel oil tanks allowing a new CT/CC facility to access them or (2) new fuel oil tanks could be constructed to serve a new CT/CC facility. Possible configurations for the gas-fired facility include: a CT plant with a generating capacity of 600 to 800 MW or a CC plant with 800 to 1,400 MW generating capacity. The major CT/CC facility components could include:

- Up to four CT generators with inlet evaporative cooling.
- Two or three HRSGs.
- One STG.
- One natural gas-fired auxiliary boiler.
- Three natural gas-fired dew-point gas heaters.
- One multiple-cell mechanical draft cooling tower.
- One diesel engine-driven emergency firewater pump.
- Exhaust stacks.
- One water-cooled condenser.

Reciprocating engines would be installed to combust biogas from adjacent bio-waste lagoons to produce approximately 6 to15 MW of power. The environmental analyses in Chapter 3 describes the greatest potential impacts from the various configurations and operating modes.

A summary of the primary characteristics of the proposed CT/CC facility during both construction and operation is provided in Table 2-1.

In addition to major equipment systems, the proposed CT/CC facility could include plant equipment and systems such as natural gas metering and handling systems; instrumentation and control systems; water treatment, storage, and handling systems; transformers; and administration and warehouse/maintenance buildings. A typical CC plant configuration and similar facility constructed at TVA's John Sevier Plant are illustrated on Figure 2-1 and Figure 2-2, respectively. Typical CT facilities consist of a similar configuration but lack the HRSG component.

The new CT/CC facility would require potable water obtained from MLGW. For a CT plant, up to approximately 100 gpm (0.1 MGD) could be used for evaporative cooling when ambient air temperatures are above 70°F. On a plant-wide basis, up to 3,200 gpm (4.6 MGD) of demineralized water would be required for NO_x control when burning fuel oil (if required for back-up fuel purposes). To have an adequate supply of demineralized water for use when burning fuel oil, TVA would have large demineralized water storage tanks on site. TVA would only utilize backup fuel oil on an emergency basis (less than 500 hours per year). Therefore, this high usage rate of demineralized water would be rare.

What is potable water?

Potable water is water that is drinkable.

What is gray water?

For this project, gray water is non-potable treated wastewater from domestic and industrial sources that would normally be discharged into the river. The gray water has 98 percent of waste removed.

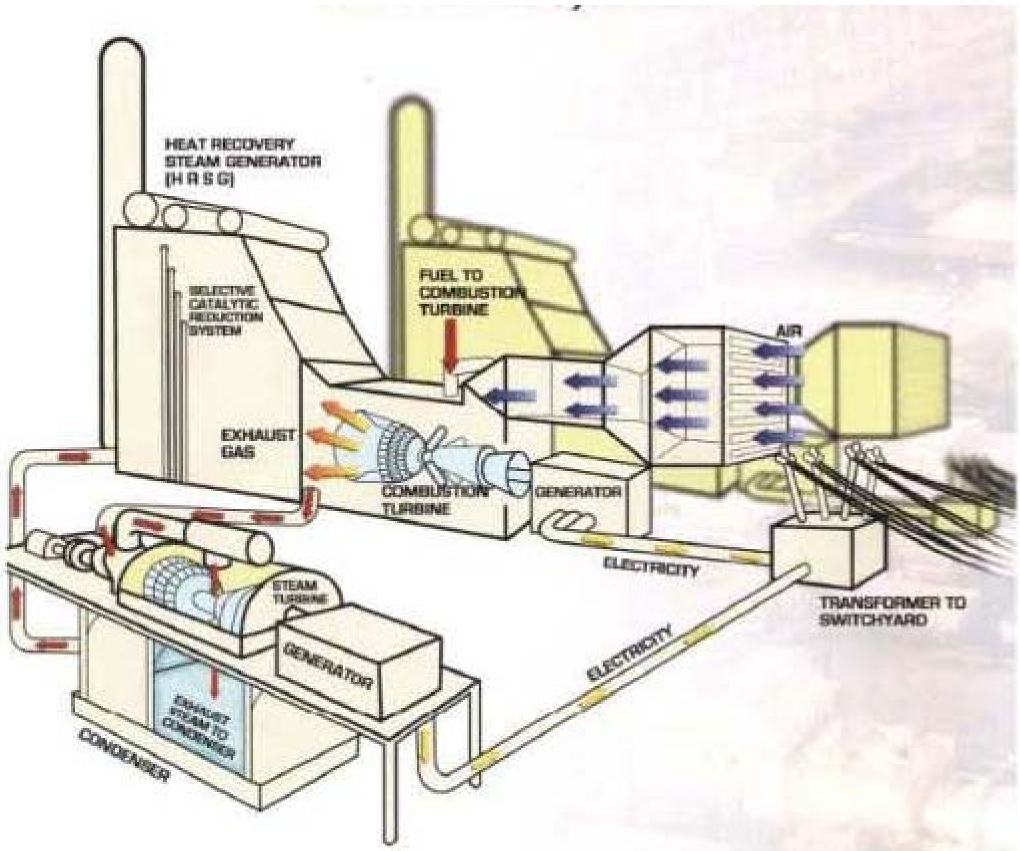

Figure 2-1.   Components of a Typical CC Generation Facility

Figure 2-2.   Illustration of TVA's John Sevier CC Project

A CC plant would require larger quantities of water than a CT plant. It would use 7 to 10 MGD of gray water and would discharge approximately 10 to 40 percent of that amount depending upon regional energy demands and ambient conditions. Gray water would be supplied to a CC plant by the City of Memphis Public Works Maxson WWTP located adjacent to the proposed CC plant site. It would be piped to the CC plant, used, and returned back to the Maxson WWTP for discharge. A CC plant would also use a small amount of potable water (0.1 to 0.3 MGD) that is referred to as “make-up water”, for demineralized water production used in the plant steam system. Just as in a CT plant, potable water at a CC plant is also used for evaporative cooling purposes. In addition, demineralized water can be used for water injection if backup fuel oil is necessary for emergency operations.

Table 2-1. Primary Plant Characteristics of the Proposed CT/CC Facility

Plant Characteristic		Value*
Plant Area	Operation-permanent land use: Construction-temporary land use:	73.3 ac Up to 150 ac
Generation Capacity	CT plant: CC plant:	600 to 800 MW 800 to 1,400 MW
Employment Workforce	Construction: Operation: Outage:	400 to 700 workers 30 to 40 workers 100 workers
Depth of Excavation	CT/CC facility: Pipelines:	10 ft below ground surface 7 to 9 ft trench depth 3 ft minimum cover
Water Use	Maximum potable water use: Average potable water use: Gray water use:	(0.4 MGD [300 gpm]) 0.2 MGD 4 to 5 MGD average and 7 to 10 MGD peak via pipeline from the City of Memphis, Division of Public Works
Process Discharge Water		600 to 1,000 gpm
Gas Pipeline (diameter up to 30 in)	ROW/Temporary Use: Permanent use area:	250 ft (427 ac) 50 ft (92 ac)
Transmission Improvements	Potential future improvements needed to MLGW system depending on future selection of plant type by TVA and transmission needs assessment by MLGW	

* Values based upon comparable data from other TVA CT/CC facilities. Values may be subject to modification based on final design.

2.1.2.2.1 Emission Monitoring and Controls

Operating the CT/CC facility would require emission monitoring and controls. Reduction of NO_x emissions from CTs would be achieved through dry low-NO_x combustion systems. The CC plant would use an SCR system located within the HRSG for additional NO_x reduction. The SCR system would use 19.5 percent aqueous ammonia that would require an independent storage/receiving system to be installed. Reduction of carbon monoxide (CO) would be achieved using a separate catalyst layer specifically for that pollutant. The new exhaust stacks would be equipped with continuous emissions monitoring systems for CO, NO_x, and oxygen.

> ***What is a catalyst?***
>
> A substance that causes a chemical reaction to happen more quickly.

2.1.2.2.2 Gray Water Supply

Operation of the proposed gas plant would require the supply of approximately 7 to 10 MGD of water for condenser cooling. Rather than using water from naturally occurring source water bodies (e.g., McKellar Lake), TVA would use gray water provided by the Maxson WWTP located west of the ALF coal-fired plant if TVA decides to build a CC plant. To provide this water, the City of Memphis Division of Public Works would construct a water supply line (and return water line) extending from the existing WWTP to the project site. The location of the proposed gray water line has not been determined, but it is expected that it would be located within previously disturbed areas area identified as Laydown Area 1 (Figure 2-3). The diameter and length of the pipe would be designed in the engineering phase of the project if a CC plant were constructed.

2.1.2.2.3 Fuel Supply

Operation of the proposed CT/CC facility would require construction and operation of a new natural gas pipeline lateral. Preliminary estimates indicate a maximum 270,000 MMBTU per day of natural gas could be needed for operation of a 3x1 CC plant. This demand would require a pipeline lateral up to 30 in in diameter at up to 1,200 pounds per square inch of pressure. An existing 250-ft pipeline corridor route that is owned by MLGW is the proposed route for a new natural gas pipeline to the proposed CT/CC facility.

TVA has existing CT units on site at the coal plant facility that are used for peaking operations. Natural gas for the existing TVA CTs is supplied by a 16-in MLGW pipeline that is connected to the Texas Gas Transmission Company. The maximum allowable operating pressure is 900 pounds per square inch [gauge] and the length is 13.38 mi.

A new gas pipeline lateral would be required as the primary supply for the proposed CT/CC power plant. The path of the proposed new natural gas line would be located parallel to the existing 16-in line and would extend approximately 13 mi to the proposed CT/CC facility (see Figure 1-2 and Appendix A). This new line would connect the plant site to third party interstate gas pipeline systems. This configuration would assure delivery of ample pressure gas from any of MLGW's three suppliers through the new line.

The new natural gas pipeline would interconnect with the existing 16-in pipeline near the existing CTs then continue to the new metering station at the new CT/CC site. There would also be a crossover connection between the new line and 16-in line at the new CT/CC facility. A gas metering station would be installed at the new CT/CC facility that would consist of ultrasonic meters and turbine meters.

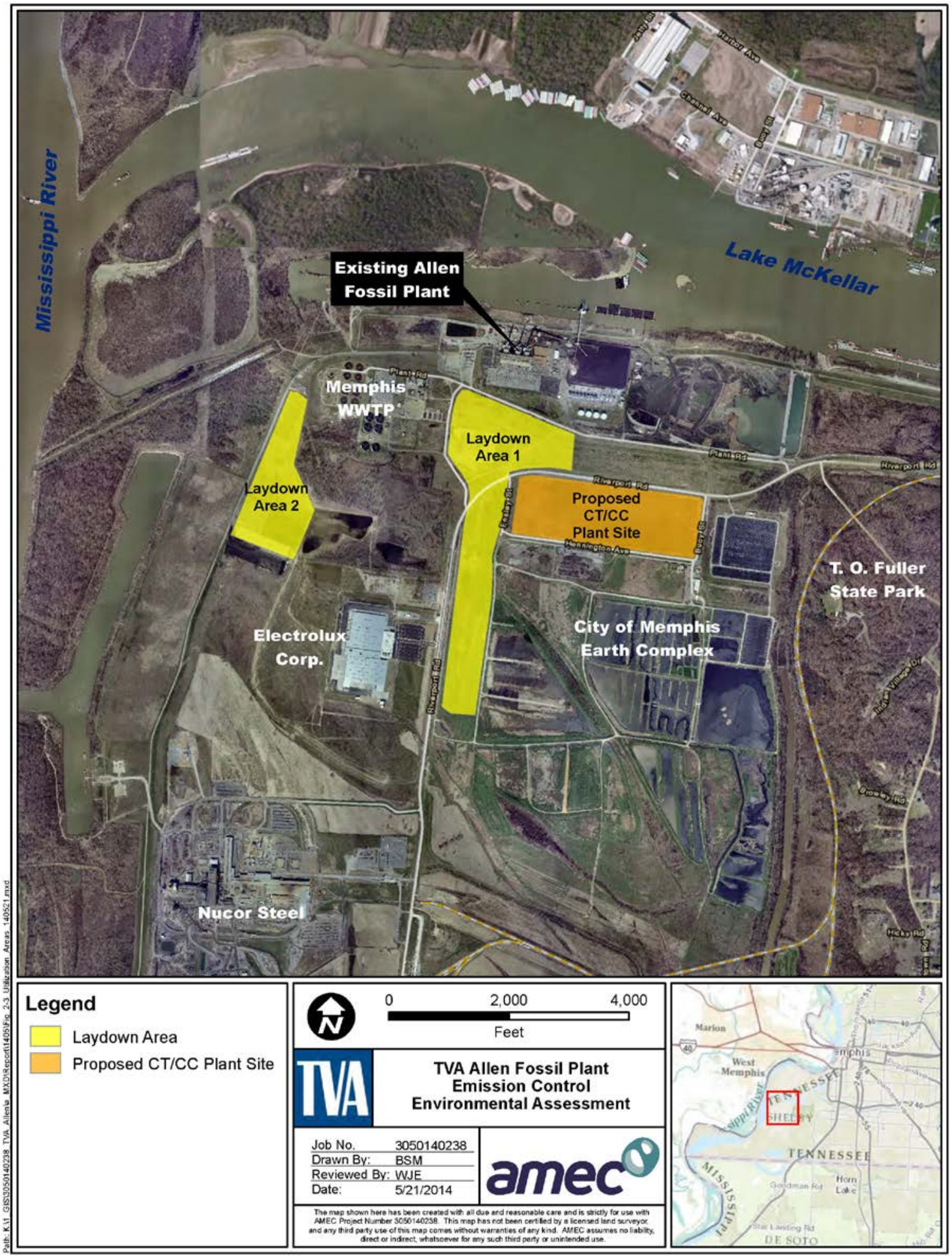

Figure 2-3. Site Utilization Areas On and Near the Proposed CT/CC Facility

TVA would consider maintaining a redundant fuel supply for the proposed CT/CC facility. Fuel oil would be available on site to fuel the combustion turbines if the natural gas supply was not available. Fuel oil is currently delivered to ALF via barge. Due to the high reliability of interstate gas pipelines, use of backup fuel would seldom be required. For this reason, annual barge trips for delivery of additional fuel oil would be minimal.

2.1.2.2.4 Transmission and Electrical System Components

On Site Transmission

TVA would construct and operate two new 161-kV TL from the existing 161-kV switchyard (at the coal site) to the proposed CT/CC facility. The new TL would likely be constructed with double and single steel-pole structures with varying heights (depending on the terrain and existing obstacles). The new TL structures would either be on concrete foundations or direct-buried with spoil and gravel backfill.

All unit transformers would be oil filled; therefore, concrete foundations and an oil containment system would be included.

Off Site Transmission

Additional off site transmission improvements may be required based upon future decisions made by TVA and external analyses of the need for improvements to the transmission infrastructure by MLGW. Future decisions by TVA regarding the type of facility to be constructed on the proposed CT/CC site will determine the electric output of the facility. Based upon that decision, TVA would coordinate with MLGW which would conduct detailed studies to evaluate needed improvements to their regional transmission system to maintain system stability and integrity. Final planning, design, and construction of any needed transmission improvements would be conducted by MLGW.

While specific improvements to the regional transmission system cannot be determined at this time, information is available to describe the range of actions and improvements that may be needed. Various uprate activities that may be conducted include: moving features that interfere with clearance, replacing and/or modifying existing structures, installing intermediate structures, modifying or replacing some of the existing conductor (lines) in order to increase ground clearance, adding fill rock or dirt (surcharge) around the base of existing structures, and working with MLGW to modify their lines.

If future studies indicate that a new TL must be constructed, the process of siting the proposed TL would follow basic steps used by TVA to determine TL routes. These include the following:

- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Locate potential connection points to TVA or MLGW transmission infrastructure.
- Generate general route segments that produce potential routes.
- Gather public input.
- Incorporate public input into the final selection of the TL route.

Prior to completing TL upgrades, however, site-specific reviews would be conducted to further investigate potential effects to the environment. If warranted, tiered NEPA documentation would be prepared.

A detailed summary of the off site transmission improvements that may be undertaken and an assessment of potential environmental impacts based upon TVA's TL experience are provided in Appendix B.

2.1.2.3 Construction Activities

2.1.2.3.1 CT/CC Gas Plant Construction

With the exception of the natural gas supply pipeline(s) and waterline from the Maxson WWTP, construction activities associated with the proposed CT/CC facility would occur just south of the existing coal-fired plant on land currently leased by TVA (see Figure 2-3). The plant at full CC build-out would occupy approximately 40 ac of the 73.3-ac site and an additional 33 ac would be used for equipment laydown and mobilization. For the purposes of impact analysis in this EA, it is assumed that all 73.3 ac of the site for the proposed CT/CC facility would consist of permanent use areas. Subsurface piles would be installed to support foundations for plant components, as required. Additional areas located within close proximity to the 73.3-ac site have been identified for supplemental laydown support as illustrated in Figure 2-3.

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

Site preparation work for the proposed CT/CC facility and associated equipment would begin in 2015. Actual plant construction would begin in 2016 and the plant would begin commercial operation as early as the third quarter of 2018. During the construction period, 400 to 700 workers would normally be employed on site.

2.1.2.3.2 Gas Pipeline Construction

MLGW would be responsible for construction of the lateral natural gas pipeline. Typical pipeline construction practices and activities are designed to meet standards set by U.S. Department of Transportation (USDOT) Office of Pipeline Safety and are contained in Title 49 of the Code of Federal Regulations (CFR), Part 192 (49 CFR 190-199). Normal pipe wall thickness and details of pipeline construction would be selected to provide maximum safety and to comply with the USDOT construction requirements. The pipeline would be constructed using the "cut and fill" and boring methods. A summary of locations expected to be constructed by boring methods to minimize potential impacts to existing infrastructure or environmental resources is provided in Table 2-2. A 250–ft wide ROW is currently maintained by MLGW.

Table 2-2. Summary of Pipeline Locations Assumed to be Crossed by Subsurface Directional Drilling

Pipeline Segment (East to West)	
1.	I-55 and Santa Barbara
2.	Santa Monica, Millbranch, McAllister Drive
3.	Bancock Street
4.	Vandergreen Street
5.	Elvis Presley Boulevard
6.	Railroad
7.	Tulane Road and pond (700 ft west of Tulane Road)
8.	Neely Road
9.	Horn Lake Road
10.	Weaver Road
11.	Horn Lake Creek
12.	Highway 14, Robco Lake, W. Holmes Road, Cana Road
13.	Railroad
14.	West Shelby Drive and railroad
15.	Horn Lake Creek
16.	Railroad

The construction of a natural gas pipeline to serve the CT/CC facility would require several sequential activities. These activities are generally conducted by separate crews that specialize in particular facets of pipeline construction.

- Survey and Staking – The pipeline alignment would be surveyed. Other pipeline crossings would be marked.
- Trench Excavation – Backhoes or trenching machines would be used to excavate a 7- to 9-ft-deep trench. The trench would be installed to provide approximately 3 ft of cover over the pipelines as required by 49 CFR Part 192 of the USDOT regulations. To provide working room in the trench, the width of the excavation would be 5 to 7 ft. Soil removed from the ditch would be placed within the construction ROW and used for cover.
- Water Body Stream Crossing – Construction at water bodies not crossed by directional drilling methods would be conducted using either a “dry” crossing or “wet” crossing method. The length of the crossing, the sensitivity of the area, existing conditions at the time of crossing, and permit requirements would determine the most appropriate measures to be used. Mobilization of construction equipment, trench excavation, and backfilling would be performed in a manner that would minimize the potential for erosion and sedimentation within the water body channel. Erosion control measures would be implemented to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas.
- Stringing – Once the ditch has been dug, individual segments of pipe would be laid end to end along the ROW using special "stringing" equipment.
- Bending – To accommodate moderate changes in vertical or horizontal alignment, a mechanical pipe-bending machine would bend individual segments of pipe to the required angle. Prefabricated fittings would be used to form the sharp turns, if necessary.

- Welding and Lowering In – Crews would weld individual segments together to form longer sections, which would then be lowered into the trench by side-boom tractors. The longer sections would be welded together in the ditch. Welds would be inspected by a qualified third party using radiographic techniques.
- Coatings – In addition to factory coatings applied to protect the pipe from corrosion, weld joints would be coated.
- Backfilling – The rock and soil removed in the trenching step would be used to backfill the ditch after the pipeline has been laid. To avoid damage to the line, soil or sand would be placed around the line followed by the rock. The surface would be graded and revegetated to approximate original contour and to meet specific agreements with the landowner.
- Testing – Before the pipeline is placed into service, it would be hydrostatically tested. Water from a nearby source would be pumped into the line and pressurized for several hours at pressures that would substantially exceed maximum operating pressures anticipated during service. At the conclusion of each test, the water would be discharged near the test point at a rate designed to minimize the impacts to the adjoining land and local drainage system.
- Cleanup – The final step in the pipeline construction process would be the removal and disposal of any construction debris and the restoration of the surface to its original conditions. This would include approved revegetation practices and the repair of any fences, gates, or other features that may have been affected by the construction.

Additional pipeline construction details and information about pipeline testing, reliability, and safety are contained in Appendix C.

2.1.2.3.3 Pipeline Operations

Following construction of the natural gas pipeline and its ancillary facilities, the pipeline(s) would be placed into service. Maintenance activities could include mowing the ROW periodically; performing gas-leak surveys; maintaining fence posts, markers, and decals; performing annual inspection of line ROW (including all water body crossings); performing valve inspections and lubrications; and performing cathodic protection monitoring to prevent corrosion of the steel pipeline.

2.2 Alternatives Considered But Eliminated From Further Discussion

2.2.1 Alternative C – Emission Controls, Scrubbers

Alternative C involves continuing to operate the coal-fired facility at ALF and installing FGD systems, better known generically as "scrubbers." FGD systems are devices designed to control SO_2 emissions and other contaminants from coal plants. The scrubbers could either be wet or dry. Wet FGD systems force contact between flue gas and aqueous slurries which contain reagents. The aqueous slurries react with the acids contained in the flue gas to form salts. Due to its low cost and effectiveness, the typical reagent used in wet scrubbers is limestone. Wet FGD systems are usually designed to remove SO_2 at removal efficiencies of 95 to 99 percent depending on the type of coal being burned. For more information about the impacts of wet FGD systems see, generally, Final Environmental

Assessment, *Installation of Flue Gas Desulfurization System at Kingston Fossil Plant* (April 2006b).

Dry FGD systems, known generically as “dry scrubbers,” force maximum contact between flue gas and a scrubber reagent. Most often, the reagent used in dry scrubbers is calcium hydroxide. Dry scrubbers typically use high rates of recirculation of the reaction product. A majority of the reacted calcium is collected as calcium sulfite. A dry scrubber typically uses either a precipitator or fabric filter/baghouse to collect the dry product generated from the reaction. Particulate collection is typically downstream of the scrubber and consists of a mixture of the calcium salts and fly ash. The calcium salts and fly ash are disposed of by transfer to a landfill. For more information about the impacts of dry FGD systems see, generally, Final Environmental Assessment, *Installation of Emission Control Equipment at Gallatin Fossil Plant* (March 2013).

Continued operation of the existing ALF plant, as proposed in Alternative C, would result in the generation of approximately 300,000 tons per year of coal combustion residuals (CCR) per year. CCR management capacity at ALF is limited and TVA does not own sufficient land at the plant site for a new CCR landfill. In 2006, TVA prepared a final EA entitled *Environmental Assessment of Development of Ash Management Strategy Allen Fossil Plant* that evaluated the potential impacts of alternatives for utilization or disposal of the ash near the existing coal-fired plant (TVA 2006a). Depending on the particular site selected, such impacts would have included effects to surface water resources, plant communities, wildlife, aquatic species, sensitive species, and prime farmland. Localized impacts associated with the construction and operation of the landfill such as emissions and noise could occur. Additionally subsequent developments within the nearby Pidgeon Industrial Park have been undertaken (e.g. Electrolux Corporation), or are planned (i.e., expansion of the Maxson WWTP) that would further limit the feasibility of developing a landfill near the existing ALF site.

TVA also considered the potential use of the Class II Solid Waste Landfill owned by the City of Memphis adjacent to TVA’s ALF property. This landfill is currently used for sewage sludge. However, the city indicated that use of the landfill by TVA would not be authorized because of its effect on their future landfill capacity. In addition, the Class II landfill permit would not allow TVA’s CCR and would need to be modified to receive fly ash and gypsum through a major modification process. Even if authorized by the City, this process would take an estimated 24 to 36 months to obtain approval from TDEC which would include a public comment period.

More recently, in 2010, TVA prepared a report entitled *Regional Siting Study for Biproduct Disposal Facilities in Tennessee* (TVA 2010). This report conceptually examined alternatives for regional landfills that could potentially be used for disposal of CCR from ALF. The alternatives that were studied in the report are shown in (Table 2-3).

Table 2-3. Comparative Analysis of ALF Landfill Alternatives Required for Scrubber Operation

					Cost ($M/Landfill Life)			
Site	**City**	**County, State**	**Distance (mi)**	**Landfill Life (Years)**	**Transportation**	**Landfill Construction**	**Landfill Operation**	**Total**
230	Galloway	Fayette, TN	45	10	$21.0	$9.0	$6.0	$36.0
281	Rialto	Tipton, TN	55	10	$26.4	$9.0	$6.0	$41.4
220	Huntington	Carroll, TN	125	10	$60.0	$9.0	$6.0	$75.0
213	Camden	Benton, TN	155	10	$74.4	$9.0	$6.0	$89.4
Bivens Quarry	Camden	Benton, TN	155	10	$74.4	$9.0	$6.0	$89.4
291		Tishomingo MS	130	10+	$62.4	$9.0	$6.0	$77.4

The nearest sites (Sites 230, 281 and 220) would require TVA to enter into a contract to use the site as a landfill for coal operations at ALF. A solid waste permit application to construct a solid waste landfill would be required. The contracting and permitting process would require approximately 5 years from the time that TVA selected one of these sites until it would be ready to use as a landfill for the coal plant.

Four potential new landfill sites were evaluated in Mississippi with one site in Tishomingo County, Mississippi, meeting the criteria for a new landfill. Like Tennessee, a new landfill in Mississippi would require approximately 5 years from the time of selection to time of available use for the coal plant.

Because each of these options involves the development of a new landfill, it is expected that a range of environmental resources would be impacted depending on the particular site selected. As discussed above, such impacts could include effects to surface water resources, plant communities, wildlife, aquatic species, sensitive species, socioeconomic characteristics, prime farmland, localized emissions and noise. Such a new landfill would be a dedicated TVA landfill and a NEPA review would be required to evaluate the potential impacts of the new landfill and the associated transportation from ALF.

Site 213 and Bivens Quarry are permitted solid waste landfills that can accept ash and gypsum. However, each site requires a substantial haul distance from ALF (155 mi). Accordingly, hauling CCR to the landfill would result in localized noise and air emissions associated with truck traffic to/from the landfill. Depending on the volume of the truck traffic and the routes followed, there also could be safety issues. A NEPA review of the transportation from ALF to the landfill would be required to support a decision to use either of these sites.

Continued operation of the coal-fired units would continue to require approximately 300,000 gpm of water flow from McKellar Lake through the plant and into the Mississippi River for heat removal (same as the No-Action alternative). There would be minor ongoing impacts related to surface water circulation patterns and water quality in McKellar Lake and ongoing thermal discharge to the Mississippi River.

The EPA recently issued a final rule implementing Clean Water Act Section 316(b), that sets regulations on the design and operation of cooling water intake structures that withdraw water from waters of the U.S. and have or require an NPDES permit. TVA would be subject to this rule with continued operation of ALF. To comply with 316(b), TVA could face some risk of having to redesign of the plant's cooling system to a closed-cycle system to address fish entrainment through the plant. Installation/operation of fish-friendly screens with a return system would be the likely compliance option to address fish impingement. If a closed-cycle system was required, significant additional equipment and land area would be needed for cooling towers. Such systems, when retrofitted to an existing plant, would result in a decrease in overall plant efficiency and output. In addition, plant water consumption would increase due to evaporative cooling in the cooling cycle. At this time, it is not known what future steps or costs would be required for compliance with the new Section 316(b) regulations.

On June, 2, 2014, the EPA issued proposed CO_2 emission guidelines for existing power plants called the "Clean Power Plan." The proposed emission guidelines will require reductions in CO_2 emissions from existing facilities. It likely will take several years before the potential impact of this rulemaking on TVA's fossil-fueled plants can be determined. To comply with the EPA Clean Air Agreements by December 2018, TVA must move forward with a decision to either retire ALF or install scrubbers. TVA cannot wait until uncertainties are resolved. However, this and other recent and emerging EPA regulations create an unquantified economic risk that is associated with environmental compliance costs for the continued operation of coal units, including the ALF units if TVA chose to install scrubbers on those units. This risk has to be taken into account when making decisions about whether to continue to operate coal units.

In addition to 316 (b) and the Clean Power Plan, other new regulations relating to waters of the U.S. could require relocation of current discharge monitoring points at ALF making it more difficult for TVA to meet compliance requirements without upgrading current water-treatment systems. In addition, a number of water quality criteria are being revised (e.g. selenium and arsenic) that could create greater challenges for compliance at coal-fired facilities. Continuing to operate ALF would not allow TVA to take advantage of the opportunity to discontinue use of water from Lake McKellar for system operation. In addition, TVA would not have the opportunity to reuse gray water from the adjacent Maxson WWTP for system operations and would thereby not be making efficient use of a valuable resource in the Memphis area.

The existing coal units at ALF are partially fueled from biogas produced by the Maxson WWTP. The WWTP currently produces 3,000,000 standard cubic feet (scf) per day and plans to increase that production to 4,000,000 scf per day in the very near future. ALF currently uses approximately 33 percent of the available 3,000,000 scf which will soon drop to 25 percent when additional biogas is produced. If ALF is retired and TVA builds a CT/CC facility, the design would include installation of equipment to maximize the use of the available biogas fuel and use a much larger percentage of this available resource.

Depending on design and placement of final structures, installing scrubbers at ALF could require an existing transmission line owned by MLGW to be relocated. It is estimated that three to five structures would need to be relocated.

The initial capital cost of each option varies significantly, depending on the resource, size, and configuration selected. Natural gas plant capital costs can vary between $500 million and $1,300 million depending on whether they are configured as combustion turbines or combined cycles and depending on the size (600-1,400 MW). The initial capital cost estimate of adding an FGD at Allen is approximately $450- $650 million for the 741 MW Allen units, which does not include the cost of a required landfill or the ongoing plant O&M and capital costs associated with Alternative C. The cost components described previously are assessed in a total resource evaluation that also includes fuel cost differences and the impact of each alternative on TVA's resource portfolio. This evaluation accounts for the difference in capacities of the alternatives. Evaluations performed by TVA indicate that the overall system cost for Alternative C is similar to the proposed action, but that each alternative possesses a different risk profile. Future changes to commodity prices, load growth forecasts and environmental regulatory forecasts could change either alternative from a cost perspective. Additionally, the timing of emerging environmental regulations introduce uncertainty regarding future environmental costs for coal alternatives. The risks and associated costs from this uncertainty are not presently quantified but would be reduced with the proposed action.

The landfill issues discussed in this section also create complex economic and other risks for TVA. Landfill issues include the lack of local landfill site availability and considerations for a regional landfill such as distance to off-site facilities, potential environmental impacts, and length of time for environmental studies and permitting. A landfill likely cannot be completed in time to support continued operation of the three coal units at ALF after December, 2018.

While operating the existing coal units with scrubbers would meet the requirements to remove SO_2 at the facility per the EPA Clean Air Agreements, the controlled SO_2 emissions still would be greater than that of a CT/CC plant.

In summary, TVA has environmental and logistical reasons not to pursue installation of scrubbers and continued coal operations at ALF. Retiring the coal units and constructing a natural gas plant to provided needed generation is environmentally more beneficial, reduces the uncertainty risks and associated cost of emerging EPA regulations, and avoids having to permit and construct a new landfill, something that that is not likely achievable by the December 2018 deadline. Based on these factors, TVA has determined that Alternative C is unreasonable and eliminated this alternative from detailed consideration.

2.2.2 Alternative D – Retire ALF, Rely on Energy Efficiency

Under Alternative D, TVA would retire ALF and develop a TVA Energy Right® Solutions portfolio with the goal of replacing approximately 4.8 billion kilowatt-hours of electricity per year, enough to offset the energy needs in the Memphis area. Energy efficiency efforts would include programs to improve efficiency in the residential, commercial and industrial sectors as well as TVA facilities and distribution systems of local power companies.

Current projections indicate that if significant resources are devoted to energy efficiency programs, energy efficiency could yield the cumulative potential annual generation of ALF by the end of fiscal year 2019. However, this would be across the entire TVA system, and it is unlikely that sufficient energy efficiency savings of this magnitude would be achieved in the Memphis area by the time the ALF coal units would have to be retired. With substantial speculation and depending on the level of investment, TVA estimates that improvements in energy efficiency can be achieved in the Memphis area annually by 2019. Regardless of the energy savings that could be achieved, to continue to reliably serve the Memphis area, generation at ALF or in the vicinity of Memphis is required. The ALF coal units are a major source of generation serving the energy needs of the Memphis area. Those units not only provide the real power to meet area loads, but also serve as major sources of dynamic reactive power for the area that is needed to maintain adequate voltage. Inadequate voltage can damage equipment such as motors and undermine reliability. Without generation at ALF or elsewhere in the Memphis area, TVA would risk violating reliability standards set by the Federal Energy Regulatory Commission.

TVA possibly could offset or reduce the risk that energy efficiency would not produce sufficient savings or the needed voltage support (reactive power) in the Memphis area by upgrading its transmission system. Doing this, however, would take 8 to 10 years to complete and could not be done before the ALF units would have to be retired.

Because of these issues, this alternative was determined to be unreasonable and was eliminated from further consideration.

2.2.3 Alternative E – Convert ALF to Natural Gas Fuel

Alternative E involves converting the three ALF units to burn natural gas. The primary characteristics of this alternative include:

- Installation of three new gas burner nozzles and one lighter assembly per cyclone (seven cyclones per boiler).
- Modification of the cyclone boilers by removing refractory, alterations to secondary air chambers, coal inlet removal, oil lighter removal, refurbishment of seal casing and scanner replacement.
- Modification of burner management systems to meet National Fire Protection Association control requirements for natural gas.
- Coal yards would be cleaned of coal and conveyor belts removed and stored.
- The following coal equipment would be decommissioned and retired in place:
    - Coal feeder
    - Coal conveyors and crushers
    - Precipitators

TVA has studied the technical feasibility, anticipated performance level, and approximate cost of converting ALF to natural gas fuel.

Although this alternative is technically feasible, the plant's operational efficiency would be adversely impacted. The converted units' fixed O&M and operating cost ($/MWh) would be higher than the operating costs of a gas-fired plant. Other characteristics of the converted units such as start times, load ramp rates, and minimum up and down times would remain the same as the coal units. Given the expected capacity factors at the Allen site (driven by the need for transmission system support in Memphis), the combination of high operating costs and reduced unit flexibility renders the gas conversion uneconomic relative to other options.

In addition, converting the existing coal boilers to natural gas is not expressly permitted by the EPA Agreements. A provision in those agreements would allow TVA to do this in lieu of retiring the units or installing scrubbers only if EPA, in consultation with the other parties to the agreements, agrees to this in its sole discretion. Whether EPA would agree to this and the time needed to obtain such agreement is unknown. Because of all the factors discussed, this alternative was not considered reasonable and was eliminated from detailed consideration.

2.2.4 Alternative F – Retire ALF, Construct a Renewable Energy Source (Wind or Solar)

Under Alternative F, TVA would retire ALF and construct a solar photovoltaic (PV) or wind power plant that would be built on and/or close to ALF. The location would be critical in order to provide the generation needed to meet the area's real and reactive power demands. The project would be sized to replace the net generation produced by the three ALF coal units on an annual basis. That would require a wind or solar facility with a capacity much greater than the coal plant because the reliable capacity of such resources is much less than that of traditional energy resources including coal, gas or nuclear. Building a solar PV or wind power plant is, however, not considered a viable option because of capital cost, the required amount of land, and system operation issues. The footprints and associated impacts from these resources would be much greater than that of the proposed natural gas plant.

Importantly, the intermittent nature of solar and wind power generation would have to be compensated for because of the need for generation in the Memphis area. One or more combustion turbines or an energy storage technology (e.g. batteries and the associated controls) would be needed to provide power and grid support during intermittent periods and periods when there was not enough solar energy or wind to power these systems. Finally, the timeframe to complete required transmission upgrades would be 8 to 10 years and would result in TVA's failure to comply with the requirements of the EPA Clean Air Agreements.

TVA also considered the feasibility of sizing the proposed CT/CC facility to the minimum amount needed in the Memphis area and providing or securing amounts above that from renewable energy resources. The power need in the Memphis area is approximately 600-800 MW dependent on system load levels. TVA is considering sizing the proposed gas plant from 600 MW to 1400 MW. At the low end, there would be no need to secure additional capacity or energy from another energy resource, renewable or traditional, to meet the specific reliability needs of the Memphis area. However, generation above that amount may be required to support overall TVA system needs. This generation would not necessarily have to be located in the Memphis area and could come from renewable resources. There are, however, substantial economic benefits to building a larger capacity CT/CC facility compared to constructing a new wind or solar energy facility elsewhere. On a per kilowatt installed cost basis, new wind and new solar energy facility costs are estimated to be approximately 75%-140% higher than the cost to build a larger capacity CT/CC facility. In addition, the wind or solar facilities would need to be sized significantly larger than the proposed CT/CC facility in order to deliver comparable reliable generating capacity, substantially increasing cost. Additionally the environmental footprint of a new wind or solar facility would be significantly larger than the proposed natural gas plant which would be constructed on a previously-disturbed area already zoned for industrial use.

It is possible to acquire energy or capacity from renewable resources that already are in existence, but TVA does not know of any existing and available renewable resources that could provide this energy and capacity. There also would be the increased risk attendant with every power purchase agreement that non-TVA owned or controlled energy resource suppliers would fail to provide the contracted power. That risk is avoided with the proposed TVA-owned natural gas plant. However, as renewable energy resources become available, the operational range of the gas plant would reliably accommodate the variability of energy generation by these resources.

Because of these issues, this alternative was considered unreasonable and eliminated from detailed consideration.

2.2.5 Alternative G – Retire ALF, Upgrade TVA's Transmission System/Rely on Power Purchase Agreements

Under Alternative G, TVA would retire ALF and install transmission system upgrades to deliver replacement power to the greater Memphis area from other generation sources, potentially including wind generation from the southwest. Various Power Purchase Agreements would be required for replacement generation from non-TVA sources. These transmission projects are needed to mitigate thermal overloads as well as low voltage issues on various transmission elements. In addition, these projects will address potential stability issues in the Memphis area as a result of dynamic reactive support that will be lost with the Allen generation offline. These upgrades are needed to maintain system reliability while meeting transmission reliability standards in this area. Following are the minimum transmission upgrades that would be required for Alternative G:

- A new 500-kV substation would be required near ALF.
- A new 500-kV double circuit TL (5 to 10 mi in length on new ROW) would be required to supply the new 500-kV substation.
- A new 500-kV TL (50 to 75 mi in length on new ROW) would be required.
- A new 161-kV TL (3 to 5 mi in length on new ROW) would be required.
- Multiple reactive power compensation devices would be required to support area voltage.
- Several existing transmission lines would need to be upgraded for higher operating capacity.

The timeframe to complete these transmission upgrades would be 8 to 10 years minimum due to outage constraints, ROW acquisition, construction durations, and environmental review processes. To comply with the EPA Clean Air Agreements, TVA is required to retire ALF or install scrubbers by December 2018. This alternative cannot meet this time constraint. Therefore, this alternative was determined to be unreasonable and was eliminated from detailed consideration.

2.2.6 Alternative H – Convert ALF to Renewable Biomass Fuel

Under Alternative H, TVA would convert the fuel source at ALF to 100 percent biomass fuel. TVA has considered converting various coal-fired units to burn 100 percent biomass, but did not proceed with those projects because of capital and operating cost considerations. It is estimated it would cost $1,000 to $3,000 per kilowatt to convert these units to burn 100 percent biomass. This is the cost for the boiler modifications, environmental controls, and new fuel (biomass) handling equipment.

Converting a unit that was designed to burn coal to burn 100 percent biomass would reduce the capacity of that unit by 35 to 50 percent. Depending on the regional load requirements, new capacity could be needed to make up for the loss in generation. The capital cost estimate above does not include the cost for the additional generating capacity. Since the biomass would likely cost more than coal on a dollar per MBTU basis, the higher fuel cost combined with the increase in the net heat rate would increase the dispatch cost of the unit (the operational cost). Approximately seven million tons of green biomass (at 50 percent moisture by weight) would be needed annually if there was no reduction in capacity as a result of the repowering. There are concerns that there would not be a sufficient amount of acceptable and sustainable sources of biomass within a reasonable distance of ALF to support the long-term operation of these units. In addition, converting the existing coal boilers to biomass is not expressly permitted by the EPA Agreements. A provision in those agreements would allow TVA to do this in lieu of retiring the units or installing scrubbers only if EPA, in consultation with the other parties to the agreements, agrees to this in its sole discretion. Whether EPA would agree to this and the time needed to obtain such agreement is unknown. Because of these issues, this alternative was considered unreasonable and was eliminated from detailed consideration.

2.2.7 Alternative Locations for Proposed CT/CC Plant

In addition to the consideration of alternative actions for meeting the Purpose and Need, TVA also considered where to locate the proposed CT/CC facility. Locating the facility adjacent to existing ALF infrastructure has significant benefits. Key considerations evaluated by TVA that led to the identification of the proposed site included the following:

- Integration with Demand Centers and Established Transmission Assets. The regional transmission system in the project area is designed around ALF and is integrated with the ALF switchyard in such a way as to efficiently serve area loads while maximizing reliability. In addition to serving area loads, replacement generation at the proposed site provides dynamic reactive support to the Memphis area during system disturbances. Lack of dynamic reactive power could lead to voltage stability issues including blackout conditions during such events. Since generators can dynamically react to system events, they can quickly compensate for depressed system voltages in the area. Without dynamic reactive support in this area, there is a high risk for a Fault Induced Delayed Voltage Recovery event that could result in an area blackout under certain conditions.

  Construction of replacement generation at a different site in the region could also require extensive modifications to the transmission system in order to reliably deliver power to the load centers. Some of these transmission system improvements would include new transmission lines on new rights of way, extensive reconfiguring of the 161-kV switchyard at ALF (possibly including new breaker bays), extensive communication and relay protection upgrades, a new switchyard and control house at the new generation location, and extensive outage coordination. In contrast, construction of the proposed CT/CC facility at the proposed site immediately south of ALF has the effect of replacing the generation capacity at nearly the same location as ALF, and better sustaining system stability and reliability within the region.

- *Maximized Use of Other Constructed Assets*. The location of the proposed CT/CC facility provides important benefits in the use of existing previously constructed assets that effectively minimize project costs relative to constructing a plant at a more distant location. Specifically, while the proposed CT/CC facility would use the MLGW natural gas lateral as its primary fuel source, TVA would use the existing oil fuel tanks at ALF as a backup fuel supply for the new plant. These tanks are located in proximity to the proposed site and can be integrated into the proposed facility design at minimal cost. Additionally, the proposed site is immediately south of the existing 161-kV switchyard at ALF and provides for use of this important constructed feature in connection to the regional transmission grid. Construction of a plant at a different location would eliminate the function of this existing switchyard and require the construction of a new switchyard, resulting in higher project costs. Finally, the proposed site is located immediately adjacent to an existing potable water supply line. Consequently, no additional effort or environmental impact would result from development of a new potable water supply.

- *Enhanced Use of Renewable Biogas*. The proposed site presents an opportunity to maximize the use of renewable biogas produced locally by the Maxson WWTP. While the coal units at ALF are partially fueled by biogas produced by the Maxson WWTP, TVA is not currently able to use all of the biogas available. The proposed action would present TVA with the opportunity to use all of the available biogas from the WWTP, and increase the use of available fuel that is otherwise wasted. In addition to the CT/CC facility, TVA would burn biogas from the Memphis Public Works WWTP using multiple reciprocating engines (approximately 6 to 15 MW of power). This aspect of the project provides important benefits in the maximizing the use of this renewable energy source.

- *Gray Water Use and Water Resource Conservation*. The proposed action presents an opportunity to reuse gray water, thereby reducing the use of valuable natural resources in the area. The proximity of the proposed CT/CC facility to the Maxson WWTP makes the use of gray water from the WWTP feasible. As a result, use of raw water from McKellar Lake (or an alternative source water body at another site) is avoided, thereby minimizing impacts to aquatic ecosystems of the source waterbody and the receiving waterbody (thermal effluents). In addition, while the coal units at ALF are partially fueled by biogas produced by the Maxson WWTP.

- *Use of Previously Disturbed Lands.* The proposed CT/CC site, supporting laydown areas and the associated connected actions (gray water line and MLGW natural gas pipeline) are located exclusively on previously disturbed lands such that highly sensitive environmental resources (wetlands, surface water resources, sensitive species, cultural resources, sensitive land uses, residential receptors, etc.) are either lacking or essentially avoided. Therefore, the proposed site offers important advantages in reducing overall environmental impacts. The site is also zoned for industrial use. Alternative site locations would be expected to not only result in higher environmental impacts from the proposed CT/CC facility, but also from the development of natural gas laterals that would impact higher quality environments.

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

2.3 Comparison of Alternatives

The environmental impacts of Alternative A and Alternative B are analyzed in detail in this EA and are summarized in Table 2-4. These summaries are derived from the information and analysis provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

2.4 Identification of Mitigation Measures

Mitigation measures identified in Chapter 3 to avoid, minimize, or reduce adverse impacts to the environment are summarized below. TVA's analysis of selected alternatives includes mitigation, as required, to reduce or avoid adverse effects. Project-specific best management practices (BMP) are also identified.

- 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 as required, to ensure that all surface waters are protected from construction and operational impacts.
- Waste streams would be characterized to ensure permit limits would be met, as required.
- Consistent with 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.
- Directional borings will be conducted under streams and lakes for the installation of pipelines.
- Mitigation measures used to avoid impacts to rare plant communities or sensitive species would be dependent on the situation and could include:
    - Ensuring that the location of rare plant communities areas would be communicated to TVA or MLGW project managers (as appropriate).
    - Use of signage and temporary fencing to exclude construction equipment from rare plant communities.
    - Use of directional boring instead of cut-and-cover for pipeline construction.
- Wetland mitigation measures to be determined after wetland survey completed, and will depend in part on USACE and TDEC permitting requirements.
- BMPs would be used during construction activities to minimize and restore areas disturbed during construction.
- To avoid and minimize impacts to archaeological sites, TVA will ensure that the proposed pipeline route is either shifted to avoid identified sties (including appropriate buffer zones) or by using directional boring to install the pipeline below the site deposits.

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

Issue Area	Alternative A: No Action	Alternative B – Retire ALF, Construct a Natural-Gas Fired Facility (CT/CC)
Air Quality	Local and regional air quality would not improve as much without the installation and operation of emission controls.	Impacts to local and regional air quality would be beneficial from the development of the CT/CC facility, contributing to regional improvement in air quality.
Noise	Existing noise levels at nearby parklands and residences would continue with continued operation of ALF. Impacts would be minor.	Noise levels at nearby parkland and residences would be minor compared with background noise from existing roadway traffic. Noise generated from the proposed CT/CC and pipeline construction and operation are not expected to cause an adverse impact.
Surface Water Quality	Continued plant operation would result in on-going minor impacts related to surface water circulation patterns and water quality within McKellar Lake and the thermal discharge to the Mississippi River.	Impacts would be minor and beneficial associated with the closure of ALF. Facility and pipeline construction impacts would be minor with the implementation of standard BMPs and temporary.
Wetlands	Continued plant operation would not impact wetlands.	There would be no impacts to wetlands on the proposed CT/CC site. There would be minor, temporary impacts to wetlands from new pipeline construction.
Aquatic Ecology	Aquatic ecology impacts would be minor but on-going in conjunction with existing operation of ALF's cooling water intake structure.	Aquatic ecology impacts would be minor and beneficial resulting from the closure of ALF. Minor, short-term effects would occur to intermittent streams during trenching operations.
Terrestrial Ecology - Plants	On-site impacts to terrestrial plant communities would be minor.	There would be minor short term impacts to plant communities of temporary use areas and pipeline ROWs.
Terrestrial Ecology- Animals	On-site impacts to terrestrial animals would be minor.	Impacts to terrestrial animals would be minor.
Endangered and Threatened Species	There would be no effect on endangered or threatened species.	There would be no effect on endangered or threatened species.
Cultural Resources	There would be no on-site impacts to cultural resources.	None with avoidance of identified sites.
Visual	Visual impacts would be minor.	Visual impacts would be minor.
Socioeconomic Resources	Maintained ALF operations and socioeconomic effects on employment and tax payments.	Notable short term increases in employment, payroll and tax payments during construction resulting in beneficial direct and indirect economic impacts. Reduction in employment workforce during operations.
Environmental Justice	No impacts to low income or minority populations.	No impacts to low income or minority populations.

2.5 The Preferred Alternative

TVA's preferred alternative is Alternative B under which TVA would construct and operate a new gas-fired CT/CC generating plant on a 73.3-ac parcel that TVA leases immediately south of the existing coal-fired facility. The proposed facility would utilize the existing switchyard at ALF. Under a CC configuration, the new plant would use gray water provided by the Maxson WWTP located west of ALF. Potable water would be provided by an existing water supply line. In addition the proposed CT/CC facility operation would require the construction operation, and maintenance of approximately 13 mi of new gas pipeline to supply fuel for the new plant. Retiring the three coal units and constructing the proposed natural gas plant would comply with the EPA Clean Air Agreements consistent with TVA's mission to provide reliable and affordable power and TVA's goal of achieving and maintaining a balanced portfolio of generation resources (collectively, the Purpose and Need for this proposed action).

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Air Quality

3.1.1 Affected Environment

The CAA regulates the emission of air pollutants and, through its implementing regulations, establishes standards (National Ambient Air Quality Standards or "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, PM, CO, NO_x, 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.

Shelby County, Tennessee is currently designated in attainment with all of the NAAQS except ozone. The USEPA has designated Shelby County as a nonattainment area for ozone based on 2008-2010 data. The State of Tennessee has filed a petition to have the area re-designated based on 2009-2011 data demonstrating attainment with the 2008 ozone NAAQS of 75 parts per billion.

Air quality in Shelby County is also protected by Air Quality Regulations found in City of Memphis Code Section 16-77, which adopts, by reference, Rule 1200-3-9-.02(11) of the Tennessee Air Pollution Control Regulations. The ALF coal units are permitted to operate under City of Memphis Code Section 16-77, which governs issuance of air operating permits for major sources known as Title V permits. Title V permits are comprehensive documents that encompass all air regulatory requirements to which a major source is subject. Currently, ALF complies with all of its permit requirements and other applicable air quality regulations.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action

Under Alternative A, No Action, TVA would continue to operate the three ALF coal units in compliance with all applicable local, state and federal air quality regulations without implementing additional actions to reduce SO_2 emissions. As a result, air pollutant emissions would be unchanged, and air quality would not change from its current expected state. No additional benefits to regional air quality would be realized under this alternative.

Alternative A, however, would affect compliance with the EPA Clean Air Agreements discussed in Section 1.1. Under these agreements, TVA must notify USEPA and all other parties on or before December 31, 2015 of its decision to either install an FGD system at ALF or retire the facility on or before December 31, 2018. TVA could not continue to operate the ALF units without violating the EPA Agreements.

3.1.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.1.2.2.1 Proposed CT/CC Facility

Construction and operation of a new natural-gas-fired facility would replace all coal-fired generation from ALF. In addition to the CT/CC facility, TVA could burn biogas from the Memphis Public Works WWTP using multiple reciprocating engines (approximately 6 to 15 MW of power). This biogas is currently co-fired in the coal-fired boilers. As a result, the net emission impact from burning bio-gas is expected to be minimal and has not been included in the emission impacts analyses below.

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. A large fraction of fugitive emissions from vehicle traffic in unpaved areas would also be deposited near the unpaved areas. 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 local emissions of PM, NO_x, CO, volatile organic compounds (VOC), and SO_2 during the site preparation and construction period. Although specific construction equipment has not yet been determined, including sizes, numbers of vehicles, and the hours each piece of equipment would operate, the emissions for these operations would be minor. For example, combustion emissions from a 200-horsepower diesel truck operating 8 hr every day for 3 mo would be less than 1 ton each of NO_x, CO, and PM. Emissions of SO_2 would be negligible because of the ultralow sulfur diesel fuel available on the market and low sulfur content in gasoline. This estimate assumes usage of emission factors from older vehicles that have not benefited from more stringent engine emission standards (USEPA 2004).

Overall, effects to air quality from construction activities would be temporary and generally localized. These effects to air quality would not be adverse or long term.

Operational Impacts

Operating Scenarios Evaluated

To evaluate the emission impacts associated with the Alternative B, it is assumed that the CT/CC facility comprises the following emission sources:

- Three fuel-oil- or natural-gas-fired CT generators rated at 210 MW each.
- Three HRSGs with natural -gas-fired duct burners, catalytic CO oxidation, and SCR.
- One reheat condensing steam turbine generator.
- One natural-gas-fired auxiliary boiler.
- Three natural gas heaters.
- One diesel engine-driven fire pump.
- One multiple cell cooling tower.

Because load demand will vary, the CT/CC facility would likely operate in cycling mode, in which the plant, including the HRSGs and steam turbine, would operate with wide load swings to meet fluctuating electrical system demands. To conservatively account for maximum annual emissions, three possible operating scenarios were evaluated:

1. Simple cycle (SC) only
2. Base–load CC plus limited SC
3. Cycling CC plus limited SC

Under SC mode, the combustion turbines would operate without the HRSGs and steam turbine to allow quick response to meet peak–load demands. Base–load CC mode is continuous operation at relatively steady load.

These scenarios, provided in Table 3-1 and Table 3-2, include conservatively high assumptions for potential annual operating hours to account for potential emissions. Anticipated operating hours would be expected to be lower based on TVA's experience at other CC/CT plants.

Table 3-1. Potential ALF CT/CC Facility Operating Scenarios[1]

Scenario	SC/CT Only (Hours/Year)	Base-Load Mode (Hours/Year)	Cycling Mode (Hours/Year)
SC Natural Gas	3,100	200	200
SC Fuel Oil	100	100	100
CC Natural Gas	NA	7,960	4,300
CC Fuel Oil[2]	NA	500	500

[1] TVA would vary the number of CT operational hours, as needed, to meet system power demand
[2] EPA Clean Air Agreements - Appendix B

Table 3-2. Potential Operating Scenarios for CT/CC Facility Auxiliary Equipment[1]

Scenario	Gas Heaters (Hour/Year)	Auxiliary Boiler (Hours/Year)	Fire Pump (Hours/Year)	Cooling Towers (Hours/Year)
SC-Cycle/CC Natural Gas/Fuel Oil	8,760	2,500	50	8,760

[1] TVA would vary the number of the auxiliary equipment operational hours, as needed, to meet system power demand; table presents annual hours of operation

Project Emission Scenarios

The sources of air emissions from the potential CT/CC facility include the CT and HRSG exhaust stacks, the auxiliary boiler, the diesel fire pump, the fuel gas heater stacks, the mechanical draft, and cooling tower.

CT emissions vary with ambient temperature and operating configuration. All annual emission estimates are conservatively based on maximum emission rates occurring at intermediate temperatures (ISO Standard, 59°F). Short-term emission estimates (pounds per CT hour) reflect the ambient temperatures that produce maximum values.

Table 3-3 presents a composite list of the highest tons per year (TPY) emissions for individual pollutants from the three operating scenarios. This table also identifies which scenario results in the worst case emissions, and compares the emissions to the current actual baseline emissions for the three coal units that would be replaced. Based on these scenarios and assumptions, replacement of the three coal units with the CT/CC facility would result in a net decrease in all regulated air pollutant emissions except for CO.

Table 3-3. Comparison of Actual Units 1 - 3 Emissions and Future Potential CT/CC Facility Emissions in Tons/Year

Pollutant	ALF Units 1-3 Coal-Fired Emissions (TPY)[1,2]	Future CT/CC Facility		
		CT/CC Emissions (TPY)[3]	Net Change (TPY)	Operating Scenario
NO_x	2,600.4	610.2	-1990.2	CT Only
SO_2	11,461	114.8[4]	-11,346.2	Base-Load
CO	693.0	760.7	67.7	CT Only
Lead	0.12653	0.044	-0.082	Base-Load
PM	892.5	193.8	-698.7	Base-Load
PM_{10}	606.8	193.8	-413.0	Base-Load
$PM_{2.5}$	321.32	193.8	-127.5	Base-Load
VOC	152.46	134.1	-18.4	Cycling Mode
Sulfuric Acid	7.126	2.84	-4.28	CT Only

[1] Coal operations include, but are not limited to, coal–fired boiler operations, coal handling, and ash handling
[2] Average of the highest consecutive two–year emissions of the past five years (2009 through 2013)
[3] CC/CT operations include the CT and HRSG exhaust stacks, the auxiliary boiler, the diesel fire pump, the fuel gas heater stacks, and the mechanical draft cooling tower
[4] The most likely operating scenario of the proposed plant would be gas-fired only; under this scenario the SO_2 emissions would be much lower (15 tons versus 115 tons)

The proposed CT/CC facility would provide TVA with a nominal peaking generation capacity of 600 to1,400 MW. Based on the conservative operating scenarios evaluated (described above), Alternative B would result in a net emissions decrease of all regulated air pollutants except for CO. Reductions in emissions of NO_x and VOC would contribute to Shelby County attaining and maintaining the 2008 ozone NAAQS.

3.1.2.2.2 Natural Gas Pipeline

Potential air quality impacts would likely occur from fugitive dust generated as a direct result of the movement of construction equipment across the project area. No tree clearing is expected to be required as this is an established and maintained ROW. Potential air quality impacts from construction of the proposed pipeline would be temporary and minimal, and no air permitting actions would be required. Operation of the proposed pipeline(s) 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.

3.2 Climate Change

3.2.1 Affected Environment

The average temperature in the United States has increased by 1.3 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 to the cumulative global emissions of greenhouse gas and particles by these studies. 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 Gases

In nature, 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 (HFCs), perfluorocarbons (PFCs) 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 Hawai’i 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 above 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. HFC-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 kV 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). Electric utilities in the U.S., in turn, emit 2.039 billion tons, roughly 32 percent of the U.S. total (U.S. Geological Survey [USGS] 2014a). 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 emission by over 30 percent and anticipates achieving a total CO_2 emission reduction of 40 percent by 2020. This reduction assumes replacement of the three coal units at ALF with the proposed natural gas plant.

From 2005 through 2013, ALF CO_2 emissions ranged from 4.433 to 5.735 million tons of per year (Table 3-4). During 2013, ALF emitted approximately 4.735 million tons of CO_2 or approximately 1.1001 tons of CO_2 per megawatt-hour.

3.2.1.4 Biogas

Biogas is the gas produced by the biological breakdown of organic matter in the absence of oxygen. Feedstocks for biogas can come from a variety of sources, including municipal wastewater treatment. While the combustion of biogas, like natural gas, produces CO_2, the carbon in biogas comes from plant matter that fixed this carbon from atmospheric CO_2. As a result, any consumption of fossil fuels replaced by biogas will lower CO_2 emissions. In addition, using the energy potential for electricity eliminates the impact of releasing nitrous oxide and methane directly into the atmosphere – gases that warm the atmosphere 310 times and 21 times more than CO_2, respectively.

Table 3-4. Existing ALF CO_2 Emissions (2005-2013)

Year	ALF CO_2 Emissions (million tons)
2005	5.338
2006	5.734
2007	5.477
2008	5.359
2009	5.210
2010	4.982
2011	4.890
2012	4.433
2013	4.735

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action

With the No Action Alternative, ALF would continue to burn coal and contribute to greenhouse gas emissions at existing levels. The plant would continue to rely upon McKellar Lake as its source water for condenser cooling. Projected higher air and water temperatures and altered precipitation frequency resulting from climate change (USGS 2014b), if they occur, would likely result in a minor reduced efficiency of condenser cooling and reduce plant operational efficiency.

3.2.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Natural gas power plants generally emit half as much CO_2 as a coal-fired plant. EPA's proposed Section 111(b) rule regulating CO_2 emissions from new combustion turbines would require the CC plant being considered at ALF to meet a standard of 1,000 pounds (lb) CO_2 per megawatt hour if that rule is finalized.

In addition to the CO_2 emissions reductions shown in Table 3-5, the installation of reciprocating engines to burn biogas as part of the proposed project would qualify for voluntary GHG emissions reduction and/or renewable energy credit certification. Currently, the existing coal-fired facility burns approximately 3 million scf per day of biogas from the adjacent wastewater treatment plant. Multiple standalone biogas electrical generators at the new CT/CC facility would use all of the available biogas produced from the WWTP (more than 3 million scf per day) and would operate independently of the main plant, providing additional project emission reductions. Assuming 3 million scf per day biogas production at a gross calorific value of around 600 Btu per scf, these engines would produce about 9 MW or more of electrical power.

While the proportion of biogas burned is small in comparison to the overall consumption of natural gas, the carbon in the biogas consumed comes from atmospheric CO_2. In addition, utilizing the energy potential of the biogas for electricity also serves to eliminate nitrous oxide and methane emission, creating additional reductions from that of the combined cycle power plant alone.

The reduction in CO_2 emissions from retiring the three fossil units and constructing and operating a natural gas plant would have a very minor and, unnoticeable impact on global emissions of CO_2 and any associated effect on global warming or climate changes.

Table 3-5. Projected ALF CC CO_2 Emissions

Greenhouse Gas	Baseline (Short Tons)	Projected (Short Tons)	Operating Scenario
Carbon Dioxide (CO_2)	5,355,000	3,820,000	Base-Load
Methane (CH_4)	56.62	269.00	Base-Load
Nitrous Oxide (N_2O)	90.61	93.70	Base-Load
CO_2 Equivalent (CO_2e)	5,394,000	3,830,000	Base-Load

3.2.2.2.1 Life Cycle Natural Gas Production

In order to further evaluate the potential for greenhouse gas (GHG) production associated with the proposed CT/CC facility, TVA evaluated the published data regarding full life-cycle emissions associated with the use of natural gas as a fuel for its facility. GHG emissions are quantified as carbon dioxide equivalent (CO_2e). CO_2e includes carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) and incorporates each pollutants global warming potential (GWP). Key segments of the natural gas production process are resource development and extraction, processing, transmission and end-use combustion. The following are the major sources of GHG emissions in the life-cycle analysis of natural gas fired electrical power generating plants:

- Upstream CO_2e from combustion – compressors and other internal combustion engine powered process equipment used to extract, process and transport the natural gas.
- End-use combustion – the CO_2e released from the end-use combustion of the natural gas to generate energy.
- Fugitive and vented methane emissions.
- Non-combustion CO_2e released from the processes – CO_2 that is removed from the raw natural gas and vented.

Numerous studies of life-cycle GHG emissions for electricity generation indicate that GHG emissions from the combustion of natural gas are less than generating electricity from coal even when taking the entire life-cycle of the fuel into account. For example, Jaramillo, et.al (2007) investigated life cycle air emissions from coal, natural gas, liquefied natural gas (LNG), and synthetic natural gas (SNG). This life cycle analysis included an assessment of extraction, processing, transportation and end use combustion. Emissions factors calculated were converted to pounds of pollutant per megawatt hour (MWh) of electricity generated using Department of Energy efficiency estimates for both natural gas and coal power plants. The Jaramillo study found that natural gas life-cycle GHG emissions are generally lower than coal life-cycle GHG emissions (1250 lb CO_2e/MWh for domestic natural gas versus 2270 lb CO_2e/MWh for coal).

In April 2011, the United States Environmental Protection Agency (EPA) released revised methodologies for estimating fugitive and vented methane emissions from the natural gas exploration and processing industry that included revised estimates of methane from well venting, amounts attributable to flaring, emissions from compressor seals and other factors. EPA also included additional estimates of releases associated with hydraulic fracturing. According to the EPA, hydraulic fracturing has the potential to produce higher methane emissions than conventional natural gas production as a result of methane that is released during the flow-back after the fracturing.

A white paper released by the National Petroleum Council (NPC) in 2011 reviewed life-cycle emissions from natural gas and coal fired electric power generating plants in the Jaramillo study using the revised EPA methodology for estimating fugitive methane emissions for each of the life-cycle components identified above. The purpose of the NPC study was to review the impact of the EPA's increased methane emissions on the life-cycle use of natural gas in the power sector relative to coal. Consideration of the higher EPA emissions factors for natural gas only resulted in a six percent increase in overall life-cycle emissions relative to the values reported in the Jaramillo study, and approximately 35% lower than coal on a heat input basis. Subsequent analysis by Worldwatch Institute (2011) compared life cycle greenhouse gas emissions from natural gas and coal using the updated methane emission estimates and found that life cycle emissions increased by 11 percent from the estimates based on prior methane emission estimates. However, the study concluded that even with the adjustment, on average, U.S. natural gas-fired electricity generation still emitted 47 percent less GHGs than coal from source to use.

As is presented in Table 3-4, from 2005 through 2013, ALF CO_2 emissions ranged from 4.433 to 5.735 million tons per year (see Table 3-4). During 2013, ALF emitted approximately 4.735 million tons of CO_2 or approximately 1.1001 tons of CO_2 per megawatt-hour. EPA's proposed Section 111(b) rule regulating CO_2 emissions from new combustion turbines would require the proposed CT/CC facility to meet a standard of 1,000 pounds (lb) CO_2 per megawatt hour if that rule is finalized. Therefore, even considering full life-cycle analysis, the resulting GHG emissions of the proposed CT/CC facility (in CO_2 equivalents) would overall be substantially less than that associated with the continued operation of ALF (Alternative A). As such, even in consideration of life cycle emissions from natural gas, Alternative B is an effective alternative to help TVA reduce GHG emissions. Given the need for real and reactive power in proximity to the existing ALF, the proposed gas facility leads to both sustained reliability and substantially lower emissions of GHG within the Shelby County region.

3.2.2.2.2 Potential for Effects of Climate Change on CT/CC Facility Operations

The proposed gas plant would not use water from the river system. As a result, the proposed plant should be highly resilient to predicted higher air and water temperatures and altered precipitation frequency resulting from climate change (USGS 2014b). Additionally, according to a literature study recently performed for an Asian Development Bank project, with each 1°C increase above 33°C , power output of the gas turbines drops by 0.50 to 1.02 percent while efficiency drops by approximately 0.24 percent (Asian Development Bank 2012). Steam turbine power output and efficiency are not significantly changed by changing air temperature, while net CC power output generally drops by 0.3 to 0.6 percent and net efficiency drops by approximately 0.01 percent per degree above 86°F. The Asian Development study concluded the net plant efficiency could be approximated as linear for temperatures greater than 84.2°F, with a 0.01 percent decrease in efficiency with each 33°F increase in temperature.

Consequently, no significant effects of climate change on the proposed CT/CC facility operations are expected.

3.3 Land Use

3.3.1 Affected Environment

3.3.1.1 Proposed CT/CC Facility

The proposed CT/CC facility would be located on a 73.3-ac parcel located in the southwest corner of the city of Memphis in Shelby County, Tennessee (see Figure 1-1). Current land use at the site is undeveloped and, consequently, there are no existing structures or infrastructure located within the site boundary. Facilities proposed to be located on the new site are described in Section 2.1.2.2 and illustrated in Figure 2-1.

The property surrounding the proposed site consists of both developed and undeveloped industrial uses that are served by a roadway network and rail system. The parcel for the proposed facility is located with the Frank C. Pidgeon Industrial Park, which has been zoned for heavy industrial use by both the city of Memphis and Shelby County (Memphis City Council 1981; City of Memphis and Shelby County 2010). According to the Memphis and Shelby County zoning code, a heavy industrial district is intended to accommodate high-impact manufacturing, industrial or other uses, that by their nature create some nuisance, and which are not properly associated with or are compatible with nearby residential districts or other less intense mixed use or industrial districts (Memphis and Shelby County 2010). Primary facilities within the Frank C. Pidgeon Industrial Park include Nucor Steel, Electrolux Corporation, Canadian National/CSX Intermodal Facility, the City of Memphis Earth Complex (sludge management), and the T.E. Maxson Wastewater Treatment Facility.

Additionally, the International Port of Memphis is located immediately north of ALF at Presidents Island and consists of five public terminals with 11 berths. Cargo handling services include intermodal interchange capability, bulk loading facilities, chemical tank storage, product specific warehousing and five grain elevators. Several terminals have large cranes available in the 100 to 300 ton class. Specialty heavy lift service is also available up to 1,250 tons (Port of Memphis 2014).

No residential or commercial land uses occur in the immediate vicinity of ALF or the proposed location of the natural gas plant.

Land use/land cover based on National Land Cover Data near the proposed site is identified in Figure 3-1. Primary land uses within the 5-mi radius of the site are summarized Table 3-6 and include a mix of industrial, residential, conservation agriculture, and commercial mixed use. Notably, however, much of the land within the Frank C. Pidgeon Industrial Park is mapped as agricultural use. However, based on field review it is recognized that most of these lands are previously disturbed lands associated with industrial uses and the City of Memphis' Earth Complex.

Single-family residential areas (mapped as "developed open space" and "developed low intensity" occur to the east of the site approximately 0.9 mi away. Nearby park and recreational land uses include T.O. Fuller State Park east of the site about 0.6 mi and the Presidents Island Wildlife Management Area (north of McKellar Lake) about 1.3 mi from the site that is used for deer hunting and bird watching (Figure 3-2).

3.3.1.2 Natural Gas Pipeline

The proposed gas pipeline route includes lands that consist of industrial, undeveloped, and residential land use areas. For the entire length of the route, the pipeline would be located completely within the existing MLGW ROW (Appendix A). In the northern portion of the route, most of the adjacent land use is undeveloped land. The pipeline would bore under Robco Lake, which includes some neighboring residences. East of Robco Lake, adjacent land uses are largely undeveloped land and residential. Some schools are located near the proposed gas pipeline route, including the Benjamin J. Hooks Job Corps Academy, Holmes Road Elementary School, and John P. Freeman Optional School.

Table 3-6. Land Use/Land Cover Within the Region

Land Use Type	Acres within 5-Mi Radius
Evergreen Forest	44.9
Mixed Forest	117.6
Herbaceous	138.8
Barren Land	221.3
Emergent Herbaceous Wetlands	236.2
Hay/Pasture	449.7
Shrub/Scrub	503.7
Developed, High Intensity	1,404.6
Developed, Medium Intensity	2,229.9
Developed, Low Intensity	2,930.7
Developed, Open Space	4,129.0
Deciduous Forest	4,252.2
Open Water	6,365.6
Woody Wetlands	6,456.5
Cultivated Crops	9,297.4
Total	**38,778.2**

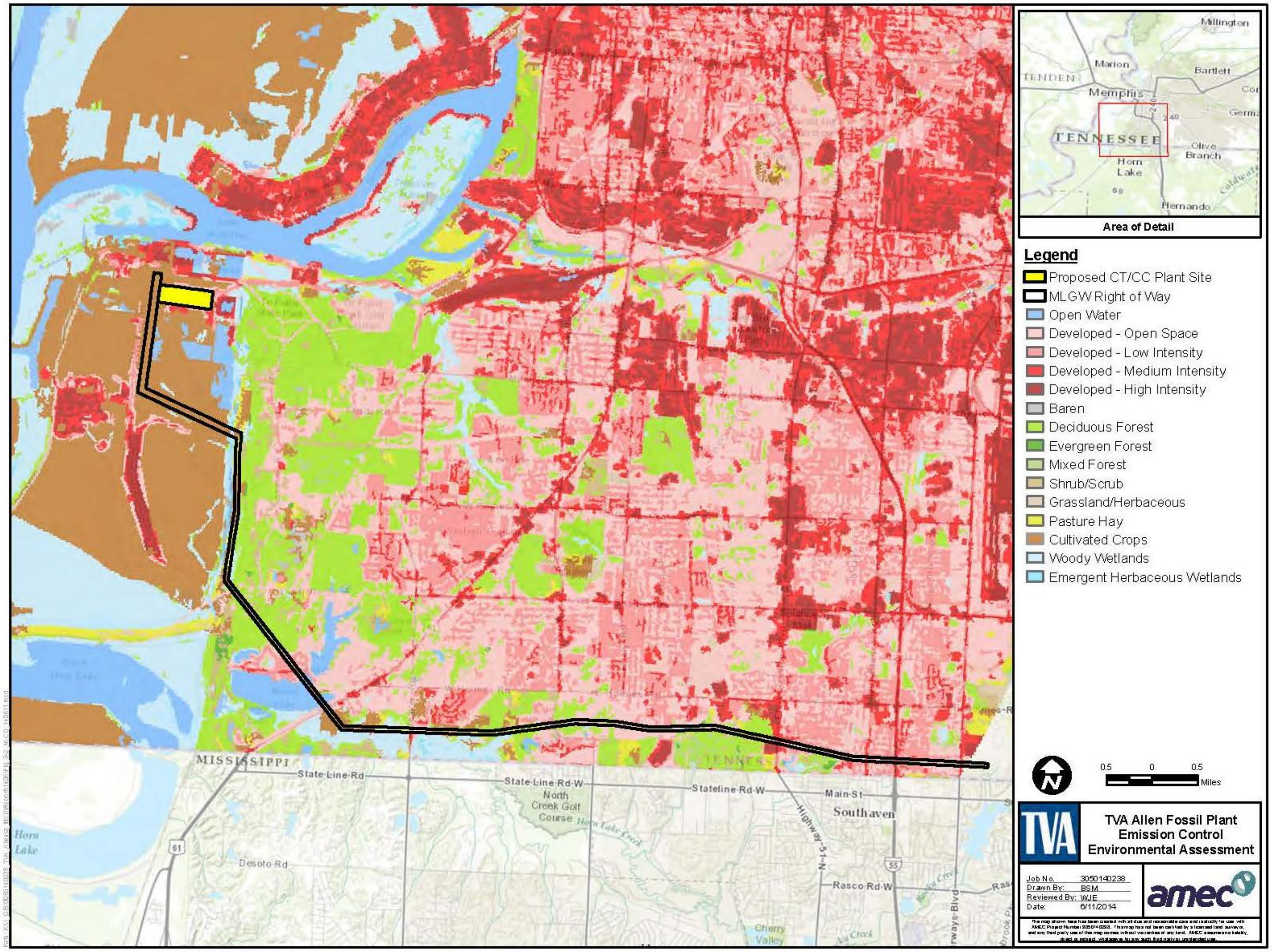

Figure 3-1. Land Use/Land Cover Near the Proposed CT/CC Facility

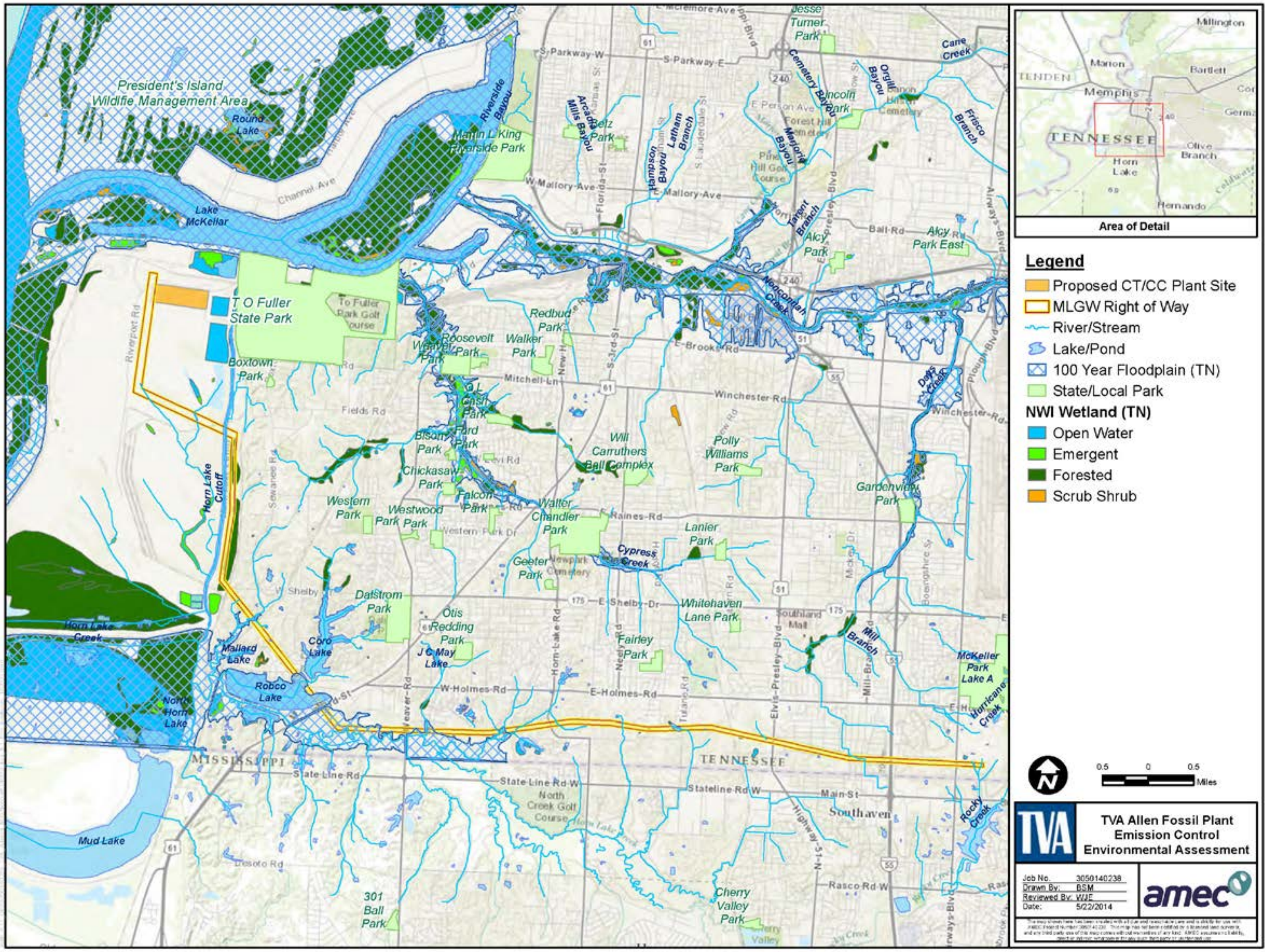

Figure 3-2. Environmental Features Near the Proposed CT/CC Facility

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action

Under Alternative A, TVA would not construct the proposed CT/CC facility and MLGW would not install the associated gas pipeline. Therefore, no impacts to land use would occur.

3.3.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.3.2.2.1 Proposed CT/CC Facility

Alternative B would result in minor changes to land use at the proposed CT/CC site. The potential construction-related land use impacts to the site and off site areas are based on the site utilization plan illustrated in Figure 2-3. The parcels proposed for operations and construction-related activities are already zoned for heavy industrial use and almost all of this land is currently in an undeveloped state.

Construction of the proposed facility permanently converts 73.3 ac of undeveloped land to industrial facilities. Permanent conversions to industrial facilities include the construction of the CT/CC facility, employee parking lot, and supporting buildings. Construction impacts also include potential temporary impacts to 150 ac. of undeveloped land. Short-term impacts would include the temporary conversion of the undeveloped areas of open space 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.

BMPs and erosion and sediment controls will be implemented according to the "Guide for Environmental Protection and BMPs for Tennessee Valley Authority Transmission Construction and Maintenance Activities" (Muncy 2012).

The conversion of undeveloped lands to industrial facilities is minor when compared to the abundance of undeveloped land remaining within a 5-mi radius of the site (see Table 3-6). Furthermore, the proposed land use of the site is consistent with the current zoning of the site. Therefore, impacts to land use from construction and operations would be minor and not significant.

3.3.2.2.2 Natural Gas Pipeline

The proposed gas pipeline will be constructed entirely within the existing MLGW ROW. All construction phase activities including temporary laydown of materials would occur within the existing ROW. Therefore, there would be no changes in land use since the corridor is already developed for utility uses. Up to 459 ac may be disturbed during installation of the pipeline; however this area would be restored upon completion. Permanent impacts are limited to 92 ac along the 50-ft corridor for the actual pipeline. Potential secondary impacts to other uses within and adjacent to the existing corridor (e.g. existing TL towers, gas pipelines, roads, etc.) would be avoided with the use of boring techniques. Impacts to land use from pipeline construction and operation are therefore, considered to be minor and not significant.

3.4 Prime Farmland

3.4.1 Affected Environment

The 1981 Farmland Protection Policy Act (7 CFR Part 658) requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air, not excessively erodible or saturated for extended period, and are protected from frequent flooding.

Within the proposed facility project area, all 73.3 ac are considered to be prime farmland soils. Soils types within the proposed area include Commerce silt loam and Robinsonville fine sandy loam (Table 3-7). In Laydown Area 1, all soils are considered prime farmland with the exception of approximately 1 percent in each area. Laydown Area 2 includes approximately 34 ac of prime farmland, although over a quarter of the area is not considered to include prime farmland. Along the proposed gas pipeline route, 303.4 ac (67.1 percent of total land) are designated as prime farmland.

Table 3-7. Soil Types Mapped Within Proposed Project Area

Soil Mapping Unit	Prime Farmland	Acres	Percent of Area
Proposed CT/CC Site			
Commerce Silt Loam	Yes	52.0	70.9
Robinsonville Fine Sandy Loam	Yes	21.3	29.1
Laydown Area 1			
Robinsonville Fine Sandy Loam	Yes	61.9	59.4
Commerce Silt Loam	Yes	28.7	27.5
Robinsonville Silt Loam	Yes	12.8	12.3
Filled Land, Sandy (Udorthent, Loamy)	No	0.9	0.8
Laydown Area 2			
Robinsonville Silt Loam	Yes	24.6	53.3
Commerce Silt Loam	Yes	9.4	20.3
Levees and Borrow Pits (Udorthents, Silty)	No	12.2	26.4

Although the soils within the proposed CT/CC site have the physical characteristics of prime farmland, the site has been zoned for industrial use, thereby removing it 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, there would be no ground-disturbing activities. As a result, no impacts to prime farmland would occur.

3.4.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Alternative B would result in minor impacts to soils with prime farmland characteristics, but the proposed site and laydown areas are zoned industrial. Based on the proposed development plan, impacts from construction and operation of the facility include 150 ac of temporary and 73.3 ac of permanent impacts. Temporary impact areas would not include substantial ground disturbance activities and the areas would be restored to the original condition upon construction completion.

Approximately 20,030 ac (51.7 percent) of the area within 5 mi have soils classified as prime farmland. Within Shelby County, the largest concentrations of prime farmland soils are located in the northeast and northwest quadrants. The minor loss of on site agricultural lands including prime farmland, and the subsequent loss of potential crop production to industrial facilities, is not significant when compared to the amount of land designated as prime farmland within the surrounding region. In addition, in the Memphis County Growth Plan (Memphis and Shelby County Division of Planning and Development 1999), the council recognized that some agricultural land would be absorbed to support urban growth.

Prime farmland soils would be crossed by the proposed gas pipeline route; however no farming is conducted on those lands. The construction practices and BMPs described above, including topsoil segregation, would prevent permanent impacts to this soil. Within the 250-ft ROW, a 50-ft corridor would be permanently impacted. Given the large amount of prime farmland soils within the region, and that this corridor is already within a utility corridor, impacts to prime farmland soils are minor and not significant.

3.5 Vegetation

3.5.1 Affected Environment

Aerial photos and field surveys of the proposed project area indicate that lands associated with the ALF property, Laydown Area 1, Laydown Area 2, and the proposed CT/CC site have been extensively disturbed by current and/or previous land use. These areas are currently used for industrial and agricultural purposes and do not contain intact, high-quality native plant communities. Herbaceous vegetation is the predominant cover type in these areas and is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. Vegetation on the site has been managed to maintain its open condition and, as a result, it is dominated by non-native species. Small portions of lands associated with the Maxson WWTP contain early successional forest that likely has little conservation value. However, previous investigations of portions of the Maxson WWTP area did indicate the presence of several plant species undocumented from Tennessee (TVA 2006a). Clasping coneflower and prairie sunflower were new records for Tennessee, but it was concluded that the species were adventive and unlikely to persist in the flora of the state.

The proposed pipeline route follows an established ROW that contains a natural gas pipeline and electric TL. The vegetation along this ROW is regularly managed to prevent the establishment and growth of woody species. Therefore, all plant communities within the foot print of the proposed new gas pipeline are herbaceous in nature. In general, the herbaceous plant communities along this ROW are heavily disturbed and are dominated by invasive plant species. Common plants in upland portions of the ROW include Japanese honeysuckle, perennial ryegrass, ragweed, sericea lespedeza, tall fescue, and vetch.

However, some emergent wetlands within the existing ROW do contain areas with native vegetation. Common species in this habitat include bishopweed, black willow, fox sedge, Frank's sedge, green bulrush, shallow sedge, smartweed, and soft rush. All plant communities found along the proposed pipeline route are common and well represented throughout the region.

3.5.2 Environmental Consequences

Adoption of the No Action Alternative would not affect plant life because no project-related work would occur. ALF would continue to operate in its existing configuration and the proposed infrastructure would not be built. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur, but the changes would not result from the proposed project. The project area likely has a high proportion of invasive species and implementation of the No Action Alternative would not change this situation.

3.5.2.1 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Construction, operation, and maintenance of a new CT/CC facility, associated TL, gray water line, and natural gas pipeline would directly impact the vegetation within the project areas, but the impacts would not be significant. The ALF property, Laydown Area 1, Laydown Area 2, and the proposed CT/CC site have been extensively disturbed. Impacts on these sites may be temporary or permanent, depending on the activity, but these portions of the project area do not contain unique vegetation with conservation value. Therefore, effects of the worst case scenario of permanent vegetation removal would be negligible when viewed at the local, regional, or state level.

3.6 Wildlife

3.6.1 Affected Environment

Characterization of habitat is based on review of aerial imagery. The proposed CT/CC site is located in an urban/human-created landscape with industrial infrastructure to the north (ALF) and east. To the south and west are open fields and/or graded/exposed soil interspersed with lowland areas (i.e., depressions) that hold water for at least a portion of the year. Impervious road surface surrounds the CT/CC site. The 73.3-ac CT/CC site is comprised of open field. The proposed pipeline route would occur within existing ROW, extending for approximately 13 mi through a mosaic of landscape types (see Figure 3-1). These include:

- agricultural lands
- manmade river channels
- early-successional corridors that have been cut through forest
- residential areas
- reservoir impoundments
- industrial sites

Birds commonly observed in urban landscapes, woodland and/or early successional habitat interspersed with human infrastructure and dwellings include Carolina wren , tufted titmouse, northern mockingbird, northern cardinal, eastern towhee, eastern bluebird, brown thrasher, field sparrow, and eastern meadowlark. Red-tailed hawk and American kestrel also forage along road ROWs (Sibley 2000; LeGrand 2005). Mammals routinely observed in this type of landscape include Virginia opossum, raccoon, eastern cottontail, striped skunk, white-tailed deer, eastern mole, woodchuck, and rodents such as white-footed mouse and hispid cotton rat (Whitaker and Hamilton 1998). Common reptiles include black racer, black rat snake and eastern garter snake (LeGrand 2005; Conant, Roger and Collins 1998; Niemiller et al. 2013).

Woodland habitat in urban landscapes may be too fragmented and isolated to support most common forest animal species. However, birds in small forested areas typically include American crow, Carolina chickadee, tufted titmouse, American goldfinch, blue-gray gnatcatcher, red-bellied woodpecker, and downy woodpecker (LeGrand et al. 2007; Sibley 2000). Mammals such as eastern chipmunk and eastern gray squirrel tend to occur in urban woodlands (Whitaker and Hamilton 1998). Amphibian and reptile species that may be found in this habitat include ring-necked snake, gray rat snake, five-line skink, copperhead snake, spring peeper and upland chorus frog (LeGrand 2005; Conant, Roger and Collins 1998; Niemiller and Reynolds 2011).

One wading bird colony has been documented within 5 mi of the project site (Tennessee Natural Heritage Program 1977). Based on review of aerial photography, no suitable habitat for heron colonies are available within the project footprint. Work activities would not affect heron rookeries or other aggregations of migratory birds.

No caves have been documented within 5 mi of the project area.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action

Under the No Action Alternative, wildlife and wildlife habitats would not be directly or indirectly affected by any project-related actions.

3.6.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

The project site occurs within a highly fragmented, urban landscape. Since woody vegetation is absent on the CT/CC site, clearing of trees would not need to occur as part of the proposed actions. The proposed pipeline would occur within an existing ROW and clearing of trees is not expected to be necessary. Siting of associated staging and laydown areas would be chosen to avoid tree clearing. During construction, most wildlife present within the project site would likely disperse to adjacent and/or similar habitat. Although terrestrial animal individuals may move into surrounding area during construction activities, they may return to the area once construction is complete. The project is not expected to result in a significant change to available suitable habitat for any species common to the area. Proposed actions are not expected to significantly impact the local population of any wildlife species.

3.7 Aquatic Ecology

3.7.1 Affected Environment

ALF lies approximately 1.8 mi east of the Mississippi River at Mississippi River Mile 725, and is located approximately 7.7 mi from downtown Memphis on a floodplain along the southern shore of McKellar Lake (see Figure 3-2). McKellar Lake is an oxbow lake (a lake formed in the bend of a river – Mississippi River in this case) that has a watershed area of 2,176 ac. The water quality in the lake is considered impaired (TDEC 2014). Fish consumption advisories have been in effect for the entirety of McKellar Lake since 2010 due to elevated levels of mercury, chlordane and other organics.

An ecoregion is an ecological community, together with its environment, functioning as a unit. ALF is within the Mississippi Valley Loess Plains ecoregion. The proposed project could potentially affect the Nonconnah Creek and Horn Lake Creek watersheds which are located in the Mississippi Alluvial Plain and Mississippi Valley Loess Plains ecoregions. These watersheds have warmwater fish communities typical of Coastal Plain streams (Etnier and Starnes 1993). Both of these stream systems are considered impaired because of degraded water quality and physical habitat alteration (TDEC 2014).

What is "Impingement" and what is "Entrainment?"

Fish and other larger aquatic organisms drawn into a facility's intake structure may become entrapped or "impinged" on screening systems designed to keep debris out of the cooling system. Small aquatic organisms such as fish eggs and larvae that pass through the screens and enter the cooling system are "entrained." Both impingement and entrainment result in mortality to aquatic organisms.

Impingement of fishes by ALF was monitored during 2004-2006 (TVA 2007) and compared with historical data collected during 1974-1976 (TVA 1976a). The annual average of the recent two-year study estimated impingement at 225,162 fish per year—significantly lower than the average (795,967 fish per year) for two years of historical monitoring conducted during 1974-1976. Prior analyses performed in the 1970s concluded that impingement at ALF did not adversely affect the aquatic communities of McKellar Lake or the adjacent Mississippi River. Because recent impingement rates were notably lower than the previously documented rates, impingement at ALF is similarly not expected to adversely affect adjacent aquatic communities. Entrainment of fishes by ALF was monitored during 1975. Fishes belonging to seven families were entrained. Collections were dominated by shad, suckers, minnows and freshwater drum. The low overall entrainment and apparent low use of McKellar Lake as a spawning area supported a conclusion of no adverse impact on the fish communities of McKellar Lake (TVA 1976b).

The Federal CWA Section 303(d) requires that States develop a list of the streams and lakes that need additional pollution controls because they are water quality limited or are expected to exceed water quality standards in the next two years. Streams where water quality is limited are those that have one or more properties that violate water quality standards and these are considered degraded by pollution, not fully meeting designated uses (TDEC 2014).

The Nonconnah Creek system in southwest Tennessee has numerous tributaries and stream segments that were 303(d) listed by TDEC in 2014 (see Surface Water Subsection 3.12.2). Cypress Creek of the Nonconnah Creek system has areas where the stream flows through concrete channels in sections and is considered impaired (TDEC 2014). Twelve flowing watercourses were documented during a 2014 review: two perennial stream (streams that flow year round) and 10 intermittent streams (streams that flow when they receive water from springs or surface runoff). Additionally, in January 2003, an investigation of streams in this vicinity was performed by TDEC and four wet weather conveyances (ephemeral streams or streams that typically only flow in direct response to rainfall events) were identified in unnamed tributaries to Horn Lake Cutoff, Shelby County, Tennessee. During a May 2014 field review by TVA an additional 10 ephemeral streams (wet weather conveyances) were identified. A complete list of surface waterbodies crossed by the proposed gas pipeline can be found in the Section 3.12.

Riparian areas are the area of interface between land and a river or stream. Because construction activities could mainly affect riparian conditions and in-stream habitat, TVA evaluated the condition of both for each stream during the 2014 review. A riparian condition was assigned to one of three classes to indicate the current condition of streamside vegetation across the majority of the stream (Table 3-8). The assigned classes are as follows:

- Forested – Riparian area is fully vegetated with trees, shrubs, and herbaceous plants. Vegetative disruption from mowing or grazing is minimal or not evident. Riparian width extends more than 60 ft on either side of the stream.
- Partially forested – Although not forested, sparse trees and/or scrub-shrub vegetation is present within a wider band of riparian vegetation (20 to 60 ft). Disturbance of the riparian zone is apparent.
- Non-Forested – No or few trees are present within the riparian zone. Significant clearing has occurred, usually associated with pasture or cropland.

Table 3-8. Riparian Condition of Streams Crossed by the Potential Gas Pipeline

Riparian Condition	Number of Perennial Streams	Number of Intermittent Streams	Number of Ephemeral Streams	Total
Forested	0	0	0	0
Partially Forested	0	0	0	0
Non-Forested	2	10	14	26
Total	2	10	14	26

Streamside management zones and BMPs identified in TDEC (2012) and Muncy (2012) are based upon considerations such as 303(d) impairment and presence of endangered or threatened aquatic species. These streamside management zones and BMPs minimize the potential for impacts to water quality and in-stream habitat for aquatic organisms. Specifically, Muncy (2012) and TDEC (2012) outline site preparation standards with emphasis on soil stabilization practices, structural and sediment controls including runoff management, and general stream protection practices associated with construction activities.

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

No adverse impacts to aquatic ecology would occur as a result of new TVA actions, however impingement and entrainment would continue to occur at ALF. Changes to aquatic life would likely occur over the long term due to factors such as population growth and land use changes within the area.

3.7.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

No direct impacts to aquatic ecosystems would occur in conjunction with the construction of the proposed CT/CC facility, associated TL or proposed gray water supply line. However, closure of ALF would eliminate the use of raw water from McKellar Lake. This would result in minor beneficial impacts associated with the elimination of impingement and entrainment of fish and shellfish due to cooling water intake operation.

Aquatic life could be affected by the proposed natural gas pipeline construction either directly or indirectly. Direct impacts may be associated with habitat alteration from trenching activities, whereas indirect impacts may be associated with storm water runoff due to temporary construction activities associated with site preparation. In conjunction with Alternative B, it is expected that the two ponds crossed by the pipeline would be directionally drilled. Consequently, no impacts to aquatic ecosystems are expected to ponded environments. Additionally, three streams are also expected to be directionally drilled including the Horned Lake cutoff, Horn Lake Creek south of Cessna Road, and an unnamed tributary to Days Creek. All other streams that are proposed for crossing by trenching methods are considered intermittent streams. Potential impacts to these streams due to removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of in-stream habitat, and increased stream temperatures. Other potential construction impacts include alteration of stream banks and stream bottoms by fracturing of the stream bed during trenching activities. Additionally, increases in turbidity and loss of instream aquatic macrophytes and benthic invertebrates along the trenching corridor as well as temporary loss of stream connectivity in small streams could occur as a result of trenching.

Perennial and intermittent streams as well as watercourses that convey only surface water during storm events potentially affected by the proposed site preparation would be protected by measures outlined in standard permit conditions. Applicable permits are listed in Section 1.8. Aquatic Resource Alteration Permit and U.S. Army Corps of Engineers (USACE) 404 Permits would be obtained for any stream alterations located within the project area or pipeline segments and the terms and conditions of these permits would require mitigation from these proposed activities. Since directional boring techniques would be used during pipeline construction for major stream and water body crossings by MLGW and appropriate protective measures outlined in permits would be implemented during site preparation for stream crossings, no significant impacts to aquatic ecology are anticipated to occur as a result of the proposed TVA action.

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 State of Tennessee provides protection for species considered threatened, endangered or deemed in need of management within the State other than those already federally listed under the ESA.

The listing of species is managed by the TDEC; additionally, the Tennessee Natural Heritage Program and TVA both maintain databases of aquatic and terrestrial animal species that are considered threatened, endangered, special concern, or are otherwise tracked in Tennessee because the species is rare and/or vulnerable within the state.

Why is shovelnose sturgeon a Federally protected species?

Shovelnose sturgeon is listed as "threatened" under the Endangered Species Act as having a "similarity of appearance" (SAT) to an endangered species. This species is listed to provide additional protection to the pallid sturgeon which is very similar in appearance.

A review of the TVA Regional Natural Heritage database for terrestrial species of conservation concern was conducted in April 2014. Based on the database search, there is one federally endangered species (Indiana bat) and one species proposed for listing as federally endangered (northern long-eared bat) within the proposed project area. Within the 5-mi region around the proposed project site, there are two federally listed species (interior least tern and piping plover), two state listed species (lark sparrow and Mississippi kite), and one species tracked by the Tennessee Natural Heritage Program (striped whitelip). Additionally, the bald eagle, subject to protection under the Bald and Golden Eagle Protection Act, has also been recorded from the area near ALF.

Five state listed aquatic species are known to occur within Shelby County, Tennessee, and Desoto County, Mississippi, or in watersheds within a 10-mi radius of the proposed project area (Table 3-9). Additionally, the federally endangered pallid sturgeon and federally threatened shovelnose sturgeon are known to occur in the Mississippi River near Memphis (U.S. Fish and Wildlife Service [USFWS] 2014); however, the TVA heritage database contains no records of these sturgeon species within a 10-mi radius.

Table 3-9. Species of Conservation Concern Within Proposed Project Area[1]

Common Name	Scientific Name	Status[2]	
		Federal	State (Rank[3])
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	DM	NMGT (S3)
Interior Least Tern	*Sterna antillarum athalassos*	LE	END (S2S3)
Lark Sparrow	*Chondestes grammacus*	--	THR (S1)
Mississippi Kite	*Ictinia mississippiensis*	--	NMGT (S2S3)
Piping Plover	*Charadrius melodus*	LT	TRKD (S2)
Fishes			
Blue Sucker	*Cycleptus elongatus*	--	THR (S2)
Naked Sand Darter	*Ammocrypta beani*	--	NMGT (S2)
Northern Madtom	*Noturus stigmosus*	--	NMGT (S3)
Mammals			
Northern Long-Eared Bat	*Myotis septentrionalis*	PE	--
Indiana Bat	*Myotis sodalist*	LE	END (S1)
Mussels			
Fatmucket	*Lampsilis siliquoidea*	--	TRKD (S1)
Southern Hickorynut	*Obovaria jacksoniana*	--	TRKD (S1)
Terrestrial Snails			
Striped Whitelip	*Triodopsis multilineata*	--	TRKD (S1)

[1] Source: TVA Natural Heritage Database, accessed 04/28/2014; Species documented in Shelby County, Tennessee, DeSoto County, Mississippi, and/or within 5 mi (terrestrial animals, plants) or 10 mi (aquatic animals) of the proposed site.

[2] Status Codes: DM = Delisted, Recovered, and Being Monitored; 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).

No federal or state listed plant species or designated critical habitats have been documented within a 5-mi vicinity of the project area. Additionally, no federally listed plant species are known to occur in DeSoto County, Mississippi or Shelby County, Tennessee. Comprehensive field surveys of the project area did not identify rare plant species or their habitat in areas where work would occur.

The interior least tern nests on open shorelines, riverine sandbars and mudflats throughout the Mississippi and Missouri river drainages. Suitable nesting habitat is sparsely vegetated with sand or gravel substrate and located near an adequate food supply. Fidelity exhibited by terns across years to a particular site is strongly influenced by the dynamic nature of river hydrology, which may change island size and vegetative cover annually (USFWS 2013). Least terns also have been documented using inland sites created by humans such as dredge spoil and stilling ponds associated with coal plants, where site characteristics mimic (to some degree) natural habitat (Spear et al. 2007; Jenniges and Plettner 2008).

The population of the interior least tern was listed as an endangered species by the USFWS in 1985 (USFWS 1985b). It is a locally common summer resident in Tennessee along the Mississippi River and a rare migrant elsewhere in Tennessee. Individuals begin arriving in early May and are concentrated in the western half the state (Nicholson 1997). Nesting colonies of least tern have been documented within 5 mi of the project area. Summer colonies have been documented along the Mississippi River (Jones 2009), located west of the proposed CT/CC site and pipeline route, and along the banks of several ponds at TVA's ALF, located north of the proposed CT/CC site. Occurrence of nesting colonies at ALF typically coincides with high water levels along the nearby, Mississippi River, where the more suitable sandy islands, sand bars and river banks are rendered inaccessible due to the high water levels. Adult individuals were observed perched along exposed ash and foraging in the ponds on the eastern side of ALF during the May 29, 2014, field survey.

The piping plover is a small shorebird that was federally listed under the ESA in 1985 (USFWS 1985a). Occurrence of piping plover is limited to fall and summer migration seasons within the Tennessee Valley Region, where the species is considered a rare fall migrant and extremely rare spring migrant (Henry 2012). Adult female piping plovers typically migrate from summer to winter grounds during July; adult males and juveniles migrate between late August and early September (USFWS 2003; Pompei 2004). 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 TVA reservoirs (Henry 2012).

Studies of migration ecology suggest that piping plover does not concentrate in large numbers during migration and that most sightings were of individual birds. Although the species uses a variety of habitats, most interior sites used by piping plovers included reservoir shorelines. Piping plovers were noted to move quickly through the southern states during spring, often overflying southern states. The species appears to select stopover sites opportunistically (Pompei 2004). One piping plover was observed foraging on an ash flat along a settling pond at ALF in 2010. Suitable habitat was not identified within the proposed CT/CC site or gas pipeline route. Given the infrequency of occurrence by this species in this region, occurrence of piping plover within the project area also is minimal.

Bald eagles are federally protected by the Bald and Golden Eagle Protection Act and managed under the Bald Eagle National Management Guidelines (USFWS 2007b). Bald eagles in the Tennessee Valley Region typically select large, tall trees for nesting that have prominent views and that are fairly close to rivers, lakes and reservoirs, over which they forage (Hudson 2006). Nesting bald eagles have been documented within 5 mi of the proposed CT/CC site and gas pipeline route. Documented nests occur in close proximity to the Mississippi River. No bald eagle nests were identified at the CT/CC site and suitable habitat is not present. Suitable nest sites may occur within the project area where the proposed pipeline ROW crosses Robco Lake, but no nests were identified during the field survey.

The Indiana bat is listed as federally endangered by the USFWS (2007a). The species overwinters in large numbers in caves and forms small colonies under loose bark of trees and snags in summer months (Barbour and Davis 1974). Indiana bats disperse from wintering caves to areas throughout the eastern U.S., from New York and New Hampshire in the north to Alabama in the south and as far west as eastern Kansas and Oklahoma. The species favors mature forests interspersed with openings. The presence of snags with sufficient exfoliating bark represent suitable roosting habitat. Use of living trees with suitable roost characteristics in close proximity to suitable snags has also been documented. Multiple roost sites are generally selected. The availability of trees of a sufficient bark condition, size, and sun exposure is another important limiting factor in how large a population an area can sustain (Tuttle and Kennedy 2002; Harvey 2002; Kurta et al.

2002). Numbers of Indiana bat are stable or decreasing throughout portions of their range. This has been attributed to loss of habitat and disease.

The closest summer record of Indiana bat to the project site occurs in Benton County, Mississippi, within Holly Springs National Forest, which is located approximately 50 mi to the southeast of the project area. This record is of a roost tree identified by tracking a female Indiana bat during spring migration from a cave in White County, Tennessee, in 2013.

The closest winter record of Indiana bat to the project site is of a hibernaculum greater than 100 mi to the east in Tishomingo County, Mississippi. No Indiana bats have been observed at this location, however, since 1939.

Federal agencies are directed under Section 7 of the ESA to assess the suitability of habitat and potential impacts to Indiana bat within project areas that occur within the potential range of the species (USFWS 2014a). This increased vigilance is based on the continued decline of Indiana bat and the recent and continued impact of white-nose syndrome on cave-dwelling bat species. Since 2006, when white-nose syndrome was first observed in a cave in New York, the associated fungus, *Pseudogymnoascus destructans*, has adversely impacted cave-dwelling bat species up and down the eastern seaboard. Impacts are spreading farther south and west, with close to 100 percent mortality in affected caves after two to three years (USFWS 2012). Indiana bat is one of the species that has experienced mortality due to white-nose syndrome.

The northern long-eared bat is found in the U.S. from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, reaching into eastern Montana and Wyoming, and extending southward to parts of southern states from Georgia to Louisiana. Suitable winter habitat (hibernacula) includes underground caves and cave-like structures (e.g., abandoned or active mines, railroad tunnels). These hibernacula typically have large passages with significant cracks and crevices for roosting; relatively constant, cool temperatures (32 to 48°F) and with high humidity and minimal air currents. During summer this species roosts singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees (typical diameter ≥3 in). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bat forages in upland and lowland woodlots, tree-lined corridors, and water surfaces, feeding on insects. In general, habitat use by northern long-eared bat is thought to be similar to that by Indiana bat, although northern long-eared bats appear to be more opportunistic in selection of summer habitat (USFWS 2014b).

Field surveys determined that suitable summer roost habitat within the proposed CT/CC site and the gas pipeline route is lacking. The existing ROW for the proposed pipeline may provide a suitable travel corridor and/or foraging habitat for both species.

Lark sparrow has been documented in both the summer and winter in Tennessee, where the bird is considered threatened due to significant population declines over the last 70 years throughout its range. Summer occurrence (mid-April to mid-July) of lark sparrow has been documented in central and western sections of the state, primarily concentrated in the limestone cedar glade region of the inner Central Basin and secondarily in the Coastal Plain Uplands region. Suitable habitat includes extensive areas of bare ground interspersed with rocky outcrops, patchy herbaceous plant cover, and scattered saplings in a dry environment. A low density of widely spaced cedar trees and other saplings or shrubs are preferentially used for perch sites and nest cover. Documented nests in Tennessee were located on the ground, typically in a slight depression at the base of a weedy herbaceous plant, crop, or shrub that provided shade (Nicholson 1997). The species has been recorded in Shelby County, within 5 mi of the project site. One adult was observed feeding two juveniles in August on Presidents Island. Suitable habitat does not occur on the CT/CC site, but does occur within the proposed gas pipeline route.

Mississippi kite is an uncommon summer resident bird in extreme western Tennessee, typically arriving after mid-April and departing by mid-September. Although suitable habitat is considered to be extensive, mature, wooded areas, the species is regularly observed in urban areas, including zoos, golf courses, parks and residential areas, where nests have been documented in back yards. Nests typically are in located near the top of trees either in a central fork or at the end of a sturdy branch. Mississippi kite was originally listed as endangered in Tennessee based on continued loss of bottomland hardwood forest, which was originally thought to be optimal habitat for the species, and small population size. Status for the species was downgraded to In Need of Management after the discovery that Mississippi kite occupies a greater variety of habitat types (Nicholson 1997). Several summer records for the species, including at least one nest, occur within Shelby County, within 5 mi of the project site. These occurrences include sitings at Riverside Park Golf Course, T.O. Fuller State Park, and adjacent to Robco Lake. Since habitat within the proposed CT/CC site is an herbaceous field, and the proposed gas pipeline route occurs within a maintained ROW, suitable nest habitat does not occur within the project area.

Striped whitelip is a terrestrial snail that is associated with lowland forest, sedge meadows, and fens (NatureServe 2014). Records within Tennessee occur within coastal plain habitat in close proximity to the Mississippi River. Several individuals of the snail species were observed approximately 2 mi west of the proposed gas pipeline route near Horn Lake. Suitable habitat does not occur within the project area.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action

Under the No Action Alternative, the existing coal-fired facility at ALF would continue to operate to supply power. Monitoring activities associated with presence of least terns at ponds during the summer breeding season would continue on an as-needed basis (i.e., when actions on site had the potential to directly disturb breeding or nesting activities), and incidental occurrence of piping plover would be documented when observed. Protected terrestrial animals and their habitats otherwise would not be affected by any project-related actions under the No Action Alternative. Federal or statelisted plants do not occur in the project area and would not be impacted by implementation of Alternative A.

3.8.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Based on review of aerial photography of the proposed CT/CC site and gas pipeline route, suitable summer breeding habitat for least tern is not present in the project area. Use of ash ponds at ALF is driven by availability of nesting habitat along the Mississippi River. If exposed ash, which mimics (albeit poorly) more suitable sandbar habitat, continues to be available adjacent to ash ponds after closure of ALF, it is possible that terns would nest on the exposed ash when sandbars on the Mississippi River are inaccessible due high water levels. Due to the gray color of ash, which contrasts with the sandy color of both the eggs and chicks of least terns, eggs and chicks are vulnerable to predation by both avian and mammalian predators. Few juveniles, therefore, survive to fledge from ash ponds at ALF. Of 52 eggs laid in the summer of 2010, for example, one chick was documented to reach the fledgling stage. Biologically, use of the ash ponds at ALF by least terns contribute very little to the viability of the species. If closure of ALF ultimately eliminates use of ash by least terns for breeding, nesting and foraging, this would not impact long-term fitness of the species. Therefore, impacts to this species by the proposed actions are not anticipated.

Suitable habitat within the project area for the piping plover is absent. Given the infrequency of occurrence for the piping plover (i.e., less than annual) and lack of suitable habitat, no impacts are anticipated. Suitable nest habitat for the bald eagle is limited within the project area and the nearest documented nesting site is greater than 660 ft away. Impacts to these nests are not anticipated to occur as a result of proposed actions due to the distance away (USFWS 2007b).

Suitable habitat for the Indiana bat and northern long-eared bat does not exist within the proposed CT/CC site and is absent within the proposed gas pipeline route. Removal of trees within the ROW would be avoided as all temporary and permanent impact areas would be within the existing utility corridor that is already cleared of vegetation. Therefore, impacts to the Indiana bat or northern long-eared bat would not occur as a result of proposed action.

Suitable habitat for lark sparrow occurs within the proposed pipeline route. Because the route would occur within existing maintained ROW and permanent impacts would be smaller than the existing ROW, impacts that may occur to nesting lark sparrow are not expected to reach an adverse level for the species. Further, optimal habitat (limestone cedar glades) is limited within the project site. Suitable nesting habitat for Mississippi kite and suitable habitat for striped whiptail is not expected to occur within the project area. Impacts to these species are therefore, not anticipated.

Any upgrade of existing transmission corridors resulting from implementation of Alternative B will be subject to further detailed review as is described in Chapter 2. No federal or state listed aquatic animals are documented to occur within the Nonconnah Creek or Horn Lake Creek Watersheds; however, state listed fish and mussels occur in other streams within a 10-mi radius of the proposed action. Impacts to state listed aquatic species could occur indirectly due to modification of the riparian zone and fracturing of the stream bottom resulting from construction activities associated with site preparation and pipeline construction.

The federally endangered pallid sturgeon and federally threatened shovelnose sturgeon are known to occur in the Mississippi River main channel but both species require large riverine habitats (USFWS 2014c). The proposed action would not impact mainstream Mississippi River aquatic habitats, and stream tributaries to the river are unsuitable for occupation by pallid or shovelnose sturgeon. There are no records of federally protected species within watersheds crossed by the proposed action or within a 10-mi radius of ALF. Since no federally listed aquatic species or designated critical habitat is known to occur within watersheds in the proposed project area, and appropriate stream protection measures outlined in permit conditions would be implemented during site preparation activities, no impacts to federal- or state-listed aquatic species are anticipated to occur as a result of TVA actions.

Federal or statelisted plants do not occur in the project area and would not be impacted by implementation of Alternative B.

3.9 Geology

3.9.1 Affected Environment

ALF is located in the Gulf Coastal Plain Physiographic Province and lies within the Mississippi Embayment (TVA 2006). The surface geologic formation is quaternary alluvial deposits composed of gravels, sand, silt, and clay (Hart 1979). Structurally, the area lies near the center of the upper portion of the Mississippi Embayment, a broad southward-plunging syncline with its axis approximately aligned with the course of the Mississippi River. The syncline consists of several thousand feet of relatively unconsolidated cretaceous, tertiary, and quaternary age deposits of clay, silt, sand, gravel, chalk, and lignite. The principal aquifers of this sedimentary sequence include (in descending order), recent alluvium, the Memphis sand, and the Fort Pillow sand. Many of these soils range from 20 to 100 ft deep based upon the Geologic Map of Tennessee (Hardeman 1966). Alluvial silts and sands underlie the subject site that also contain lenses of silty clay (MACTEC 2005).

The proposed CT/CC site is located just south of ALF and McKellar Lake, a narrow, winding embayment of the Mississippi River.

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. The NMSZ has produced several damaging earthquakes, including the sequence of very large earthquakes and aftershocks in 1811-1812.

The amount and type of shaking a structure is subjected to during an earthquake is strongly influenced by the strength and thickness of the underlying materials. Sites founded on soft rock and soils generally experience stronger shaking than site founded on competent, hard rock. The National Earthquake Hazard Reduction Program defines a rock/soil type scale from Category “A” to Category “F.” The hardest rock conditions are Category A, and the softest soils are Category F. Geotechnical investigations performed at a site approximately 3 mi east of ALF indicate that the surficial materials generally correspond to rock/soil Category D/E (MACTEC 2005). Actual conditions at the proposed CT/CC site will be further investigated during detailed design.

Determination of the susceptibility and potential for seismically induced liquefaction of site soils will also be required. Based on the depositional environment and the character of surficial soils in the vicinity, the proposed foundation of the CT/CC site may exhibit classic indicators for significant strength loss from strong ground shaking.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action

Under the No Action Alternative, no construction would take place in support of development of the proposed CT/CC facility or the natural gas pipeline. Consequently, there would be no impact to geology associated with this alternative.

3.9.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.9.2.2.1 Impacts of Construction

Impacts to geological resources are limited to the construction phase and are associated with excavation activities for CT/CC facility foundations, associated water supply lines, TL tower footings, and gas transmission pipeline construction. 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 as described further in Section 3.12.1.

Along the proposed gas pipeline, construction activities are expected to largely encounter surficial soil horizons. Impacts to geology from both trenching activities and boring activities associated with directional drilling are expected to be minimal and not significant. Appropriate measures will be incorporated into pipeline design to minimize potential effects of earthquake on facility safety and integrity.

3.9.2.2.2 Impacts of Operation

<u>Earthquake Hazards</u>

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 displacement 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. Similarly, pipelines and underground utilities should be located so as not to cross faults, if possible. 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.

Surface Fault Rupture Potential at the Proposed CT/CC Site

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 trends northeast-southwest and forms the linear bluffs northwest of Memphis. The fault is projected to extend southwest and would pass significantly west of proposed CT/CC site.

No faults are mapped or described at or near the plant (Hart 1979). Therefore, the potential for surface fault rupture at the proposed CT/CC site is considered to be low.

Considerations of Probabilistic Ground Motion Parameters

The potential earthquake hazard at the proposed CT/CC site can be modeled probabilistically by considering all nearby contributing seismic sources and the probability that these sources will produce earthquakes of various magnitudes. The USGS performed probabilistic seismic hazard analyses throughout the U.S. to prepare the 2008 national seismic hazards maps (USGS 2008b). American Society of Civil Engineers (ASCE) 7-10 (ASCE 2010) provides guidelines for calculating the seismic hazard at any location based on the USGS (2008a) maps, given: site soil classification, facility risk/occupancy category, and recurrence interval of shaking. A preliminary determination of the ASCE 7-10 ground motion parameters for the proposed CT/CC site is presented in Table 3-10. The parameters are presented in terms of response spectrum ordinates at the peak ground acceleration, 5 Hertz, 1 Hertz, and 0.5 Hertz. The parameters reflect a 2,475-year return period (2 percent probability of exceedance in 50 years) assuming both site class D and E conditions. It should be noted that ASCE 7-10 identifies a Seismic Design Category for the facility or structure based on assigned risk category and intensity of shaking. The Seismic Design Category determines how the design spectral shape is modified to account for the facility's importance after a strong shaking event. For the intensity of shaking postulated at the proposed CT/CC site, the spectral shape is modified by the same factor whether the risk category is assigned as III or IV.

Table 3-10. Preliminary 2,475-Year Return Period Ground Motion Parameters at the Proposed CT/CC Site

Soil Class	Risk Category	Spectral Acceleration (g)			
		PGA	5 Hz	1 Hz	0.5 Hz
D	III/IV	0.44	1.08	0.58	0.30
E	III/IV	0.38	0.90	0.90	0.46

Note: Determined by ASCE 7-10, based on USGS 2008a

Based on this evaluation, earthquakes pose a real risk to important structures and critical facilities in the region. Accordingly, TVA will consider earthquake loads (and the secondary effects of strong ground shaking) as part of the design of new facilities at the proposed CT/CC site. Similarly, MLGW will integrate seismic considerations as part of final pipeline design. Together these design considerations are expected to mitigate the potential seismic risk of impact to the proposed CT/CC facility 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 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 Mississippi Valley Loess Plains ecoregion and Wolf River watershed. Compared to middle and eastern Tennessee, wetlands in the project area are much more common. Land use/land cover data shows that wetlands comprise almost 10 percent (34,470 ac) of the overall land use within the Wolf River watershed (TDEC 2005).

Wetlands within the proposed project footprint were identified during field surveys conducted in May 2014. Areas surveyed included includes the proposed CT/CC site, Laydown Areas 1 and 2 and the MLGW ROW. Eleven wetlands were mapped within the 250-foot existing gas line ROW. Wetlands identified on National Wetland Inventory (NWI) maps and those identified by field delineation are shown on Figure 3-2 and Appendix A. Table 3-11 summarizes wetlands identified during field delineation.

Table 3-11. Wetland Acreage Impacts

Project Area	Wetland Type	Acres
Proposed CT/CC Site	None	0
Laydown Areas 1 and 2	None	0
Gas Pipeline Route	Freshwater Emergent	5.6

Lands within the proposed project area have been heavily disturbed by current and/or previous land use. Based on the field delineation no wetlands occur on the proposed CT/CC site or proposed laydown areas.

The proposed gas pipeline route follows an established ROW that contains an existing natural gas pipeline and electric TL. To maintain the reliable transmission of electricity and gas, the vegetation along this ROW is regularly managed to prevent the establishment and growth of woody species. The eleven wetlands present within the gas line ROW are emergent wetlands; vegetation is comprised primarily of soft rush (*Juncus effusus);* Johnson grass (*Sorghum halepense*), wool grass (*Scirpus cyperinus*), spike rush (*Eleocharis obtusa*), fescue (*Festuca arundinacea*), smartweed (*Polygonum sagittatum*), Frank's sedge (*Carex frankii*), bearded sedge (*Carex comosa*), dock (*Rumex verticillatus*); rice cutgrass (*Leersia oryzoides*). The wetland present within the WWTP area is a mix of emergent/scrub-shrub/forested habitats surrounding an open water area.

3.10.2 Environmental Consequences

As a federal agency, TVA is subject to the requirements of E.O. 11990, Wetland Protection. The objective of E.O. 11990 is "… to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or Indirect support of new construction in wetlands wherever there is a practicable alternative," (United States Water Environmental Protection Agency 1977). The E.O. is not intended to prohibit impacts to wetlands in all cases, but rather to create a consistent government policy against such development under most circumstances. The E.O. requires that agencies avoid activities in wetlands unless there is no practicable alternative.

3.10.2.1 Alternative A – No Action

Adoption of the No Action Alternative would not result in impacts to wetlands as no alterations or construction activities would occur to or near wetlands. Along the gas pipeline route, on-going vegetation maintenance activities would continue to occur for the existing pipeline and electric TL, therefore wetlands in these areas would remain emergent and scrub-shrub.

3.10.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Construction, operation and maintenance of the proposed CT/CC facility and gas pipeline would result in temporary impacts to wetlands within the project areas. A total of 5.6 ac of emergent wetlands were identified within the proposed gas line ROW. Based on field delineation, , no wetlands would be impacted on the proposed CT/CC site. Additionally, while a total of 12.9 ac of wetlands were identified on the WWTP site, no impacts to these wetlands would occur in conjunction with the proposed CT/CC project. Unavoidable directs impacts to wetlands would be minimized via directional boring, BMPs, and mitigation via both state and federal agencies as per USACE Section 404 wetland regulations. Impacts to wetlands would be temporary and limited to the construction phase. Upon completion of construction activities, the area would be restored to as close to the original state as possible and in accordance with applicable permits. Therefore, development of the proposed CT/CC site and use of the laydown areas would be consistent with E.O. 11990.

Construction activities associated with installation of the gas pipeline would temporarily impact approximately 5.9 ac of wetlands. It is estimated that approximately 2.0 ac of wetlands would be located within the permanent pipeline ROW of 50 ft. Pipeline construction methods, including directional boring, use of BMPs, and restoration of topography within the gas line ROW will minimize these impacts. However, because the pipeline would be installed with a minimum cover of 3 ft, wetlands within the permanent pipeline ROW would continue to perform wetland functions. Therefore, no permanent losses to wetlands are expected to result from pipeline construction. Accordingly, construction of the natural gas pipeline would be consistent with E.O. 11990.

Effects of wetland impacts (5.9 ac of temporary wetland impacts associated with the gas pipeline construction; 2.0 ac of wetlands within permanent pipeline ROW) would be negligible when viewed at the watershed/ecoregion level, impacting less than 0.01 percent of wetlands within the region (TDEC 2005).

3.11 Floodplains

3.11.1 Affected Environment

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a 1-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. Floodplains within the project area are shown on Figure 3-2 and Appendix A.

The proposed CT/CC site, existing switchyard, laydown areas, and a portion of the 24 or 30-in underground gas pipeline would be located behind the Ensley Levee at Mississippi River Mile 725 in Shelby County, Tennessee. The Mississippi River 100-year flood elevation at this location is 225 ft above mean sea level (MSL); and the 500-year flood elevation is 230.5 ft MSL (Marsh 2011). As shown in Figure 3-2, the area behind the levee is protected from the Mississippi River 100-year flood. The top of the Ensley Levee ranges from 237 to 238 ft (Marsh 2011). The USACE has determined the 100-year flood level within the levee to be at elevation 204.0 with a coincidence high flood stage on the river, whereas the 500-year flood level within the levee has not been determined.

Based on a review of the topographic map of this area, the Horn Lake Cutoff and one unnamed tributary are the only streams within the levee.

The existing ground elevation of the proposed CT/CC facility and switchyard is at about elevation 215 ft MSL. The existing ground elevation of the proposed laydown areas is about elevation 210 ft MSL.

3.11.2 Environmental Consequences

As a federal agency, TVA is subject to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (United States Water Resources Council 1978). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. For certain "Critical Actions", the minimum floodplain of concern is the 500-year floodplain.

The Federal Emergency Management Agency defines "Critical Actions" as including those that create or extend the useful life of structures or facilities (including generating plants, and other principal points of utility lines, 44 CFR Chapter 1, Part 9.6) Therefore, the proposed CT/CC facility would qualify as a "Critical Action".

3.11.2.1 Alternative A – No Action

Under Alternative A, no permanent physical alteration or construction activities would occur to or near the existing flood control levee system. Therefore, there would be no impacts to floodplains because there would be no physical changes to the current conditions found within the local floodplains.

3.11.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Under Alternative B, ALF would be retired and a CT/CC facility would be constructed. Potential flooding of the CT/CC facility and TL could occur from two sources: the Mississippi River and on site runoff in the protected area behind the Ensley Levee. As stated in Section 3.11.1, the top of the Ensley Levee ranges from 237 to 238 ft MSL. Therefore, the CT/CC facility and TL would be located outside of the Mississippi River 100- and 500-year floodplains. The CT/CC facility and TL would be constructed on ground that is currently at elevation 215 MSL, which is above the “within levee” 100-year flood elevation, and presumed to be above the “within levee” 500-year flood elevation (see Section 3.12.1). Therefore, construction of the CT/CC facility and TL would be consistent with EO 11988 requirements for critical actions.

Two parcels of land just west of the proposed plant would be used for construction laydown areas. The laydown areas would be used only during construction of the CT/CC facility and TL. No long-term development would occur within the laydown areas. Potential flooding of the laydown areas could occur from the same two sources: the Mississippi River and on site runoff in the protected area behind the Ensley Levee. As stated in Section 3.11.1, the top of the Ensley Levee ranges from 237 to 238 ft MSL. Therefore, the laydown areas would be located outside of the Mississippi River 100-year floodplain. The laydown areas would be located on ground that is currently at elevation 210 ft MSL, which is above the “within levee” 100-year flood elevation. Therefore, use of the laydown areas would be consistent with EO 11988.

The ASCE states in its booklet *So You Live Behind a Levee!* that “no levee can guarantee protection from flooding. There is always the chance that a levee will fail and flooding will occur” (ASCE 2010). Should the levee fail, the CT/CC facility and laydown areas could be inundated by as much as 10 ft of water in a 100-year flood on the Mississippi River, and as much as 15.5 ft of water in a 500-year flood (Marsh 2011).

Drainage within the area protected by the levee generally flows northwest to southeast, following the topography. The proposed CT/CC site is located within the northern portion of the lands protected by the Ensley Levee. The topography in the northern portion of the levee-protected area is at about elevation 215, whereas the topography in the southern portion is at about elevation 205. The micro-watershed of the proposed CT/CC facility site is bounded on the north by ALF, the east by the Horn Lake Cutoff, and the west by the ALF transmission lines, where there is a local topographic ridge. Runoff in this micro-watershed flows southward, from ALF toward the proposed CC/CT facility. With the levee in place, only runoff from ALF would be expected to flow onto the proposed CT/CC facility site, but it would also flow to the southeast toward the levee pump station. Remaining interior drainage within the levee-protected area flows generally southeastward toward the pump station at the southeast corner of the levee.

In the unlikely event of a levee failure, the proposed CC/CT facility could be inundated by flood waters; however, the level of flooding at the plant would depend upon the severity of the flood event, the nature and location of the levee failure, measures taken by the plant to prevent flood waters from damaging equipment, and the ability of the levee pumps to evacuate water from levee-protected lands.

During the May 2011 flood on the Mississippi River, sand boils formed near the toe of the Ensley Levee seepage berm. Subsequently, the USACE began monitoring and, when needed, implements risk reduction measures to maintain the integrity of the Ensley Levee. Additionally, the USACE has begun the Ensley Levee Seepage Berm Repair Project (USACE, 2013), which will provide for long-term integrity of the levee.

Both the proposed gray water supply line and the proposed 24 or 30-in underground gas pipeline would cross several 100-year floodplains. Consistent with EO 11988, an underground pipeline is considered to be a repetitive action in the 100-year floodplain. No adverse floodplain impacts would be anticipated because the pipeline would be underground and the pipeline corridor would be returned to pre-construction conditions at the completion of the project.

3.12 Water Resources

3.12.1 Groundwater

3.12.1.1 Affected Environment

The study area resides within the Mississippi Alluvial Plain Subdivision of the Coastal Plain Physiographic Province, an area characterized by flat to gently rolling floodplain terrain bordered on the eastern side by steep loess bluffs. Structurally, the area lies near the center of the upper portion of the Mississippi Embayment, a broad southward-plunging syncline with its axis approximately aligned with the course of the Mississippi River. The syncline consists of several thousand feet of relatively unconsolidated cretaceous, tertiary, and quaternary age deposits of clay, silt, sand, gravel, chalk, and lignite. The principal aquifers of this sedimentary sequence include (in descending order), recent alluvium, the Memphis sand, and the Fort Pillow sand (TVA 2006a).

Exploratory drilling at ALF site and the Frank C. Pidgeon Industrial Park, located south of the plant, indicates the alluvial aquifer ranges from 100 to 136 ft in (TVA 2006a). The upper portion of the alluvial deposits generally consist of fine sand, silt, and clay; whereas, the basal portion is composed of coarser sand and gravel. Alluvial sediments typically occur in discontinuous lenses and layers and exhibit a high degree of heterogeneity. Recharge occurs primarily by surface infiltration of rainfall.

Well monitoring since 1988 indicates groundwater movement in the alluvial aquifer beneath the plant site is generally northward to McKellar Lake. Depth to groundwater generally ranges from 10 to 30 ft below ground surface and varies seasonally. Given the proximity of the proposed CT/CC site to the Mississippi River, shallow groundwater present beneath these areas would be expected to flow westward to the river. During flood conditions, hydraulic gradient reversals occasionally occur resulting in temporary recharge of the alluvial aquifer from adjacent surface water bodies. The alluvial aquifer typically provides water for domestic, irrigation, and industrial supplies in the Memphis area. However, there are no known water supply wells completed in the alluvial aquifer within at least 1 mi of the study area (TVA 2006a).

The alluvial aquifer is separated from the deeper Memphis sand aquifer by a clay aquitard associated with the Jackson and Upper Claiborne formations. Overall thickness of the Jackson clay varies from 0 to 360 ft regionally. Several deep borings completed at the ALF site encountered the Jackson aquitard at depths between 114 to 144 ft, although none fully penetrated the unit. Aquitard penetrations ranged from 4 to 40 ft and generally indicated the formation consists of silty clay with occasional thin lenses of silt, sand, lignite, and gravel (TVA 2006a).

The Memphis sand is a major regional aquifer and is the source of municipal water for the City of Memphis. The aquifer primarily consists of fine-to-coarse sand with isolated lenses of clay and silt. Thickness ranges from 500 to 900 ft regionally. Recharge occurs at the aquifer outcrop area in western Tennessee and, to a lesser extent, from influx of groundwater from overlying formations. Regional groundwater movement is generally westward toward the axis of the Mississippi Embayment. However, a large cone of depression has formed around the city due to withdrawals from numerous water supply wells completed in this aquifer in Memphis and neighboring areas of Shelby County. The Memphis sand is separated from the underlying Fort Pillow aquifer by 0 to 310 ft of clay, silt, and sand sediments of the Flour Island aquitard. The Fort Pillow aquifer is not widely used in the Memphis region because of the availability of shallower groundwater resources (TVA 2006).

3.12.1.2 Environmental Consequences

3.12.1.2.1 Alternative A – No Action

Under the No Action Alternative, ALF would continue to operate and no changes would occur to groundwater use or groundwater quality. Consequently, no significant impacts to groundwater resource are expected.

3.12.1.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Proposed CT/CC facility construction is expected to require excavation below the existing ground surface at a depth of approximately 10 to 12 ft to establish the facility sub-base and associated foundations. Additionally, shallow excavation is also expected to be required for proposed water supply line construction and TL construction. Because local groundwater levels are seasonally variable and may range from 10 to 30 ft below ground surface, it is possible that excavation activities will encounter the surficial aquifer. Under such conditions, dewatering activities will be used to control groundwater infiltration into the excavation site. Localized groundwater impacts associated with shallow excavation, dewatering and grading required for the construction of a the proposed CT/CC facility would therefore be expected. However, because such activities are localized, and generally limited to the construction phase, impacts from construction are expected to be minor and not significant.

The Frank C. Pidgeon Industrial Park area is served by the Davis Water Treatment Plant (DWTP) which draws groundwater from a regional aquifer. DWTP is one of the 10 major water plants within the Memphis area operated by MGLW. DWTP is rated at 30 MGD water treatment plant and is currently planned to be expanded within the next three years to 35 MGD. In addition to the expansion of the DWTP, MGLW plans to interconnect the Frank C. Pidgeon Industrial Park area with other distribution lines during an overall upgrade project in the next three years, according to MGLW (O. Johnson, personal communication, April 2014).

During construction activities, it is expected that there would be a temporary increase in the consumption of potable water. Based upon a workforce of 400 to 700 and an estimated potable water use of 50 gallons per day per shift (AWWA 1984), it is expected that potable water use would be approximately 0.020 to 0.035 MGD.

Based upon discussions with MLGW (O. Johnson, personal communication, April 2014), the proposed plant construction and operation would not impact the overall usage rate at the water treatment plant (i.e., current usage of 0.24 MGD at ALF, with estimated operational use at the CT/CC of 0.26 MGD) and would therefore, not represent a significant impact to potable water demand within Shelby County.

3.12.1.2.3 Natural Gas Pipeline

Two pipeline construction methods have been proposed for the construction of the MLGW pipeline to connect the existing pipeline to the proposed CT/CC facility. Both the cut-and-cover method and the directional boring methods involve excavation activities. Most of the pipeline is expected to be installed using cut and cover method that requires excavation between 7 to 9 ft below ground surface to maintain a minimum of 3 ft of cover (see Section 2.1.2). In some locations groundwater may be encountered that would require dewatering of the excavation area. The impact of the excavation dewatering would be localized and expected to be insignificant. Similarly, localized groundwater impacts may occur during directional drilling that would require management and dewatering activities. Such impacts are not expected to be significant as they are localized and short term (limited to the construction phase).

3.12.2 Surface Water

3.12.2.1 Affected Environment

3.12.2.1.1 McKellar Lake Local Area Hydrology

The project area, including plant area and gas pipeline route, are located within the Horn Lake Nonconnah Creek hydrologic unit. There are several water bodies and streams in the vicinity of ALF that are potentially affected indirectly by the proposed action (see Figure 3-2 and Appendix A). The Horn Lake Nonconnah Creek hydrologic unit has two primary discharges to the Mississippi River: McKellar Lake discharge and the discharge from Horn Lake/Horn Creek. The project area is located entirely within the Nonconnah Creek/McKellar Lake surface water system.

McKellar Lake was created around 1950 when the Tennessee Chute (the Mississippi River side channel flowing around the eastern side of Presidents Island) was blocked by an earthen embankment at the upstream end (Lauderdale 2011). The embankment supports Jack Carley Causeway which provides access to the industrial area developed on the island. A separate smaller island, Treasure Island, is located within McKellar Lake. McKellar Lake is 6.6 mi long, 1,550 ac water body (excluding Treasure Island).

The hydrology and hydrodynamics of McKellar Lake are topics of interest because the ALF cooling water system influences flow within McKellar Lake. The hydrodynamics of McKellar Lake are important for water quality conditions in the lake as it controls mixing and flushing. The hydrodynamic conditions are complex, however, being influenced by watershed runoff inflow, river stage changes, and cooling water withdrawal. River stage changes, and therefore McKellar Lake stages, span a range of greater than 50 ft from low stage to flood stage.

Two local watersheds flow into McKellar Lake from the east and southeast. Nonconnah Creek has a drainage area of approximately 180 square miles (mi^2), including a large portion of southern Memphis. Portions of the Nonconnah Creek watershed are located in Mississippi. Cypress Creek, with a drainage area of roughly 15 mi^2, is located adjacent to and west of the Nonconnah Creek watershed. Both streams drain into the upstream half of McKellar Lake (see Figure 3-2).

Nonconnah Creek, Cypress Creek, and the historic Mississippi River floodplain area west of Cypress Creek, including the ALF area and Frank C. Pidgeon Industrial Park, are combined to form the “Horn Lake-Nonconnah Creek” hydrologic unit.

The area to the west of the Cypress Creek watershed and south of McKellar Lake is former Mississippi River floodplain that drains southerly to Horn Lake. The area has low relief and numerous low ridges and drainages left from historic flood overflows of the area, typical of historic Mississippi River floodplain area. This area encompasses approximately 85 mi^2.

3.12.2.1.2 Surface Water Quality

There are water quality concerns in many of the stream segments in the Horn Lake-Nonconnah watershed. Fish consumption advisories have been issued for the first 1.8 mi of Nonconnah Creek upstream from McKellar Lake with chlordane and other organics listed as the pollutants, or cause (Denton et al. 2012). Nonconnah Creek Basin (HUC 08010211) includes 22 separate water body segments and is on the TDEC 303d list of impaired waters (January 2012).

Sources of pollution for the waterbodies within the area listed by TDEC are summarized in Table 3-12. For the Horn Lake cutoff drainage, TDEC identified the following causes for non-support and the TMDL priority (in parentheses) associated with each cause:

- low dissolved oxygen (low),
- total phosphorus (medium)
- loss of biological integrity due to siltation (low)
- arsenic (high)
- Escherichia coli (NA).

A draft TMDL for arsenic in the Nonconnah Creek watershed has been released by TDEC (January 2014). Additionally, there is a TMDL for organic enrichment/low dissolved oxygen for the portion of Nonconnah Creek in Mississippi (Mississippi Department of Environmental Quality 2006).

Table 3-12. Representative Pollutant Sources Within ALF Project Area

Cause	Source
McKellar Lake Pollutant Sources[1]	
Polychlorinated biphenyls	Contaminated sediments
Escherichia coli	Discharges from municipal separate storm sewer systems (MS4)
Mercury	Source unknown
Dioxin (including 2,3,7,8-TCDD)	Contaminated sediments
Escherichia coli	Sanitary sewer overflows (collection system failures)
Oxygen, Dissolved	Discharges from municipal separate storm sewer systems (MS4)
Nitrate/Nitrite (Nitrite + Nitrate as N)	Discharges from municipal separate storm sewer systems (MS4)
Sedimentation/siltation	Dredging (e.g., for navigation channels)
Oxygen, dissolved	Sanitary sewer overflows (collection system failures)
Sedimentation/siltation	Discharges from municipal separate storm sewer systems (MS4)
Chlordane	Contaminated sediments
Mississippi River Pollutant Sources[2]	
Chlordane	Contaminated sediments
Polychlorinated biphenyls	Sources outside state jurisdiction or borders
Mercury	Atmospheric deposition - toxics
Chlordane	Sources outside state jurisdiction or borders
Physical substrate habitat alterations	Dredging (e.g., for navigation channels)
Polychlorinated biphenyls	Contaminated sediments
Dioxin (including 2,3,7,8-TCDD)	Contaminated sediments
Dioxin (including 2,3,7,8-TCDD)	Sources outside state jurisdiction or borders
Horn Lake Cutoff Pollutant Sources[3]	
Arsenic	Discharges from municipal separate storm sewer systems (MS4)
Sedimentation/siltation	Discharges from municipal separate storm sewer systems (MS4)
Oxygen, dissolved	Discharges from municipal separate storm sewer systems (MS4)
Phosphorus (Total)	Discharges from Municipal Separate Storm Sewer Systems (MS4)
Escherichia coli	Discharges from municipal separate storm sewer systems (MS4)

Sources: TDEC, 2014: [1]WB ID: TN08010100001_1100, [2]WB ID: TN08010100001_1000, [3]WB ID: TN08010211001_0100

3.12.2.1.3 Existing Characteristics of ALF Surface Water Use

ALF Cooling Water

McKellar Lake is the source water body used to draw ALF's once-through cooling water, where coal barges pass and unload, and where plant area storm water and excess water from the east ash pond discharges. Cooling water is discharged into the Mississippi River through an approximately 4,400-ft long canal located west of the plant. The outfall at the Mississippi River is located approximately 4,000 ft downstream from the McKellar Lake outlet to the river.

McKellar Lake receives inflow from the Nonconnah and Cypress Creek watersheds, which totals approximately 200 mi^2. The runoff from this watershed was estimated from the USGS streamflow station 07032200, Nonconnah Creek near Germantown, Tennessee, which has a continuous stream record of approximately 42 years spanning from 1970 through 2013. Selected statistics characterizing the monthly average flows are provided in Table 3-13.

Table 3-13. McKellar Lake Runoff Inflow

Month	Monthly Average Runoff (Cubic Feet Per Second)					
	Nonconnah Creek Near Germantown			McKellar Lake Watershed (200 mi^2)		
	1.0 (Max)	0.5 (Med)	0.0 (Min)	1.0 (Max)	0.5 (Med)	0.0 (Min)
Jan	531	124	0	1,541	359	1
Feb	604	135	15	1,755	392	42
March	659	155	9	1,912	450	25
April	834	119	8	2,420	347	22
May	526	77	3	1,526	223	9
June	300	29	3	871	84	9
July	354	27	1	1,029	79	2
Aug	101	12	0	292	35	1
Sept	232	12	0	672	34	0
Oct	429	12	0	1,246	35	0
Nov	418	50	0	1,214	145	1
Dec	616	109	2	1,789	315	7

Heat loading to receiving surface waters from ALF is a function of the combined flow rate and increase in temperature of the cooling water from intake to discharge. Based on ALF cooling water system records for the most recent 10 years, the monthly average flow rates vary from approximately 365 MGD for December to approximately 561 MGD for July. The thermal loading also varies, but is less variable than the flow rates.

3.12.2.1.4 Storm Water

Most of the existing surface water drainage at ALF is north into McKellar Lake. To the south of ALF, however, drainage is southerly into the Horn Lake Cutoff channel. The Horn Lake Cutoff channel is a constructed channel that drains the interior area protected by the Ensley levee system, including the interior portions of Frank C. Pidgeon Industrial Park and the proposed CT/CC facility area. A pumping station located at the southern end of the channel pumps excess water into Horn Lake when lake levels are too high and prevent gravity drainage.

3.12.2.1.5 Wastewater

Sanitary waste water from ALF is discharged to the City of Memphis Maxson WWTP located immediately west of ALF. CCRs are conveyed by slurry pipeline to the east ash pond. Excess water from the east ash pond flows into McKellar Lake. The discharge, as well as the cooling water and storm water discharges, is regulated by an NPDES permit issued by TDEC.

3.12.2.2 Environmental Consequences

3.12.2.2.1 Alternative A – No Action

For the No Action Alternative, cooling water would continue to be withdrawn from McKellar Lake and discharged to the Mississippi River. Coal barge deliveries (12 barges per week), and associated unloading activities would continue to occur within McKellar Lake. The ALF plant storm water discharges to McKellar Lake would also continue. This would include discharge of excess water from the east ash pond, a facility used for management of coal ash and other CCR. Therefore, ongoing minor impacts related to surface water circulation patterns and water quality within McKellar Lake and thermal discharge to the Mississippi River would continue.

3.12.2.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

<u>Proposed CT/CC Facility</u>

Construction of the proposed CT/CC facility would not result in any direct impacts to surface water resources because no surface water features occur on the project site. However, operation of the proposed CT/CC facility and the discontinuation of operation of ALF have some potential indirect impacts to surface water resources as described below.

McKellar Lake

Under this alternative, the ALF once-through cooling water system would cease to operate, resulting in the elimination of fish impingement and entrainment at the cooling water intake structure, as well as the thermal discharge to the Mississippi River. In addition, changes in wastewater discharge from ALF would include the initial elimination of sluice water and other process water discharges to the ash pond and the eventual elimination of discharges from the east ash pond to McKellar Lake.

The ALF cooling water system currently exerts an artificial hydrodynamic effect on McKellar Lake that is caused by the withdrawal of water by ALF from McKellar Lake and its resultant discharge to the Mississippi River. The hydrodynamic conditions are complex, and are influenced by watershed runoff inflow and river stage changes. During low runoff periods and stable river levels, ALF water withdrawal causes water inflow from the river, causing the portion of the lake upstream of ALF to be hydraulically isolated, resulting in a longer residence time than would exist without the ALF withdrawal. This artificial circulation pattern is overcome, during periods of high runoff inflow to the lake and/or when falling river stage causes outflow to occur, and flow direction in the 2-mi long channel from ALF to the river is reversed. River stage increases and subsequent declines also contribute to flushing of the lake. Consequently, the circulation pattern in McKellar Lake is complex, and upstream portions of the lake may at times benefit from cessation of ALF cooling water withdrawal as a result of increased flushing while other areas may experience lower flushing as a result of no ALF withdrawal. Impacts on McKellar Lake are overall not considered to be significant.

ALF receives six barges of coal two times each day. The barge unloading operations are continuous activities on regular work days. Elimination of coal delivery would discontinue these operations and incrementally reduce the turbulence due to prop scouring and associated sedimentation associated with barge operations that serve ALF. While this may be considered to be an incremental benefit to the water quality of McKellar Lake, continued barge operations associated with port activities would continue.

Mississippi River
Thermal discharge to the Mississippi River would be eliminated by the use of a cooling tower and conveyance of cooling tower blow-down to the Maxson WWTP. The existing thermal discharge has been permitted as part of the ALF NPDES permit and therefore, has been demonstrated to be non-impactful of maintaining water quality and a balanced indigenous biological community within the Mississippi River. However, discontinuation of the thermal discharge from ALF is expected to result in an incremental beneficial, albeit non-significant, impact to water quality of the Mississippi River.

Storm water
The proposed plant would be designed, constructed, and maintained with appropriate best management practices to minimize impacts of construction and post-construction runoff. A range of complimentary structural and non-structural practices will be implemented. It is anticipated that the facilities would include a storm water retention pond, minimization of impervious area, and use of BMPs.

Runoff from the proposed plant area would be conveyed to the interior drainage system associated with the Ensley Levee and pumping station. The overall interior drainage area is part of the Frank C. Pidgeon Industrial Park and the drainage system would be constructed to meet requirements for runoff based on development of the interior drainage area. Because TVA would integrate a storm water retention pond and other appropriate BMPs, impacts from storm water runoff are not considered to be significant.

Sanitary Wastewater
During the construction phase, sanitary sewage would be collected in temporary toilet facilities, trucked to a suitable and permitted sewage disposal facility, and/or sent to the existing Maxson WWTP for treatment.

During operations, TVA would use gray water from the Maxson WWTP for approximately 80 percent of the total water needs of the proposed plant. The remaining 20 percent would be potable water supplied by MLGW. A CC plant would require between 5 and 10 MGD of gray water. After use, TVA would return approximately 10 to 40 percent of the CC intake water (properly treated) back to the WWTP. According to the City of Memphis Department of Public Works (City of Memphis 2014b), the Maxson WWTP has the following characteristics related to treatment capacity:

Total Rated Treatment Capacity = 90 MGD
Average Daily Demand = 70 MGD
Peak Demand = 160 MGD
Minimum Daily Flow = 50 MGD

The Maxson WWTP has a treatment process currently that consists of coarse bar screens, grit removal, fine bar screens and primary treatment followed by high rate trickling filters, conventional activated sludge, and secondary clarification. Blow-down from the cooling tower, and other process wastewater from the proposed CT/CC facility would be discharged to the Maxson WWTP after receiving pre-treatment in accordance with City of Memphis requirements. Process wastewaters discharged to the Maxson WWTP would include blow down from the cooling tower and HRSGs. According to the representatives of the Department of Public Works, the treatment plant has been planned for expansion and has sufficient capacity to meet the needs of the proposed CT/CC facility. Therefore, proposed plant operation on existing sanitary treatment systems is not expected to result in significant impacts to surface water resources or water quality.

Natural Gas Pipeline

A new 24- or 30-in diameter gas pipeline is proposed to be constructed by MLGW that would extend approximately 13 mi and cross 15 separate water bodies as identified from USGS topographic maps and aerial images (summarized in Table 3-14 and illustrated in Appendix A). The largest of the water bodies to be crossed by the proposed gas pipeline are Robco Lake (an approximate total of 1,550 linear ft in length) and Horn Lake Cutoff (approximately 120-ft wide channel). The pipeline crossings will be installed by either open-cut trenching (smaller streams) or horizontal directional boring (Horn Lake Cutoff and Robco Lake).

Table 3-14. List of Water Bodies Crossed by the Proposed Gas Pipeline

Resource	Type	Location	Method
Unnamed tributary to Horn Lake Cutoff	Intermittent stream	Drainage ditch to Horn Lake Cutoff	Trench
Horn Lake Cutoff	Intermittent stream	Horn Lake Cutoff	Bore
Unnamed tributary to tributary to Horn Lake Creek	Intermittent stream	West of West Shelby Drive	Trench
Unnamed tributary to Horn Lake Creek	Intermittent stream	North side of railroad	Trench
Robco Lake	Lake	Robco Lake	Bore
Horn Lake Creek	Perennial stream	Horn Lake Creek south of Cessna Road	Bore
Unnamed tributary to Horn Lake Creek	Intermittent stream	East of Weaver/south of Ruby Cr Road	Trench
Unnamed tributary to Horn Lake Creek	Intermittent stream	Southwest of Nicolette Drive cul-de-sac	Trench
Unnamed tributary to Horn Lake Creek	Intermittent stream	Southeast of Nicolette Drive cul-de-sac	Trench
Unnamed tributary to unnamed tributary to Horn Lake Creek	Intermittent stream	East of Horn Lake Road (flows north)	Trench
Unnamed tributary to Horn Lake Creek	Intermittent stream	East of new road	Trench
Unnamed artificial pond on unnamed tributary to Horn Lake Creek	Pond (artificial)	Pond west of Tulane Road	Bore
Unnamed tributary to unnamed tributary to Horn Lake Creek	ephemeral stream	West of Route 3 (not a blue line stream; only one of these crossings that is not blue line stream)	Trench

Resource	Type	Location	Method
Unnamed tributary to unnamed tributary to Horn Lake Creek	Intermittent stream	West of Route 3 (blue on USGS, but not continuous downstream)	Trench
Unnamed tributary to unnamed tributary to Days Creek	Intermittent stream	West of Mill Branch Road (large concrete lined ditch, flows north)	Bore

BMPs will be utilized during pipeline construction. Stream crossings using open-cut trenching would be constructed during low flow periods and the duration of disturbance will be minimized. Erosion controls would be used to minimize sediment generation and sediment controls will be implemented to minimize sediment discharge from the construction area. Activities would be conducted with awareness of the stream/watershed conditions with sediment impacts contributing to non-support of intended use of waters. Stream channels would be restored to conditions that are stable and consistent with existing conditions.

Hydrostatic testing is the last step in pipeline construction. This consists of running water, at pressures higher than will be needed for natural gas transportation, through the entire length of the pipe to ensure that the pipeline is strong enough, and absent of any leaks or fissures. The pipeline would be pressure tested in accordance with MLGW requirements to ensure its integrity for the intended service and operating pressures. The water would normally be obtained from water sources crossed by the pipeline, including streams and available municipal supply lines.

In order to ensure the efficient and safe operation of the gas pipelines, MLGW would inspect the pipelines for corrosion and defects. This is done through the use of sophisticated pieces of equipment known as pigs. Pigs are robotic devices that are propelled down pipelines to evaluate the interior of the pipe. Pigs are used to test pipe thickness, and roundness, check for signs of corrosion, detect minute leaks, and any other defect along the interior of the pipeline that may either impede the flow of gas, or pose a potential safety risk for the operation of the pipeline. Additional “drying” pig runs would be made, if necessary, to remove any residual water from the pipeline. Discharge of hydrostatic test water following hydrostatic testing would be conducted in compliance with all applicable state and federal regulations.

Temporary Water Intake and Discharge

Typical temporary water intake and discharge procedures include the following:

- Pumps used for hydrostatic testing within 100 ft of any water body or wetland will be operated and refueled in accordance with MLGW’s Spill Prevention Control and Countermeasure Plan.
- The intake hose will be screened to prevent entrainment of fish and other aquatic life.
- Ambient, downstream flow rates will be maintained to protect aquatic life, provide for all water body uses, and provide for downstream withdrawals of water by existing users.

- Hydrostatic test manifolds will be located outside wetlands and riparian areas to the greatest extent practical.
- Overland discharges of test water will be dewatered into an energy dissipation device constructed of straw bales.
- Dewatering structures will be located in well-vegetated and stabilized areas, if practical, and an attempt will be made to maintain at least a 50-ft vegetated buffer from adjacent water body/wetland areas. If an adequate buffer is not available, sediment barriers or a similar erosion control measure will be installed.
- Discharge rate will be regulated, energy dissipation device(s) will be used, and sediment barriers will be installed, as necessary, to prevent erosion, streambed scour to aquatic resources, suspension of sediments, and flooding or excessive stream flow.

Impacts associated operation of the gas pipeline are limited to periodic inspections and maintenance work along the pipeline including mowing and erosion control. The pipeline would be located in an existing ROW for existing pipeline and overhead TL resulting in no significant additional impacts of operation.

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). Natural areas and parks located within the area around ALF and the proposed gas pipeline route are listed in Table 3-15.

Review of the TVA Natural Heritage database indicates that no natural areas are present within the proposed CT/CC site, laydown areas, or WWTP site. T.O. Fuller State Park and the Chucalissa Archaeological Site are located within 0.5 mi of ALF. T.O. Fuller State Park consists of 1,138 ac of forest, including floodplains, wetlands and 6 mi of hiking trails. Recreation facilities at the park include a picnic area, campground, swimming pool, and tennis courts. The Chucalissa Archaeological Site is located within the boundaries of the state park, and includes a Native American village, preserved archaeological excavations and a modern museum (TDEC 2014).

No natural areas or parks are intersected by the proposed pipeline route. The pipeline route crosses the upper end of Robco Lake. The crossing is also immediately adjacent to a boat launching ramp and parking area on the right descending bank of the lake.

Table 3-15. Parks and Natural Areas Within 5 Miles of Project Area

Park Name	Managing Agency
Chickasaw Heritage Park	City of Memphis
Dalstrom Park	City of Memphis
Ensley Bottoms Complex	Tennessee Wildlife Resources Agency
Falcon Park	City of Memphis
Geeter Park	City of Memphis
Lanier Park	City of Memphis
Martin Luther King Riverside Park	City of Memphis
McKellar Park	City of Memphis
Otis Redding Park	City of Memphis
Presidents Island Wildlife Management Area	Tennessee Wildlife Resources Agency
Redbud Park	City of Memphis
Riverside City Park	City of Memphis
Roosevelt Park	City of Memphis
T.O. Fuller State Park	State of Tennessee
Walker Park	City of Memphis
Walter Chandler Park	City of Memphis
Weaver Park	City of Memphis
Western Park	City of Memphis
Westwood Park	City of Memphis
Whitehaven Lane Park	City of Memphis
Will Caruthers Ball Complex	City of Memphis
Zodiac Park	City of Memphis

Source: City of Memphis, Tennessee, 2014

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action

Under the No Action Alternative, the proposed project would not be constructed. No impacts to natural areas or parks would be anticipated should the No Action alternative be selected.

3.13.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.13.2.2.1 Proposed CT/CC Facility

No significant, direct impacts to natural areas or parks are anticipated should the action alternative be adopted as there are no natural areas or parks within the proposed construction areas. Additionally, the parks and natural areas listed in Table 3-15 are located greater than 0.5 mi away from the proposed project site, which would be a sufficient distance to avoid impacts. Therefore, no direct or indirect impacts are anticipated.

3.13.2.2.2 Natural Gas Pipeline

The boat launch ramp on Robco Lake is immediately adjacent to the gas pipeline ROW and installation of this section of the line could impact ramp and lake users. Assuming the bore construction method of installation would be used at this location, any impacts to users would be temporary and minor.

3.14 Cultural and Historic Resources

3.14.1 Affected Environment

Federal agencies are required by the National Historic Preservation Act and by NEPA to consider the possible effects of their proposed actions (“undertakings”) on historic properties (generally, “cultural resources”). 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 (NRHP) maintained by the National Park Service are called *historic properties*. To be included or considered eligible for inclusion in the NRHP, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association. It must also be associated with important historical events; or associated with the lives of significant historic persons; or embody distinctive characteristics of a type, period, or method of construction or represent the work of a master, or have high artistic value; or yield information important in history or prehistory.

TVA defined two Areas of Potential Effects (APE) for the proposed CC/CT facility and gas pipeline: one for below ground resources (archaeological sites) and another for above ground resources (historic architectural resources or archaeological features that are raised above the natural ground surface). The archaeological APE is defined as the area within the proposed plant boundary, Laydown Areas 1 and 2, the proposed transmission line, the gray water line proposed to be extended from the Maxson WWTP and the proposed gas pipeline, as these are the areas within which ground disturbance may occur under Alternative B. The architectural APE is defined as a one-half mi radius surrounding the proposed CT/CC facility footprint, as this is the area within which indirect effects could occur to above ground resources.

3.14.1.1 Previous Studies

Several archaeological investigations have been carried out within the vicinity of the APE (Table 3-16). The late Mississippian period (AD 1400-1500) mound and village site of Chucalissa is located above Fourth Chickasaw Bluff, within T.O. Fuller State Park approximately 0.6 mi east of the project area. The site is listed in the NRHP and is also listed as a National Historic Landmark. Extensive archaeological investigations have been undertaken at the site (Bundy 2000; Ezell et al. 1997; Lumb and McNutt 1988). The University of Memphis conducted an archaeological field school at Chucalissa (Shlosko 2002), documenting an historic sharecropper site (40SY607). In 1996, Garrow and Associates conducted a Phase I archaeological survey for two tracts totaling approximately 570 ac; one of these tracts was located on Presidents Island, northeast of the APE at the mouth of Tennessee Chute, and the other was located in the Ensley Bottoms area, partially adjacent to Laydown Area 2 (Starr 1996). No archaeological resources were identified.

Markham et al (2000) conducted a cultural resources survey of a proposed 6-mi pipeline crossing Presidents Island and Treasure Island, ending at an oil refinery. The survey identified one previously recorded NRHP-ineligible prehistoric site (40SY638) and an NRHP-ineligible above ground structure. In 2004, Panamerican Consultants Inc. conducted deep archaeological testing (backhoe trenches) at six locations within an APE for a proposed Canadian National Railroad terminal, 0.7 mi west of a portion of the pipeline route (Albertson 2004a). The study identified no buried archaeological deposits. In that same year, Smith (2004) conducted a Phase I archaeology survey of an approximately

70-ac area south of Holmes Road and approximately 0.1 mi north of the pipeline route. The survey identified no archaeological sites, and showed that a large portion of the APE was disturbed previously by bulldozer.

Table 3-16. Previous Cultural Resource Studies Within 0.5-Mi of the APE

Author(s)	Year	Study Area	Resource(s)
Bundy	2000	Chucalissa	Chucalissa
Lumb and McNutt	1988	Chucalissa	Chucalissa
Starr	1996	Ensley Bottoms	None
Ezell et al.	1997	T.O. Fuller State Park	Chucalissa
Shlosko	2002	T.O. Fuller State Park	40SY607
Markham et al.	2000	Pipeline; Presidents Island, Treasure Island	40SY638 and one historic structure
Albertson	2004a	Canadian National Railroad Terminal	None
Smith	2004	Holmes Road near Highway 61 Subdivision	None

Four archaeological surveys and one Phase II testing investigation have been carried out in areas that lie within or partially within the APE (Table 3-17). As part of a survey of three tracts being considered by TVA as coproduction plant sites, the Department of Anthropology, Memphis State University surveyed an approximately 314-ac area that included a small part of Laydown Area 2 (Smith 1993). The study identified three low-density historic artifact scatters (40SY529, 40SY530, and 40SY531), all of which were recommended ineligible for the NRHP and all of which are outside the APE. Garrow and Associates performed a cultural resources survey of the Frank C. Pidgeon Industrial Park (Starr 1994), an area of over 3,600 ac that includes the entire archaeological APE corresponding to the CC/CT facility footprint and Laydown Areas 1 and 2. The survey identified 20 archaeological sites, including one (40SY566) that is partially within Laydown Area 2 and one (40SY554) within the proposed CT/CC facility boundary. Three of the identified sites were recommended for additional archaeological investigations, including 40SY563 and 40SY566. Panamerican Consultants Inc. (Albertson 2004b) later carried out Phase II testing at both of these sites. They found little archaeological material at 40SY566 (Ensley Plantation) and recommended that site ineligible for NRHP listing. Site 40SY563 yielded abundant prehistoric remains and was recommended eligible both for its significance as a Mississippian site that may be associated with Chucalissa and for its potential to contain the remnants of a 19th century church and cemetery. That site is located outside the APE. Weaver & Associates (Walker and Weaver 1999) conducted an archaeological survey for a proposed 1-mi, 100-ft wide biogas pipeline corridor and a 7-ac tract of land associated with ALF. The APE for that survey, located near the railroad south of ALF's tailings pond, is within approximately 0.1 mi of the proposed CT/CC facility and within less than 300 ft of the existing natural gas pipeline. No cultural resources were identified. In January 2012 TRC Environmental Corporation (TRC) conducted an archaeological reconnaissance survey of a 300-ac tract associated with the then-proposed ALF ash management expansion area (Hockersmith 2012). The western portion of the tract falls within Laydown Area 1. TRC's survey recorded no archaeological resources.

Table 3-17. Previous Cultural Resources Studies Within or Intersecting the APE

Author(s)	Year	Study Area	Resource(s)
Smith	1993	Frank C. Pidgeon tract (TVA co-production plant site)	40SY529, 40SY530, and 40SY531
Starr	1994	Frank C. Pidgeon Industrial Park	20 sites including 40SY554 and 40SY566
Albertson	2004b	Phase II of 40SY563 and 40SY566	40SY566
Walker and Weaver	1999	Biogas pipeline and 7-ac tract associated with ALF	None
Hockersmith	2012	ALF ash management area	None

3.14.1.2 Current Study

TVA recently completed a Phase I cultural resources survey of the APE. The study, carried out by Tennessee Valley Archaeological Research (TVAR), included an archaeological survey of the archaeological APE, an architectural survey of the architectural APE, an architectural assessment of ALF, and an evaluation of the undertaking's possible effects on 40SY1 (Chucalissa). The study identified four previously unrecorded archaeological sites (40SY750-40SY753) and fourteen isolated finds. The report authors recommend that sites 40SY750 and 40SY751 and the fourteen isolated finds are ineligible for the NRHP due to a lack of research potential, and TVA agrees. Based on the results of their investigation, TVAR recommends that sites 40SY752 and 40SY753 may have potential to yield significant data related to questions about mid-nineteenth to early-twentieth century rural life in Shelby County, Tennessee. However, the data generated by the Phase I survey is insufficient to make a determination of eligibility, and TVA considers these sites to be of undetermined eligibility for the NRHP. TVAR's study also investigated previously recorded sites 40SY554 and 40SY566. TVAR recommends that 40SY554 is no longer extant, having been destroyed by modern ground disturbing activities. TVAR recommends that the portion of 40SY566 that extends into the APE is ineligible for listing in the NRHP. The architectural survey identified no historic architectural resources listed or eligible for listing in the NRHP. TVAR recommends that 40SY1 (Chucalissa) continues to possess the characteristics that make the site eligible as a National Register property and as a National Historic Landmark. TVAR also recommends that ALF is ineligible for listing in the NRHP due to a lack of architectural distinction and to loss of integrity due to extensive modern alterations. TVA agrees with these recommendations. TVA has consulted with the TN SHPO regarding these findings and determinations, and the SHPO has indicated that they concur with the finding that the project will not adversely affect any property that is eligible for listing to the NRHP.

3.14.1.3 Existing Resources

Based on the previous and current investigations in the APE, two archaeological sites that could be eligible for listing in the NRHP have been identified within the APE: 40SY752 and 40SY753. Both sites may have research potential but the current study did not provide the type of data that would be needed for a full determination of eligibility. No historic architectural properties have been identified within the architectural APE. One National Historic Landmark (40SY1/Chucalissa) is located within the architectural APE.

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – No Action

There would be no impacts to historic properties under Alternative A because this alternative does not include ground disturbing activities or changes in the visual character of the APE.

3.14.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

No direct impacts to known NRHP-listed or eligible sites would occur from the construction of either the proposed CT/CC facility or the natural gas pipeline. However, Alternative B has potential to cause impacts to archaeological sites 40SY752 and 40SY753. Direct project effects could consist of compaction and loss of deposits, features, and artifacts due to ground disturbance from trench excavation related to gas pipeline construction. Indirect long-term effects could consist of erosion caused by changes to the surrounding landscape. In order to avoid and minimize impacts to these archaeological sites, TVA will ensure that the proposed pipeline route is either shifted to avoid identified sties (including appropriate buffer zones) or by using directional boring to install the pipeline below the site deposits.

Indirect impacts to the integrity of setting to Chucalissa (Site 40SY1) are anticipated to be minimal under Alternative B. Alternative B is not expected to alter the existing visual setting presently found at Site 40SY1. A visual assessment conducted at Site 40SY1 determined that Site 40SY1 is visually buffered from the commercial development that is occurring west of the site by dense foliage. Staff of T.O. Fuller State Park indicated that visible impacts from on-going commercial development have not been an issue at the site. Presently, the only commercial/industrial features visible from the site (looking to the west) are the ALF stacks, which are 400 ft tall. Although not visible from most areas within 40YS1, the stacks can be seen from the top of the platform mound and from the plaza, through small gaps in the bordering vegetation. A wooded buffer zone prevents the ALF stacks from being visible from other locations at the site. Because the maximum height of the proposed CT/CC facility is approximately 200 ft lower in height than the existing ALF stacks, it is expected that they would not be visible from the Chucalissa site under most circumstances. Although the proposed plant associated with Alternative B may at times (e.g., winter) be visible from this same location, it would not alter the existing visual setting as presently found from atop the platform mound. The NRHP and NHL forms identify the archaeological deposits at Site 40SY1 as the thematic framework for listing as a National Register property and as a National Historic Landmark. Alternative B would not have an adverse effect on the archaeological deposits at the site. As a result, Alternative B will not have an adverse impact to the qualities that make Site 40SY1 a National Register property or a National Register Landmark. In summary, because previously identified sites within the APE are considered ineligible for listing in the NRHP, and given TVA's planned avoidance measures for sites 40SY752 and 40SY753, and because the proposed CT/CC facility would not adversely affect the listing criteria for Site 40SY1, no adverse effects to historic properties would occur with this alternative.

3.15 Visual Resources

3.15.1 Affected Environment

3.15.1.1 Proposed CT/CC Facility

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

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on a number of factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent on where and how it is viewed.

Scenic visibility of a landscape may be described in terms of three distance contexts: foreground, middleground, and background. In the foreground, an area within 0.5 mi of the observer, individual details of specific objects are important and easily distinguished. In the middleground, from 0.5 to 4 mi from the observer, object characteristics are distinguishable but their details are weak and they tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment the background is measured as 4 to 10 mi from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the proposed 73.3-ac facility site, associated near off site temporary use areas, and the areas that would be impacted by the gas pipeline construction activities as well as the physical and biological features of the landscape. The existing ALF facility is located in an industrial region on the south end of Memphis. The surrounding topography ranges from gently sloping near the banks of the Mississippi River and McKellar Lake to moderately sloping ranges at T.O. Fuller State Park to the east. Industrial activities including Nucor Steel, Electrolux and the Maxson WWTP, CN/CSX Intermodal facility, ALF, and the City of Memphis Earth Complex are visible to the south of the proposed facility as part of the Frank C. Pidgeon Industrial Park. Forested areas within T.O. Fuller State Park are visible to the east and southeast. To the north of the proposed plant, across McKellar Lake, is a mix of undeveloped land and industrial developments associated with the Port of Memphis.

The existing ALF stacks, as well as the existing transmission lines leaving the plant site, are the dominant elements in the landscape that are visible to motorists on nearby roadways within the foreground and middleground. The overall viewscape around the project area is dominated by other industrial facilities located between grass fields with some small patches of trees.

Based on the above characteristics, the scenic attractiveness of the affected environment is considered to be minimal to common, whereas the scenic integrity is considered to be low (Table 3-18).

Table 3-18. Visual Assessment Ratings for Existing Affected Environment

View Distance	Existing Landscape	
	Scenic Attractiveness	Scenic Integrity
Foreground	Minimal	Low
Middleground	Common	Low
Background	Common	Low

The rating for scenic attractiveness is due to the ordinary or common visual quality. The forms, colors, and textures in the affected environment are normally seen through the characteristic landscape; therefore do not have distinctive quality. However, there is little change in the characteristics of these features, resulting in a low visual quality. The scenic integrity has been lowered by human alteration such as ALF, the Nucor Steel facility, Electrolux, transmission lines, the City of Memphis Earth Complex and roads within Frank C. Pidgeon Industrial Park. However, in the background these alterations are not substantive enough to dominate the view of the landscape. Based on the criteria used for this analysis, the overall scenic value class for the affected environment is considered to be fair.

3.15.1.2 Natural Gas Pipeline

The proposed gas pipeline route would be located adjacent to and within the ROW of an existing MLGW utility corridor containing a pipeline and associated TL. The visual assessment ratings for the lands crossed by the proposed gas pipeline are similar to those for the proposed facility as it would cross through a mix of industrial, residential, and rural landscapes. As an existing utility corridor, the proposed pipeline route is maintained in an herbaceous condition within the entire ROW.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action

Under Alternative A, no new facility would be constructed, resulting in no changes to the existing environment. Landscape character and integrity would remain in its current state; therefore, there would be no impact to aesthetics and visual resources.

3.15.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.15.2.2.1 Proposed CT/CC Facility

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

During the construction phase of the proposed facility, there would be additional visual discord 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 increase in visual discord would be temporary and only last until all activities have been completed by TVA.

The new facility would be mainly seen by employees and visitors to the various industrial park facilities. The tallest feature on the new CT/CC facility (emissions stack) would be less than 200 ft high and would be notably shorter than the existing stacks at ALF (400 ft). The proposed facility would have some limited visibility in the foreground and middleground by nearby residents and motorists along local roads. However, because of the screening effect of terrain associated with the forested bluff line, actual visibility of the proposed CT/CC site by residents southeast of the proposed plant site is expected to be very limited. In contrast, the proposed facility is not expected to be visible in the background. The construction of the proposed facility would contrast with the color of the landscape. The current landscape at the proposed site is predominantly green and brown as a result of the grass fields and coal ash ponds. However, while the facility would contrast with the natural landscape color, it would be consistent with the other industrial facilities in the foreground. The dominant shapes in the landscape include the vertical lines of existing transmission structures and stacks of existing facilities against the horizon. The color and shape contrast would be greatest in the foreground to passing motorists and employees, although the contrasts would be less noticeable in the middleground and background.

There are no sensitive visual receptors within the foreground of the proposed facility. The half-mile area around the affected environment includes undeveloped grass fields and ALF. The middleground includes a 10 parks, 37 churches, and four cemeteries. T.O. Fuller State Park, the nearest park, is located approximately 0.6 mi east of the proposed facility. The closest church is the Whites Chapel African Methodist Episcopal Church, located approximately 1.3 mi to the southeast. The nearest cemetery is Lakeview Memorial Gardens, located approximately 1.8 mi to the southeast of the proposed facility. All of these sensitive resources would be considered a middleground viewing distance, where details are weak as they tend to merge into larger patterns. However, with the exception of T.O. Fuller State Park, the proposed CT/CC site is not expected to be in the viewshed of any of these receptors because of the screening effect of terrain associated with the forested bluff line. The background includes 643 potentially sensitive visual receptors, including 64 parks, 566 churches, 10 cemeteries, and three golf courses. At the background distance, the proposed facility is not expected to be discernible (due to the screening effects of terrain and overall distance) nor would it contrast with the overall landscape.

The existing industrial facilities and transmission lines near the proposed site already contribute major visual discord with the landscape. These elements also contribute to the landscape's ability to absorb negative visual change. Additionally, the topography and vegetation within the neighboring park provide some screening and allow the landscape to absorb the minor visual changes associated with the proposed facility at the middleground and background distances.

While the proposed facility would contribute to a decrease in visual integrity of the landscape, it is not expected that the existing scenic class would be reduced by two or more levels, which is the threshold of significance of impact to the visual environment (USFS 1995). Scenic attractiveness would remain minimal to common and scenic integrity would be very low to moderate (see Table 3-18) The forms, colors, and textures of the landscape that make up the scenic attractiveness would be affected in the foreground but would remain minimal. Impacts to scenic integrity are anticipated to be greatest in the foreground for area employees and other passing motorists along local roads. In the middleground and background, impacts are not considered to be significant as they are not expected to alter the overall landscape. Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed facility is considered to be fair to poor.

3.15.2.2.2 Natural Gas Pipeline

Installation of the new gas pipeline within the existing utility ROW would be visually minor. All temporary use areas for construction activities would be located within the 250-ft ROW; therefore no additional land clearing or disturbance are needed. Construction-related impacts would include views of temporary laydown areas and an increase in personnel and equipment along the route. These minor visual intrusions would be temporary until all activities were complete and disturbed areas were restored by the implementation of standard BMPs by MLGW (Muncy 1999).

The new pipeline would be buried underground and would not be seen by area residents or motorists within the project area. During operation, there would be no changes in visual resources from the current conditions as the pipeline would be constructed within the existing ROW which is already cleared for vegetation. Therefore, impacts to visual resources as a result of the installation and operation of the proposed gas pipeline would be minor, temporary, and not significant.

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) Toxic Substances Control Act (TSCA).

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

ALF is an active power plant that consists of three coal fired, electric power generation units; coal handling process; ash handling facilities; power transmission switchyard; and ancillary support operations (see Section 2.1.1). Various hazardous wastes are generated at the plant. In 2013, ALF generated approximately 4,608 lb of hazardous waste and was classified under RCRA as a Small Quantity Generator (SQG). The largest hazardous waste streams generated at ALF in 2013 were lead containing wiring (2,280 lb) and parts washer solvent (1,292 lb).

3.16.2 Environmental Consequences

3.16.2.1.1 Alternative A – No Action

Currently, ALF is classified as a SQG and ships hazardous waste off site every 90 to 180 days. Under Alternative A, TVA would continue to generate limited quantities of hazardous wastes from its current ALF operations. Current hazardous waste streams generated during the operation of ALF include paints, degreasing solvents, sandblasting wastes, paper insulated lead covered (PILC) cable or wiring, photographic solutions, and mercury.

The proper management of these materials is performed in accordance with RCRA requirements and TVA BMPs that implement RCRA regulations and additional procedures intended to prevent spills or other releases. Therefore, there would be no impacts associated with hazardous waste with this alternative.

3.16.2.1.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

The primary potential issues concerning hazardous wastes with respect to the proposed action are: (1) the potential for increased generation during construction or operation of the proposed action; (2) the potential for an accident during transport; and (3) potential impacts of accidental hazardous materials spills or releases.

The criterion for evaluating potential hazardous waste impacts related to the proposed action is whether it increases hazardous waste generation or the potential for a spill or release to sensitive receptors along exposure pathways or transportation routes.

Construction

Lands proposed for the construction of the proposed CT/CC facility and the gray water supply line may have historically been disturbed. As such, there may be some limited potential that soils that would be excavated may be contaminated from these prior activities. Additionally, there is the potential for spills or releases of fuels, coolants, oils, and hydraulic fluids from construction machinery. Prior to site construction, TVA would further assess the site to better evaluate potential historical uses of the site and the potential presence of hazardous materials on the proposed CT/CC site. Any soils that are determined to be contaminated would be managed in accordance with the site and construction activities waste management plan.

It is anticipated that during construction of the proposed action, hazardous waste generation would temporarily increase for a period of approximately two years.

Soils or other wastes that are generated during construction and determined via testing to be hazardous contaminated soils subject to RCRA Subtitle C regulations would be managed in accordance with those requirements and TVA BMPs. Hazardous materials to be used during site preparation and construction may include fuels, lubricating oils, solvents, paints, adhesives, compressed gases, and other hazardous materials during construction of the new facilities. Appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented to protect construction and plant workers, the public, and the environment. Therefore, impacts associated with the use of fuels, oil, and lubricants are expected to be negligible.

No extremely hazardous substances regulated under 40 CFR 355 would be used or stored on site during construction. Information about the presence of hazardous chemicals that are present on site at any one time in excess of 10,000 lb would be reported under 40 CFR 372. On site storage is reported on a “Tier I or Tier II” inventory form. It is anticipated that most hazardous substances brought on site for construction would be present in quantities below this threshold or meet exemptions under 40 CFR 372 and would not be subject to reporting.

Most hazardous waste generated during construction would consist of limited quantities of flushing and cleaning fluids, solvents, welding materials, solvent contaminated rags, batteries, coating and adhesive wastes, partially emptied aerosol cans, and paints (Table 3-19**).** All construction phase wastes would be accumulated in properly managed hazardous waste accumulation areas on site. On site management of these wastes would be performed in accordance with RCRA requirements and TVA BMPs that implement RCRA regulations and that include additional procedures intended to prevent spills or other releases. A permitted hazardous waste disposal facility would be used for ultimate disposal of the wastes.

The current switchyard would be retained and some upgrade of the switchyard may occur as a result of the proposed action. The current switchyard does not have any transformers that currently contain polychlorinated biphenyl (PCBs). However, some portion of the lead containing wiring generated at ALF contains PCBs suggesting that certain switchyard, plant or control room capacitor banks, switchgear, wire sheathing, or other electrical equipment may contain PCBs. Because the project does not involve demolition, it is unlikely that TSCA-based requirements would be triggered.

TVA would manage all hazardous wastes generated from construction of the proposed CT/CC facility 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 construction related to hazardous waste generation are not significant.

<u>Operation</u>

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

Based on other TVA combined cycle plants, it is anticipated that the proposed plant would be a Conditionally Exempt Small Quantity Generator (CESQG) during operation. A CESQG generates less than 220 lb of hazardous waste per month. CESQGs are exempt from most RCRA requirements provided that the facility's wastes are shipped to a properly

Table 3-19. 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 constituents identified as characteristic hazardous waste (40 CFR 261 Subpart C); Solvents listed under 40 CFR 261 Subpart D	Recycle or dispose at a permitted TSDF
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

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. Since the proposed action is anticipated to reduce hazardous waste generation, the potential for impacts related to spills or releases is also reduced.

The proposed plant would use dry low-NO_x combustion and low-NO_x burners. A CC plant would use an SCR system located within the HRSG for additional NO_x reduction. The SCR system would use 19.5 percent aqueous ammonia which would require an independent storage/receiving system to be installed. The threshold planning quantity for ammonia is 100 lb; therefore, notification requirements under 40 CFR 355 and 40 CFR 370 would apply to storage of greater than 80 gallons of aqueous ammonia. Additional substances that are likely to be present at sufficient quantities to trigger inventory reporting include other compressed gases for welding (such as oxygen, argon, acetylene), lead acid batteries, and ion exchange bed regenerants.

Releases of toxic chemicals to the environment associated with power generation are reported to EPA under the EPCRA Toxic Release Inventory program (40 CFR 372) on a 'Form R' report if a threshold of a toxic chemical was exceeded. The Form R report would be submitted annually. These thresholds relate to amounts of toxic chemicals used, manufactured, or processed during the calendar year. If a CC plant is built at the ALF location, the site would report ammonia use.

No adverse environmental impacts are anticipated related to other hazardous materials used at the facility. 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.

Hazardous waste streams generated during the operation of ALF include: paints, degreasing solvents, sandblasting wastes, PILC cable or wiring, photographic solutions, and mercury. As described in Subsection 3.16.1, in 2013 ALF generated approximately 4,608 lb of hazardous waste and was classified under RCRA as a Small Quantity Generator (SQG). These wastes are maintenance-related and would also be generated during operation of the proposed plant.

Table 3-20 summarizes the types of hazardous wastes anticipated to result from operation of the proposed plant.

The largest hazardous waste streams generated at ALF in 2013 were PILC and parts washer solvents. Although it is anticipated that PILC would continue to be present in the proposed plant, the generation of this waste stream should be reduced in the new plant since the need for replacement of the cable in maintenance operations should be reduced for a period of time following the start of operations. Other waste streams that are generated in limited amounts would continue to be generated as part of operation of the proposed plant. Operation of the CT/CC facility is expected to reduce generation of these waste streams or amounts relative to ALF. Comparison of current ALF waste streams and generation rates to similar TVA facilities (e.g., Caledonia CC) indicate a reduction in most waste streams as compared to the coal fired plants. In 2013, ALF generated approximately 4,608 lb of hazardous waste and shipped off site for disposal approximately 4,572 lb. Caledonia CC generated 970 lb of hazardous waste in 2013.

Although comparison of the annual quantities of hazardous wastes between ALF and a CC/CT plant suggest the possibility for reduced hazardous waste generation, there is some possibility for an additional hazardous waste stream that does not exist at ALF. It is expected that the proposed plant would require potable water as make-up for the boiler system of a heat recovery steam generation loop in a combined cycle configuration. Demineralization or metals removal by ion exchange (IX) or reverse osmosis (RO) would be required for this water supply. If metals removal is performed by IX or IX combined with RO, regeneration of the cation and anion exchange resins would be required on a periodic basis. Regeneration of cation resins is typically performed with a 4 percent to 10 percent solution of HCl or sulfuric acid. Regeneration of the anion resin is usually performed with a sodium hydroxide solution of similar concentration. These regenerant waste streams were not generated at ALF in 2013. If the proposed plant relies on IX for boiler water demineralization, this may result in the generation of these regenerant solutions.

ALF generated approximately 14,270 gallons of used oil in 2013. This used oil was burned on site in accordance with RCRA requirements under 40 CFR 279. Comparison of current ALF generation rates to similar a TVA natural gas facility (e.g., Caledonia CC) indicate that used oil generation is likely to be reduced. In 2013, Caledonia generated 1,071 gallons of used oil that was recycled off site in accordance with used oil recycling requirements under 40 CFR 279. Due to the differences in materials handling technologies; machinery age; and maintenance requirements, it is likely that used oil generation would be reduced.

ALF currently generates limited quantities of Universal Wastes (batteries and lamps). These wastes would also be generated in conjunction with the proposed action. Some reduction in the generation of Universal Waste is likely however, because the expected work force of the proposed CT/CC facility would be notably lower than that of the existing ALF plant. These wastes would continue to be managed in accordance with RCRA requirements and TVA BMPs.

Table 3-20. 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
Waste solvents	Parts maintenance degreasing painting	Ignitable solvents; Solvents, paints, adhesives containing constituents identified as characteristic	Recycle or dispose at a permitted TSDF

Table 3-20. Typical Hazardous Wastes Generated During Operation

Waste	Origin	Characteristics or Constituents	Disposal Method
	equipment, and cleanup	hazardous waste (40 CFR 261 Subpart C); solvents listed under 40 CFR 261 Subpart D	
Oily and solvent contaminated rags	Cleanup of small spills	See above	Recycle or dispose at a permitted TSDF
Paper insulated lead covered cable	Maintenance	Lead	Recycle as excluded scrap metal under 40 CFR 261.4, recycle or dispose of at permitted TSDF
Photographic solutions	NDI testing	Corrosive, silver	Silver recovery, neutralization
Sandblasting waste	Cleaning and painting equipment	Solid	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	Manage as universal waste
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

Finally, as a result of construction of the proposed action, the current ALF coal fired units would discontinue operation. Process vessels or storage tanks (e.g., waste water tanks, etc.) may hold materials that are not wastes or that are exempt under RCRA under current operations. However, the regulatory status of these materials or wastes may change upon closure of the existing plant. Concurrent with the decision to close the existing ALF, TVA would make all appropriate decisions regarding the disposition and management of these materials in accordance with regulatory requirements.

Small quantities of fuel oil and grease may be released from machinery during construction. Such materials generally have a low relative risk to human health and the environment. The proposed project 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.

If there is a larger spill, the spill area would be managed in accordance with the spill prevention control and countermeasures plan to minimize its footprint of the spill as quickly as is practical. Contaminated soils and materials produced during a cleanup of a spill would be properly contained and accumulated on site and transported for off site disposal at a permitted treatment, storage and/or disposal facility (TSDF).

The design for storage of the aqueous ammonia facility would incorporate material compatibility, secondary containment, pressure reliefs and other instrumentation and controls in accordance with OSHA requirements and standard industry practices to reduce release potential. All hazardous materials would be shipped to and from the site in accordance with applicable hazardous materials regulations and TVA BMPs.

Although hazardous waste generation would temporarily increase during construction of the proposed plant, the incremental increase in waste generation is expected to be limited and the potential for impacts is very minor. Furthermore, the potential for impacts related to spills or other releases are mitigated by management in accordance with RCRA requirements and TVA BMPs that implement RCRA regulations and additional procedures to prevent such an occurrence.

The handling and management of waste generated by ALF would follow the hierarchical approach of source reduction, recycling, treatment, and disposal. The first priority would be to reduce the quantity of waste generated. The next level of waste management would involve reusing or recycling wastes (for example, used oil recycling). For wastes that cannot be recycled, treatment would be used, if possible, to make the waste nonhazardous (for example, neutralization). Finally, off site disposal would be used for residual wastes that cannot be reused, recycled, or treated.

Hazardous wastes, both solid and liquid, would be delivered licensed transporter under RCRA Uniform Manifesting Requirements and DOT requirements. All off site management would be at to a permitted off site TSDF for treatment or recycling.

TVA would manage all hazardous wastes generated from operation of the proposed CT/CC facility 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.

Natural Gas Pipeline

Construction of the proposed natural gas pipeline 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.

It is unlikely that the pipeline route would encounter hazardous waste (with the exception for limited quantities of orphan wastes) since there would not have been any sources after the construction of the existing natural gas pipeline. Based on current aerial photographs, most of the route appears to undeveloped. As such the potential hazardous wastes encountered may include agricultural chemical residues herbicide and pesticide residuals and potential wastes associated with the existing pipeline. For example, if PCBs have ever been present in the pipeline or pipeline condensate, assessment of the potential for PCB-containing soils within the construction zone of the proposed natural gas line would be conducted during the design phase. Any soils discovered to contain elevated levels of PCBs should be handled and disposed of in accordance with TSCA regulations. TVA anticipates that MLGW would assess the potential for such contamination during construction by reviewing historical land uses, regulatory agency database lists (Environmental Data Resources Inc. 2004), and TDEC site files. Any soils of concern discovered within the proposed construction area would be characterized and managed in accordance with appropriate requirements.

The proposed construction activity would use limited quantities of regulated materials. The potential for harm to the environment is greatest for spills of fuel, oil, or coolants from construction equipment during pipeline construction resulting from accidents and mechanical breakdown of machinery. It is expected that no exceptionally hazardous materials in excess of threshold quantities would be proposed for use during construction of the proposed pipeline. While commercial preparations of fuels and lubricants used during construction may contain some hazardous constituents, they would be stored, used, and transported in a manner consistent with applicable laws. Only very limited generation of hazardous wastes would occur.

The existing pipeline would remain in service and would continue to supply natural gas to ancillary activities at ALF. New or additional compressor stations are not currently planned but a new metering station would be constructed at the proposed CT/CC site. Under OSHA requirements, utilities are required to maintain a material safety data sheet on the natural gas they store or supply. As such, MLGW would continue inventory reporting under EPCRA requirements.

Limited quantities of hazardous wastes would also result from maintenance activities during operation of the pipeline. These wastes would consist primarily of cleaning fluids, solvents, welding materials, solvent contaminated rags, batteries, coating and adhesive wastes, partially emptied aerosol cans, and paints. MLGW would continue to manage these wastes in accordance with RCRA requirements. Impacts associated with the use of cleaning solvents, compressor oils, and other lubricants are expected to be insignificant.

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). Currently, the solid waste generated at ALF is managed in accordance with State requirements. 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 TMSP mandates the implementation of certain BMPs for various industry sectors. Requirements pertaining to steam electric power generating plants are under Sector O of the TMSP.

Operation of ALF results in the generation of wastes collectively known as CCR. Fly ash and boiler slag are comprised of the noncombustible particles or components in coal. Fly ash is comprised of small silt and clay sized particles that are carried out of the boiler in the exhaust gases. Boiler slag is produced as a molten ash in the bottom of the boiler and is quenched in water to form the hard, glassy slag. This material is also called bottom ash. Both fly ash and bottom ash are composed primarily of silica, aluminum oxide and iron oxide. These waste streams also contain a variety of heavy metals at limited concentrations including arsenic, cadmium, chromium, copper, lead, mercury and selenium. The five-year average generation of these wastes at ALF from 2000-2005 was estimated at 153,000 tons per year.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action

Under Alternative A, TVA would continue to generate solid nonhazardous wastes from its current ALF operations. Current waste streams generated during the operation of ALF include construction and demolition wastes, recyclables, special waste (e.g., coal ash), and general refuse.

The proper management of these materials is performed 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. Therefore, in the near term there would be no impacts associated with the generation of solid waste.

However, CCR management capacity at ALF is limited and TVA does not own sufficient land at the plant site for a new CCR landfill. TVA had previously considered both use of existing landfills and new landfill development in its report entitled *Regional Siting Study for Biproduct Disposal Facilities in Tennessee* (TVA 2010). For existing landfills a solid waste permit application to construct a solid waste landfill would be required. The contracting and permitting process would require approximately 5 years from the time that TVA selected one of these sites until it would be ready to use as a landfill for the coal plant. By comparison, new landfill sites would require approximately 5 years from the time of selection to time of available use for the coal plant. Additionally new landfill construction would result in impacts to a range of environmental resources, depending on the particular site selected. Such impacts could include effects to surface water resources, plant communities, wildlife, aquatic species, sensitive species, socioeconomic characteristics, prime farmland, localized emissions and noise. For both use of an existing landfill and development of a new landfill would require a NEPA review to evaluate the potential impacts of the new landfill and the associated transportation from ALF.

3.17.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.17.2.2.1 Proposed CT/CC Facility

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 3-21.

Table 3-21. 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 <5 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

It is anticipated that all excavated soil would be used on site for grading and leveling purposes. In the event that some excavated soil is not reused on site, it would be classified for disposal on the basis of sampling completed once the soil is excavated and stockpiled. 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 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.

TVA would manage all solid wastes generated from construction of the proposed CT/CC 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.

<u>Operation</u>

ALF generated approximately 960 cubic yards of nonhazardous waste in 2013 that was disposed by Republic Services Inc., a waste disposal company. ALF also generated and recycled 877,540 lb of metal shipped off site for metal recycling in 2013. The proposed project would be expected to reduce the amount of solid waste by approximately 50 percent based on comparisons to other TVA CT/CC facilities. For example, the Caledonia CC plant only generated 147.2 cubic yards of nonhazardous solid waste in 2013. The difference in non-hazardous waste generation resulted in part from generation of 172 cubic yards of construction debris at ALF whereas Caledonia did not generate construction debris in 2013. However, ALF generated approximately 190 cubic yards of general refuse as compared to approximately 97 cubic yards of refuse generated at Caledonia during the same period. The reduced generation of these solid waste streams is a function of the reduced work population at the natural gas-fired plant relative to the larger plant population at the coal-fired plant.

Operation of the proposed CT/CC facility does not result in the generation of CCR. As a result operation of a CT/CC facility would essentially eliminate the generation of these wastes as compared to current operations at ALF.

Operating the CT/CC facility would require emission monitoring and controls. Reduction of NO_x emissions from CTs would be achieved through dry low-NO_x combustion and low-NO_x burners. The CC plant would use an SCR system located within the HRSG 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 potable water as make-up for the boiler system of a heat recovery steam generation loop in a CC configuration (see Section 2.1.2). The use of potable water would likely require chlorine removal by addition of sodium thiosulfate or ascorbic acid, adsorption on activated carbon or aeration would be required for this water supply. Sludge would be generated as a result of dechlorination by chemical addition or activated carbon adsorption. Non-hazardous wastewater treatment sludges are special wastes requiring TDEC pre-approval for off-site disposal. However, the overall impact of this process change would not be significant.

Solid wastes would also be generated from periodic replacement of the cooling tower fill of the proposed plant. Replacement of the cooling tower fill would be expected to generate between 20,000 to 50,000 lb of solid waste per event based on data from the Caledonia CC plant. This solid waste stream would be infrequently generated (once every eight to 10 years). Cooling tower fill requires management as special wastes.

The proposed action would return cooling water blowdown to the Maxson WWTP. Approximately 20 percent (2.2 MGD) of blowdown would be returned to the WWTP that may require pretreatment in accordance with agreements with the City of Memphis, Division of Public Works. The most likely pretreatment would involve filtration to eliminate scale and sludge, ion exchange for metals removed, and activated carbon removal of biocide, and orphan organics that may have been present in the influent. This pretreatment process would result in the generation of solid waste

TVA would manage all solid wastes generated from operation of the proposed CT/CC facility in accordance with established procedures. Notably, operation of the proposed plant would result in a significant reduction in solid waste generation as compared to the existing ALF (primarily related to CCRs). 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.

3.17.2.2.2 Natural Gas Pipeline

As is described in Section 2.1.2, a pipeline would be constructed within an existing MLGW ROW to provide natural gas to the CC/CT plant. Site preparation (vegetation removal and grading activities) and construction activities 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 during construction would be characterized and managed appropriately.

Other solid wastes anticipated to result from this construction activity were described in the preceding section. Very limited generation of special wastes would also occur with pipeline construction. The wastes generated would result in an incremental and intermittent increase in solid waste. MLGW would continue to manage these wastes in accordance with its BMPs to mitigate any environmental impacts. Impacts associated with the generation of solid wastes or special wastes are expected to be insignificant.

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 A-weighted decibels (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 3-22.

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 (Federal Highway Administration [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 Shelby County; USEPA (1973) guidelines recommend that Ldn not exceed 55 dBA for outdoor residential areas.

Both the existing ALF and the proposed CT/CC site are located in an area south of McKellar Lake zoned for heavy industrial properties. The closest homes to the proposed CT/CC site are located approximately 0.9 mi southeast of the site, and the T.O. Fuller State Park is approximately 0.6 mi from the proposed site. T.O. Fuller State Park and the surrounding residential area are situated on lands approximately 100 ft in elevation above ALF. Additionally, densely forested areas of T.O. Fuller State Park separate residential areas from the proposed CT/CC site.

There are numerous existing sources of noise at ALF and near off site areas. Operations at the existing coal plant generate varying amounts of environmental noise. Noise generating activities associated with the existing plant include barge operations, coal unloading activities, dozer operations associated with coal pile management, truck operations and occasional rail operations. Existing noise emission levels associated with these activities typically ranges from 59 to 87 dBA as listed in Table 3-23.

The noise environment of the proposed CT/CC site and near off site areas is characterized by noise sources such as roadway traffic associated with Paul R. Lowry Road, periodic rail operations serving the CN/CSX intermodal facility and general environmental background sounds. Nearby noise sensitive receptors include T.O. Fuller State Park, the Chucalissa Archaeological Site associated with T.O. Fuller State Park, and low density residential areas south of the park. Noise values associated with the interior areas of T.O. Fuller State Park and residential areas south of the park are expected to be typical of these environments and may range from 40 to 50 dBA under normal conditions.

To provide a basis for evaluating potential traffic-related noise impacts of plant construction and operation, a noise analysis was conducted using FHWA's Traffic Noise Model (TNM). Paul R. Lowry Road is expected to be the primary roadway used during construction of the proposed CT/CC facility. Therefore, existing traffic data were obtained from Tennessee Department of Transportation (TDOT) for Paul R. Lowry Road to predict baseline roadway noise levels of adjacent land uses. Table 3-23 also provides predicted baseline roadway noise levels for lands immediately south of Paul R. Lowry Road. Within T.O. Fuller State Park roadway noise levels at 200 ft from the roadway are predicted to be 57.1 dBA during

Table 3-22. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 16.4 ft
Jet Flyover at 984.3 ft		
	100	
		Inside Subway Train (New York)
Gas Lawn Mower at 3.3 ft		
	90	
		Food Blender at 3.3 ft
Diesel Truck at 49.2 ft		Garbage Disposal at 3.3 ft
	80	
		Shouting at 3.3 ft
Gas Lawn Mower at 98.4 ft	70	Vacuum Cleaner at 9.8 ft
Commercial Area		Normal Speech at 3.3 ft
	60	
		Large Business Office
	50	Dishwasher Next Room
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	
		Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	
		Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

peak hours. By comparison, roadway noise levels at the proposed CT/CC facility site and similar near off site lands are predicted to be 58.5 dBA during peak periods.

Construction of the proposed pipeline also has the potential to create temporary noise pollution in the local construction area. The land uses adjoining the 250-ft corridor for the gas pipeline construction consist of several residential areas along the southern end of the corridor. Benjamin Hooks High School is on the south side of the corridor. As the pipeline corridor passes Elvis Presley Boulevard, the area is largely industrial until crossing Tulane Road, where the land uses once again are residential until the corridor turns north into the heavy industrial area where the ALF site is situated.

Table 3-23. Representative External Noise Levels Expected On Site at the Existing ALF and Near Off Site Areas

Noise Generation Feature	Noise Level (dBA Leq)
Typical Plant Noise Generators	
Primary Plant Site (Haul Roads, Coal Mill, etc.[1])	59.2 to 78.1
Barge Operations[2]	72 to 87
Coal Pile Dozer[3]	85
ALF Near Offsite Areas (200 ft from Roadway)	
Baseline Roadway Noise Emissions at Proposed CT/CC Site[4], Peak Periods	58.5
Baseline Roadway Noise Emissions at T.O. Fuller State Park[4], Peak Periods	57.1

Sources: (1) TVA 2013a; (2) Episilon, 2006; (3) FHWA, 2014; (4) Traffic-based noise modeling using TNM

3.18.2 Environmental Consequences

3.18.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue to operate the existing ALF. No changes in noise levels would occur with this alternative.

3.18.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.18.2.2.1 Proposed CT/CC facility

Under the Alternative B, most construction activities would occur during the day on weekdays. However, 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. During the first site preparation phase of construction, noise would be generated by compactors, front loaders, backhoes, graders, and trucks. The second phase would involve concrete mixers, cranes, pumps, generators, and compressors. Typical noise levels from construction equipment used at the plant site are listed in Table 3-24 and are expected to be 85 dBA or less. Based on straight line noise attenuation, it is estimated that noise levels from these sources would attenuate to 49.1 dBA at the boundary of T.O. Fuller State Park and to 47.1 dBA at the Chucalissa Archaeological Site. Consequently, noise impacts associated with construction at these nearby off site receptors is expected to be minor and temporary.

Potential impacts of traffic-related noise were evaluated using TNM. Because traffic volumes associated with the construction phase include both traffic associated with the operating ALF plant and construction related traffic associated with the proposed CT/CC facility, this phase is considered to be a bounding condition for noise impact assessment purposes. Table 3-25 presents noise levels that reflect the additional contribution of construction-phase traffic on surrounding areas. At the proposed CT/CC site and similar near off site areas within the industrial park, noise levels are expected to increase from 57.7 to 58.5 dBA. By comparison, noise levels at T.O. Fuller State Park would exhibit a similar minor increase from 57.1 to 57.8 dBA at 200-ft from the existing roadway. Given the terrain of the park and the attenuating effects of distance, expected peak noise levels from traffic related noise sources at the C.H. Nash Museum at the Chucalissa Archaeological Site are predicted to attenuate to 39.5 dBA.

Table 3-24. 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: Federal Highway Administration 2014

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

Table 3-25. Construction Period Roadway Noise Impact Analysis

Roadway Noise Analysis	Estimated Noise Level (dBA Leq)
Roadway Noise Emissions at Proposed CT/CC Site[4]	
Existing Peak	57.7
Construction Peak	58.5
Roadway Noise Emissions at T.O. Fuller State Park[4]	
Existing Peak Hour	57.1
Construction Peak Hour	57.8

3.18.2.3 Impacts of Operations

Predicted noise emissions from the operation of the proposed CT/CC facility are expected to be similar to the predicted noise levels of TVA's proposed Paradise CC Plant. TVA evaluated predicted noise emissions during 100 percent, full load capacity, and under normal operating conditions. The following assumptions were used to estimate noise emissions:

- Noise emissions from each of the three gas turbine assemblies, including air inlets and gas turbines, were limited to 60 dBA at 400 ft.

- Noise emissions from each of the three HRSGs, including the exhaust stacks, were limited to 62 dBA at 400 ft.

- Noise emissions from one 12-cell mechanical draft cooling tower were limited to 56 dBA at 400 ft.

- The steam turbine would be located inside an enclosure that limits noise emissions to 50 dBA at 400 ft.

- The steam turbine condenser and ancillary equipment would be located inside an enclosure that limits noise emissions to 50 dBA at 400 ft.

- Noise emissions from three boiler feed pumps were limited to 85 dBA at 3 ft.

- Noise emissions from the main transformer were limited to 85 dBA at 3 ft, and emissions from the auxiliary transformer were limited to 75 dBA at 3 ft.

- Noise emissions from the auxiliary boiler were limited to 85 dBA at 3 ft.

Based on straight line noise attenuation of the highest operational noise levels (HRSGs: 62 dBA at 400 ft), the estimated noise level is 44.2 dBA at the park boundary and 42.0 dBA at the Chucalissa Archaeological Site. These values do not exceed USEPA recommended guidelines of 55 dBA for Ldn. Therefore, noise from the operation of the proposed CT/CC facility is not expected to have a significant impact on noise sensitive receptors.

3.18.2.3.1 Natural Gas Pipeline

Construction of the pipeline is anticipated to last for about 6.5 months. Construction noises would be variable because the types of equipment would change throughout different phases of construction. General construction activities and horizontal directional drilling has the potential to produce noise impacts above 55 dBA and could potentially affect some nearby residences. However, 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 pipeline 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 pipeline are also expected to be minor and not significant.

3.19 Transportation

3.19.1 Affected Environment

ALF and the Frank C. Pidgeon Industrial Park are served by highway, railway and waterway modes of transportation. Major traffic generators within the Frank C. Pidgeon Industrial Park include Nucor Steel, Electrolux Corporation, ALF, and the CSX intermodal facility. Traffic generated by these facilities 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).

Two service interchanges provide access to ALF from Interstate 55 (I-55). One is at West Mallory Avenue (a Single-Point Urban Interchange), the other is a partial (half-diamond) interchange at Kansas Street. The access at Kansas Street is to/from the west only. From Kansas Street, Rivergate Drive provides access between Kansas Street and Paul R. Lowry Road. From West Mallory Avenue, Paul R. Lowry Road provides direct truck and automobile access to ALF. Paul R. Lowry Road varies from two to four lanes, whereas

Rivergate Drive is two lanes wide. Table 3-26 presents the 2012 Average Annual Daily Traffic (AADT) counts for key roadways that serve ALF and the Frank C. Pidgeon Industrial Park.

Table 3-26. Primary Routes with 2012 Average Annual Daily Traffic Counts

Roadway	Average Daily Vehicle Use (AADT)
Paul R. Lowry Road between ALF and Rivergate Drive	5,944
Paul R. Lowry Road just south of W. Mallory	7,519
Kansas St. Between Rivergate Drive and I-55	12,736
I-55 Between West Mallory and Kansas Street	69,173

Source: TDOT, 2014.

Roadways within the vicinity of the proposed natural gas pipeline are identified in Figure 1-2 and Appendix A. The proposed pipeline would cross under several local roadways along this proposed corridor. Table 3-27 presents the 2012 AADT for the primary roads potentially crossed by the proposed gas pipeline.

Table 3-27. Traffic Volume on Routes Crossed by the Proposed Gas Pipeline

Roadway	Average Daily Vehicle Use (AADT)
South 3rd Street	13,540
Weaver Road	3,426
Horn Lake Road	2,842
Tulane Road	2,709
Elvis Presley Boulevard	11,978

Source: TDOT, 2014.

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue operation of the three ALF coal units (Table 3-28). No additional construction traffic would result from 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. Additionally, this alternative would not entail the construction of a new gas pipeline to serve the proposed plant. Consequently, the No Action Alternative would not result in impacts to the local transportation network.

3.19.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.19.2.2.1 Proposed CT/CC Facility

<u>Local Roadway Traffic</u>

Traffic generated by the construction workforce is the controlling factor in assessing impacts to the local roadway network. Construction phase traffic would occur in addition to the existing traffic generated by the operating ALF (Table 3-29) and is therefore, considered to reflect the maximum potential impact on transportation. Once construction is completed, operational phase traffic of the new CT/CC facility 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.

Table 3-28. Traffic Volume Associated with the Existing ALF and Proposed CT/CC facility

Operational Phase	Expected Employment	Average Daily Vehicle Use Generated (AADT)*
Construction Phase		
Existing ALF Plant	136	300
Proposed CT/CC facility	400 to 700	1,100
Operations Phase		
Existing ALF Plant	0	0
Proposed CT/CC facility	30 to 40	90

* Based on vehicle occupancy rate of one worker per vehicle.

Table 3-29. Traffic Impacted Associated with Construction of the Proposed CT/CC facility

Roadway	Existing Traffic (AADT)	Construction Phase Traffic (AADT)	Traffic Increase (Percent)
Paul R. Lowry Rd. between ALF and Rivergate Drive	5,944	7,044	18.5
Paul R. Lowry Road just south of West Mallory	7,519	8,344	11.0
Kansas Street Between Rivergate Drive and I-55	12,736	13,011	2.2
I-55 Between West Mallory and Kansas Street	69,173	69,833	1.0

The construction work force at the proposed CT/CC facility would range from 400 to 700 workers although an average workforce is expected to consist of approximately 500 workers. Based on an assumed vehicle occupancy rate of one worker per vehicle, the construction phase traffic on Paul R. Lowry Road is expected to result in a relative minor increase (up to 18.5 percent) that would be readily accommodated by the existing traffic network (see Table 3-29).

On-site parking would be provided by means of a gravel parking lot using one of the laydown areas. Construction materials and components would primarily be delivered by truck (with the exception of the combustion turbine generator and steam turbine generator equipment, which would be delivered by rail). Additional truck traffic would occur on the public roadways (primarily Paul R. Lowry Road) during construction. This truck traffic would be intermittent and infrequent throughout the construction period. An additional three to five trucks per day at the site is expected, which would occur during the first several months of construction. Assuming vehicle occupancy of one person per vehicle, an average construction work force traffic volume of 1,100 vehicles per day can be expected.

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

<u>Equipment Transport from Barnhart Heavy Lift Terminal to the Proposed CT/CC Site</u>

The TDOT Structure Inventory and Appraisal Office works with the vehicle permit office to route overweight and oversize commercial vehicles, such as very large trucks, through the state. Using vehicle inspection information, the Structure Inventory and Appraisal Office can route these vehicles safely. TDOT uses a software system to issue these permits in a manner that is fast and efficient but which still works to protect the bridge infrastructure of Tennessee from damage. These rules are covered in “Rules of Tennessee Department of Transportation - Central Services Division, Chapter 1680-7-1”, which pertains to overweight and over-dimensional movements on Tennessee highways. A special transport vehicle would be used so that the weight of the load is better distributed over the entire road/bridge width. Other permits that may be required include a TDOT ROW permit (for work in the ROW), a local/city/county grading permit, and traffic control permits.

Three new boiler modules would be transported by barge direct to Barnhart’s Heavy Lift Terminal north of McKellar Lake and stored there prior to transport to ALF. When ready to be transported to the proposed CT/CC site, these boiler modules will be transported by truck over surface roads. The haul route for this transport would be along Channel Avenue northeast to Harbor Avenue then to West Trigg Avenue, then east to Florida Street, then south to West Mallory Avenue, then west to Paul R. Lowry Road, then to the ALF site.

Barnhart would construct heavy-haul vehicles to transport the boiler modules over connecting roadways. These vehicles would consist of several dollies to help distribute the wheel loading on the roads and bridges. The travel height of the boiler modules would be approximately 15 ft and presents no problems along the proposed haul route. Traffic control would be provided by Memphis City Police and the total haul time from the Barnhart Heavy Lift Terminal to ALF is anticipated to be one hour. Barnhart has used this same haul route, or Heavy Haul Corridor, on other projects in the past. The boiler modules would be off-loaded at the proposed CT/CC site.

No significant adverse effects to transportation are expected along this Heavy Haul Corridor. However, prior to transport, TVA will confirm exact turning dimensions of the vehicle to ensure that impacts to adjacent infrastructure and ROW (e.g. street signs, traffic signal poles, mailboxes, etc.) are minor and mitigated. Similarly, existing bridge loadings will be assessed as needed and coordinated with TDOT in the permit for overweight and over-dimension transport.

Delivery by rail is the recommended method for transport of the combustion turbine generator and steam turbine generator equipment to the proposed CT/CC site. A 500-ton Gantry Lift System would be constructed at the site to transfer the equipment from rail cars to delivery vehicles on site. The construction related to this activity would result in minimal effects to the adjacent property. No city permits would be required and there would be minimal effects to overhead power lines (minor relocations may be necessary).

Transportation of Ammonia

As is described in Chapter 2, the proposed CT/CC facility would use aqueous ammonia rather than anhydrous ammonia as a reagent in the SCR systems. Aqueous ammonia, which is proposed for use at the CT/CC facility is a considerably safer form of ammonia. Nonetheless, TVA would use a Process Safety Management program to minimize the potential for the accidental release of ammonia stored on site. A RMP currently in place at ALF would be used to prevent an accidental release of ammonia.

Aqueous ammonia for the SCR system would be delivered by truck to the proposed CT/CC site using USDOT approved tanker trucks. Hazardous materials transportation (including tanker trucks) accident rates in the U.S. and data indicates the frequency of accidents containing hazardous materials is between 0.06 and 0.19 releases per 1,000,000 mi traveled on well-designed roads and highways (Davies and Lees 1992, Harwood 1993).

TVA considered data from the USDOT showing the actual risk of a fatality over the past five years from all modes of hazardous material transportation (rail, air, boat, and truck), which is approximately 1 in 11,000,000 (PHMSA 2014).

These ammonia delivery trucks are included in the projected construction traffic to and from the site. As mentioned earlier, Paul R. Lowry Road, has sufficient capacity to accommodate this increase in construction traffic.

3.19.2.2.2 Natural Gas Pipeline

Traffic will be temporarily affected by the construction of the proposed gas pipeline. Roads potentially affected by temporary closures include Santa Barbara Street, Santa Monica Street, Bannock Street, Vandergreen Drive, Horn Lake Road, Paul R. Lowry Road, and Ensley Street. Other roadways and railroad crossings would be crossed by directionally drilling the proposed pipeline underneath the road. Final decisions regarding road crossing methodology will be made during the design phase by MLGW.

Should there be a need for temporary closures of any of these roads resulting from the construction of the proposed pipeline, the closures would result in minimal effects on these roads as adjacent local detour routes are available to accommodate the short-term disruption of traffic. Once constructed, there would be no impact to the transportation network during pipeline operation.

3.20 Socioeconomics and Environmental Justice

3.20.1 Affected Environment

Socioeconomic characteristics of resident populations were assessed using 2010 Census and American Community Survey (ACS). Employment and housing information is provided by the 2008-2012 American Community Survey five-year estimates.

The appropriate geographic scale for the analysis of socioeconomic impacts is both a 10-mi radius buffer around the proposed CT/CC facility and the limits of Shelby County, Tennessee. A 10-mi buffer gives insight into the socioeconomic conditions in the vicinity of the proposed action. Additionally, Shelby County is an appropriate secondary geographic area of reference as most workers at the existing ALF plant currently reside in Shelby County (Table 3-30). 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

ALF is located southwest of downtown Memphis in Shelby County, Tennessee (Figure 1-1). The City of Memphis is the largest city in Tennessee and is a densely populated metropolitan area with a total population of 655,155. The population of Memphis accounts for 70 percent of the total population for Shelby County and 10 percent for all of Tennessee (Table 3-31). Collectively, the 10-mi vicinity around ALF has a total population of 208,720 (U.S. Census Bureau [USCB] 2010). This population represents approximately 32 percent of the total population of Memphis and 22 percent of Shelby County. The block group that contains the proposed CT/CC facility is an industrial area bordering the Mississippi River and has no residential population.

Table 3-30. Existing ALF Workforce Distribution

Location	Total
Tennessee (County)	
Dickson	1
Fayette	1
Hardin	1
Hawkins	1
Humphreys	1
Montgomery	1
Perry	1
Shelby	78
Stewart	1
Tipton	2
Wayne	2
Other States	
Alabama	3
Arkansas	3
Mississippi	39
Total	135

Table 3-31. Demographic Characteristics

	10-mi Radius[1]	City of Memphis[2]	Shelby County[3]	State of TN[3]
Population				
Population, 2012 estimate	208,720	655,155	939,877	6,454,914
Population, 2010	209,722	646,889	927,644	6,346,105
Persons under 18 years, 2010	23.9%	26.0%	25.8%	23.6%
Persons 65 years and over, 2010	11.7%	10.3%	10.8%	13.4%
Female persons, 2010	52.2%	52.5%	52.3%	51.3%
Racial Characteristics				
White, 2010 (a)	16.2%	29.4%	42.9%*	77.6%
Black or African American, 2010 (a)	80.2%	63.3%	52.8%*	16.7%
American Indian and Alaska Native, 2010 (a)	0.2%	0.2%	0.3%*	0.3%
Asian, 2010 (a)	1.0%	1.6%	2.5%*	1.4%
Native Hawaiian and Other Pacific Islander, 2010 (a)	0.0%	0.0%	0.1%*	0.1%
Two or More Races, 2010	1.3%	1.4%	1.4%*	1.7%
Hispanic or Latino, 2010 (b)	1.0%	6.5%	5.9%*	4.6%
White, not Hispanic or Latino, 2010	2.2%	27.5%	37.9%*	75.6%
Other Demographic Characteristics				
Living in same house 1 year and over, 2008-2012		79.5%	82.3%	84.4%
Foreign born persons, 2008-2012		6.1%	6.1%	4.5%
Language other than English 2008-2012		9.0%	8.9%	6.6%
High school graduate or higher (age 25+), 2008-2012		82.3%	85.9%	83.9%
Bachelor's degree or higher (age 25+), 2008-2012		23.4%	28.7%	23.5%
Veterans, 2008-2012		37,149	59,746	493,980
Housing				
Housing units, 2010	101,478	291,883	399,771*	2,812,133
Homeownership Rate, 2008-2012	49.6%	52.1%	60.2%	68.4%
Housing units in multi-unit structures, 2008-2012		33.3%	27.5%	18.2%
Median value of owner-occupied housing units, 2008-2012	$69,750	$98,300	$135,500	$138,700
Households, 2008-2012	80,354	244,538	341,948	2,468,841
Persons per household, 2008-2012	2.60	2.59	2.66	2.51
Per capita income in past 12 months (2012 dollars), 2008-2012	$18,661	$21,368	$25,465	$24,294
Median household income, 2008-2012	$29,557	$36,817	$46,251	$44,140
Persons below poverty level, 2008-2012	31.3%	26.2%	20.2%	17.3%

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
*Denotes estimates for 2012

[1]USCB 2014a; [2]USCB 2014b; [3]USCB 2014c

Minority populations represent the primary component of the population of the project area. Specifically, blacks or African Americans represent approximately 80 percent of the population within the 10-mi radius (see Table 3-31), 63 percent of the population of Memphis, and 53 percent of the population of Shelby County. These percentages are notably greater than the state-wide value for Tennessee (17 percent). In contrast, whites account for approximately 16 percent of the population within the 10-mi radius even though they represent 43 percent and 78 percent of Shelby County and Tennessee, respectively. Other minority racial and ethnic groups are present in the project boundary, but are at or below comparative rates for Shelby County and Tennessee.

3.20.1.2 Economic Conditions

3.20.1.2.1 Economy and Regional Employment

Shelby County contains a total employed labor force of 417,662 workers (Table 3-32). Business sectors providing the greatest employment including Office and Administrative Support (15 percent), Sales (11 percent), and Management (9 percent).

Table 3-32. Largest Employers by Sector Within Shelby County, Tennessee

Sector	Number of Employees	Percent
Office and Administrative Support	64,252	15%
Sales	47,816	11%
Management	38,859	9%
Educational Services	26,553	6%
Food Preparation and Service	22,439	5%
Production	20,876	5%
Materials Moving	20,827	5%
Business and Finance	20,228	5%
Maintenance	18,020	4%
Transportation	17,645	4%
Subtotal	**297,515**	**71%**
Total Employed Population	**417,662**	**100%**

Total employed civilian population within the 10-mi radius is 81,981 (Table 3-33) with the unemployment rate within in the 10-mi radius at16,860, or 17.1 percent of the civilian labor force. This unemployment rate is noted to be higher relative to the unemployment rates of Shelby County (11.3 percent) and the State of Tennessee (9.8 percent) (see Table 3-33).

Table 3-33. Employment Characteristics of the Resident Labor Force

Employment Status	Population		
	10-mi Buffer	**Shelby County**	**Tennessee**
Population >16 years	165,489	713,977	5,030,090
Civilian Labor Force			
Employed	81,981	417,662	2,815,491
Unemployed	16,860	53,202	304,598
Subtotal	98,841	470,864	3,120,089
Unemployment			
% of Total Population	10.2%	7.5%	6.1%
% of Civilian Labor Force	17.1%	11.3%	9.8%

Source: USCB 2014a

Average per capita income for the project area was $18,661, whereas the per capita incomes for Shelby County and Tennessee were $25,465 and $24,294, respectively (see Table 3-31).

3.20.1.2.2 Tax Revenue

ALF has an annual payroll of approximately $17.3 million dollars and employs 135 people from Shelby County and surrounding areas. Payroll taxes benefit the various jurisdictions within which the existing labor force resides.

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.

TVA provides tax equivalent payments annually to state and local governments in the eight states in which the federal agency sells electricity or owns power production assets and properties (generating plants, transmission lines, substations, etc.). TVA paid a record $579 million in tax equivalent payments to state and local governments in fiscal year 2012, and the TVA board has approved estimated tax equivalent payments of $536 million for fiscal year 2013. The majority of TVA's tax equivalent payments are paid to state governments, which then distribute the money to local governments based on formulas set by the state legislatures. As such, operation of the existing ALF provides revenue support to local governments.

3.20.1.3 Housing

There are 101,478 total housing units to serve households within the 10-mi vicinity (see Table 3-31). Approximately 79.2 percent of the total housing units are occupied whereas 20.8 percent of the units are vacant. Vacancy rates within Shelby County (14.3 percent) and Tennessee (12.2 percent) are notably lower (USCB 2014a).

Transient housing options include 39 hotels within 10 mi of the project site and 170 total hotels, extended stays, and others in the greater Memphis area (HotelGuides 2014). Hotels closest to the proposed project are concentrated in downtown Memphis and near Memphis International Airport. Capacity of the 39 closest hotels total a maximum of 5,087 units.

3.20.1.4 Community Facilities and Services

3.20.1.4.1 Educational Facilities

Existing public facilities and community services in the project area include schools, emergency services and community centers. Schools, churches, cemeteries and other community facilities are identified in Figure 3-3. Public schools in the project area are part of the Shelby County Schools Southwest Region 2 which is made up of 21 elementary schools, six middle schools, and eight high schools (SCS 2014). Primary education facilities located within 1-mi of the proposed CT/CC facility or gas pipeline ROW are listed in Table 3-34.

Table 3-34. Primary Education Facilities Within 1-Mile of the Project Area

Coro Lake Elementary School
Fairley High School
Harding Academy
Havenview Junior High School
Holmes Road Elementary School
Lakeview Elementary School
Oakshire Elementary School
Whites Chapel Elementary School

3.20.1.4.2 Healthcare and Emergency Services

Existing healthcare and emergency services that serve the proposed plant site and surrounding communities include Methodist South Hospital: a 156-bed community hospital that employs 19 emergency medicine doctors (Methodist Healthcare 2014). Methodist South is part of the Methodist Le Bonheur Healthcare system that has two additional emergency care hospitals and three minor-emergency facilities in Memphis. In total, this hospital system has eight facilities in the Memphis Metropolitan Area with a total of 1,725 beds (Methodist Healthcare 2014).

Emergency medical transport and fire response is provided by the Memphis Fire Department. The Memphis Fire Department has 36 ambulances, 56 engines, 21 ladder truck companies and approximately 500 firefighter/paramedics and 1,100 firefighter/EMTs (City of Memphis 2014b). In 2013, the Memphis Fire Department responded to 111,680 EMS calls and transported 78,097 patients (City of Memphis 2014b). Fire House 45 and Fire House 36 are the closest fire departments at a driving distance of 6 and 7.3 mi, respectively. The nearest police station is the Memphis Police Westwood (5.9 mi). This station is part of the Raines Station district that covers 78.4 mi^2 including the project area (Memphis Police Department 2014). Average response time in this district is 4:07 minutes (Memphis Police Department 2012). The Memphis Police Department has 2,863 commissioned and non-commissioned personnel of which 1,669 are police officers (Memphis Police Department 2012).

3.20.1.4.3 Water and Wastewater Services

Drinking water for 257,000 customers in the Shelby County area is drawn from an aquifer below Shelby County with a capacity of 100 trillion gallons (MLGW 2014). The principal aquifers underlying the Memphis area include (in descending order), the Memphis sand, and the Fort Pillow sand (TVA 2006). Potable water for ALF is provided by the Davis Water Treatment Plant. This facility has a maximum capacity of 30 MGD with plans to expand to 35 MGD in the next three years. ALF currently uses potable water at a rate of 0.24 MGD. The nearest WWTP to the proposed action is T.E. Maxson WWTP. A maximum of 90 MGD of wastewater can be treated per day and eventually discharged into the Mississippi River (City of Memphis 2014b). Currently, ALF discharges 3,822 gallons per day to this facility.

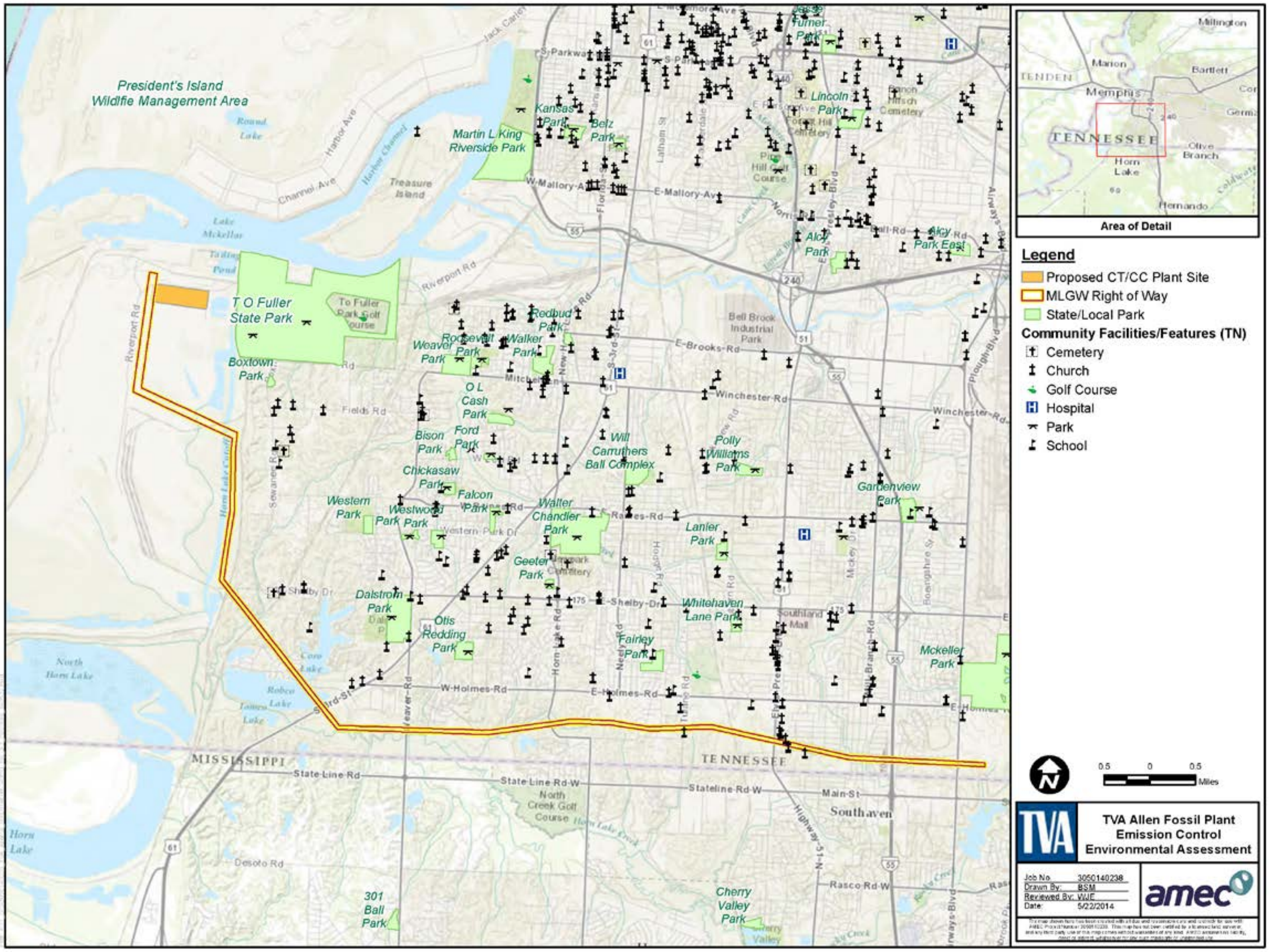

Figure 3-3. Community Facilities Near the Proposed CT/CC Facility

3.20.1.5 Environmental Justice

On February 11, 1994, President Clinton signed E.O. 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low income Populations*. EO 12898 mandates some federal-executive agencies to consider Environmental Justice (EJ) as part of the NEPA. While TVA is not subject to this E.O., it applies it as a matter of policy. EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (EPA 2014) 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.

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).

Although low income and minority populations are expected to occur both east (Shelby County) and west of the project area (e.g., West Memphis), the potential impacts to populations west of the proposed CT/CC site are only limited to the beneficial effects of improvement in regional air quality. Therefore, for this assessment detailed demographic analyses to identify potentially affected low income and minority populations is appropriately limited to Shelby County as these populations are local to the project and have the potential for additional exposure to human health or environmental hazards related to wastewater, noise, dust, traffic, and other factors.

For this analysis "meaningfully greater" was considered to be greater than or equal to (≥) 20 percent. For example, for all block groups within the geographic area of analysis (i.e., 10-mi. radius, Shelby County, or Memphis Metro), the percentage of minority population for all classifications is calculated. If any block group has a minority percentage that exceeds 50 percent, then the block group is identified as containing a minority population. If any block group has a minority percentage exceeding the corresponding minority percentage for Shelby County or the State of Tennessee by more than 20 percentage points, then a minority population is determined to exist in that block group. 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. A block group 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., ≥20 percent) the appropriate geographic area of analysis (NRC 2004).

For example, the number of low income households in each census block group is divided by the total households for that block group to obtain the percentage of low income households per block group. If any block group has a low income percentage exceeding 50 percent, then the block group is identified as a low income population. If any block group has a ratio of low income population exceeding the corresponding percentage for Shelby County or the State of Tennessee by more than 20 percentage points, then a low income population is determined to exist in that block group.

Figure 3-4 identifies the block groups that meet the specified criteria as EJ minority populations or low income populations. These groups, based upon race, are largely comprised of Black or African American populations of the block groups within the 10-mi vicinity in which they often represented more than 75 percent of the total population within the block group. Based upon USCB, the nearest block groups that are subject to consideration as EJ populations are located approximately 0.6 mi from the proposed plant center. Figure 3-4 also clarifies that the nearest EJ census block also contains the T.O. Fuller State Park which lacks residential areas. Therefore, the corrected distance to the nearest residence within an EJ block group is 0.9 mi from the center of the proposed CT/CC site.

Poverty rates in the 10-mi vicinity are 31.3 percent – 11.1 percent higher than county-wide rates (20.2 percent) and 13.0 percent higher than state-wide rates (17.3 percent). Figure 3-4 also identifies block groups determined to meet the criterion for consideration as low income population groups subject to EJ considerations.

Isolated minority or low income populations near the proposed project are also identified for potential EJ populations. Isolated populations are identified using Housing and Urban Development (2012) data for assisted-housing units (i.e., public-housing developments). Six housing developments (528 units) house 1,011 individuals (2.6 percent of the total population) within the vicinity. Racial characteristics range from 98 percent to 100 percent Black or African American and a majority of households are under the federal poverty level. These housing developments are located along Highway US-61 (Elvis Presley Boulevard) east of the project site.

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action

Under the No Action Alternative, ALF would continue to operate. Consequently, employment at the plant would remain at existing levels and would not substantially change the local demographics, local and regional community services and facilities or the economy. Additionally, EJ populations would not be disproportionately affected by increased environmental impacts under the No Action Alternative.

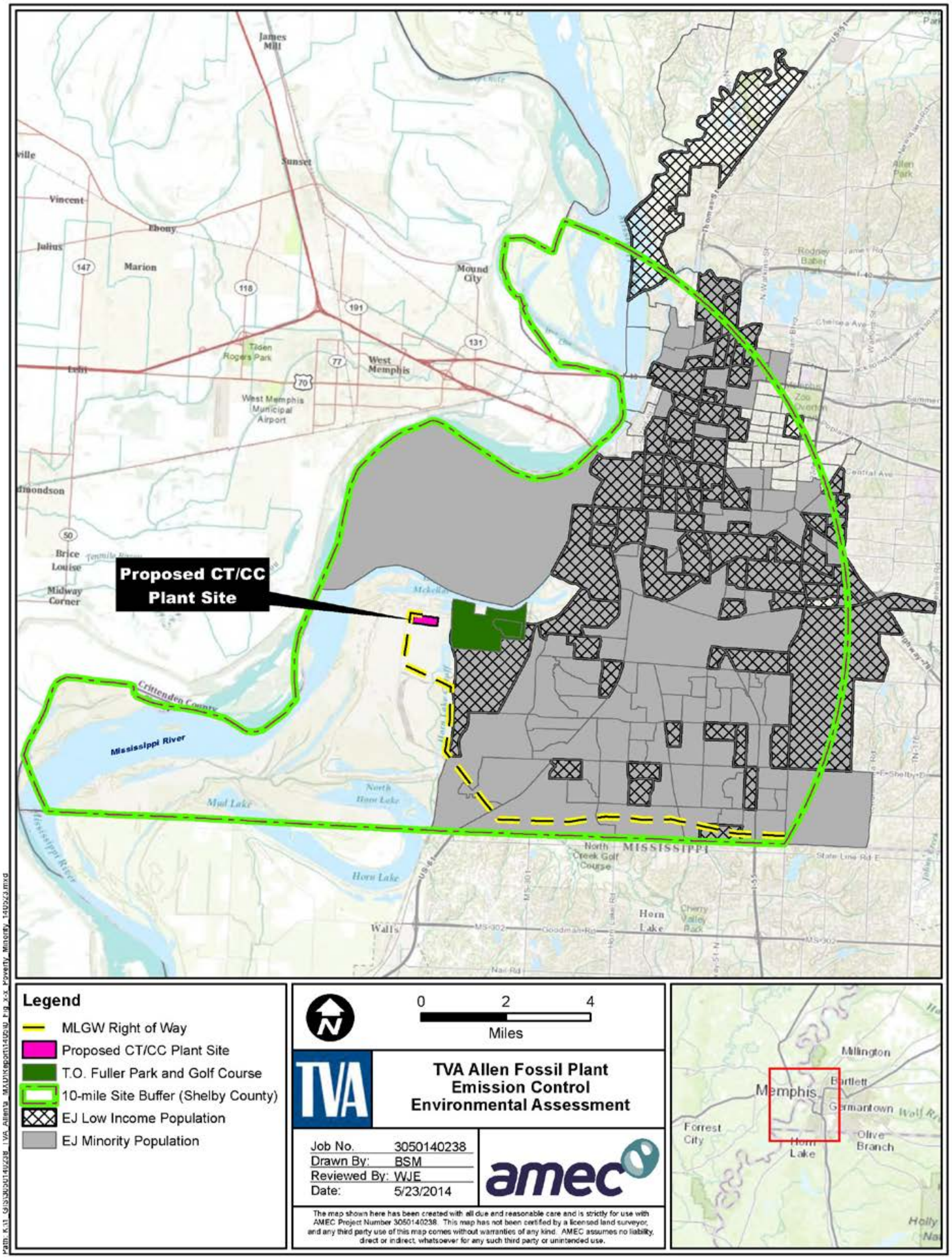

Figure 3-4. Environmental Justice Populations in the Project Area

3.20.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

3.20.2.2.1 Demographic and Employment Impacts

Demographic characteristics of the project area are expected to change in response to the in-migration of a transient construction workforce. As is described in Subsection 2.1.2, aside from occasional higher peak workforces, the normal on site construction workforce for the proposed CT/CC facility would range from 400 to 700 workers (see Table 2-1). Other workers would be required to support construction of the proposed gray water line and natural gas pipeline. During construction, most workers are expected to be drawn from the labor force that currently resides in the Shelby County area. However, specialty craft workers and laborers not available within the area would be expected to either temporarily relocate or commute to the project area to support the construction of the new plant and associated connected actions. In consideration of the size of the population within Shelby County and the short-term duration of construction, no significant impacts to local demographics are expected.

During operations, the proposed plant workforce is expected to be approximately 30 full time workers (see Table 2-1). Most of these workers would be obtained from the existing ALF workforce. Most other existing ALF workers would either be expected to be provided opportunities for employment within other TVA operating plants or would find employment elsewhere within the industries of the Shelby County area and the region. Because current and future employment at ALF represent less than 0.1 percent of the civilian labor force of Shelby County and the local employees represent less than 0.1 percent of the civilian labor force in the project area, potential impacts of the proposed CT/CC facility operation on the workforce of the region are considered to be minor and not significant.

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 CT/CC facility. Construction activities would entail a dramatic increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services. Depending on the configuration selected by TVA for the proposed CT/CC facility, construction costs may be as much as $1.5 billion dollars. Capital costs associated with the proposed action would therefore have direct economic benefits to the local area and region. Additionally, significant beneficial secondary impacts to the economy are also expected in conjunction with the multiplier effects of large capital construction activities.

Economic effects of changes in employment as described above would have a parallel effect on payroll. Based on expected employment levels, the payroll of ALF would be reduced from approximately $17 million dollars per year to $4.5 million dollars per year, and would have related adverse secondary effects on the economy.

Additionally, during plant operation, TVA is expected to provide tax equivalent payments annually to state and local governments in the region. While tax equivalent payment estimates have not yet been adjusted to account for the proposed CT/CC facility, it is expected that such payments to Tennessee likely would increase. Therefore, while some reductions in payroll taxes would occur with the proposed action, notable beneficial local and regional economic impacts are expected to occur in conjunction with the capital construction of the proposed plant and the long term tax equivalent payments made by TVA.

3.20.2.2.3 Housing

The majority of the workforce is expected to reside in the Shelby County area and would therefore, not require additional housing. However, the construction and operation of the proposed facility may result in a small demand for housing. According to the 2010 Census, approximately 20.8 percent of the existing housing units in the 10-mi vicinity are vacant and available for transient workforce. Transient housing options also include the use of hotels and motels within the vicinity. Hotel capacity in the 39 closest hotels within the 10-mi vicinity exceeds 5,000 units. Therefore, 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 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). The total labor force of the proposed plant during construction is expected to range from 400 to 700 workers with occasional higher peaks. Additional workers would be required to construct the gray water line and the MLGW natural gas pipeline. For the proposed plant and these other connected actions it is expected that most of the workers for the construction of the plant would be residents of the region and would therefore not require additional services. Other members of the workforce would be transient and would likely reside in existing built rental units or hotels. Because existing service levels and infrastructure capacities are already in place to meet the demands of transient workers, no additional impacts on community facilities or services would be expected during construction.

During operation, the permanent workforce of the operating gas plant is expected to range from 30 to 40 workers. This increase in workers for the new plant would be off-set by the reduction of the workforce at the existing ALF plant. Because the net change in the operational workforce is a reduction, no additional demands for community facilities or services would result from plant operation.

<u>Water and Wastewater Services</u>

Impacts to existing water and wastewater supply systems may be evaluated by examining the effect of construction and operation activities on capacity and community supply. Construction phase activities are expected to employ between 400 and 700 workers that will place an additional demand for water supply and wastewater treatment on existing community treatment and supply systems. Additionally, construction phase activities at the project site are expected to require additional water to support construction. According to the representatives of the Department of Public Works, the treatment plant has been planned for expansion and has sufficient capacity to meet the construction needs of the proposed CT/CC facility.

Demands of the transient population associated with the construction workforce on community wastewater treatment systems are also expected. Community water and wastewater systems are sized to serve the current demands of existing housing and hotel developments. Because the proposed construction and operational workforces are expected to either reside within existing homes or hotels within the Shelby County area, no substantively new demands for water and wastewater services are expected with the proposed project.

During operations, TVA would use gray water from the Maxson WWTP for approximately 80 percent of the total water needs of the proposed plant. The remaining 20 percent would be potable water supplied by MLGW. A CC plant would require between seven and 10 MGD of gray water. After use, TVA would return approximately 10 to 40 percent of the CC intake water (properly treated) back to the WWTP. According to the City of Memphis Department of Public Works (City of Memphis 2014b) the Maxson WWTP has the following characteristics related to treatment capacity:

- Total Rated Treatment Capacity = 90 MGD
- Average Daily Demand = 70 MGD
- Peak Demand = 160 MGD
- Minimum Daily Flow = 50 MGD

Blow-down from the cooling tower and other process wastewater at the plant will be discharged to the Maxson WWTP after receiving pre-treatment in accordance with City of Memphis requirements. Process wastewaters discharged to the Maxson WWTP would include blow down from the cooling tower and HRSGs. According to the representatives of the Department of Public Works, the treatment plant has been planned for expansion and has sufficient capacity to meet operational needs of the proposed CT/CC facility. Therefore, proposed plant operation on existing sanitary treatment systems is not expected to result in significant impacts.

Future plant operations are expected to require between 7 and 10 MGD of gray water for plant process water use. The City of Memphis and representatives of the Maxson WWTP have indicated that supplying gray water for use by the proposed plant is well within the capacity of the existing facility. Additionally, operational water use by the new plant will be offset in part by a reduction in the demand for wastewater treatment at the existing ALF plant. The Maxson WWTP currently considers the chemical characteristics of the existing ALF wastewater discharge in balancing its effluent composition to meet the requirements of its NPDES permit. Accordingly, it is expected that the elimination of these inputs from the existing ALF would require some modification or adjustment of their processes to ensure compliance with their NPDES permit limits. However, because the expected future demands of the proposed plant are well within the available capacity of the WWTP and in part offset by reductions in demand from the closure of ALF, no significant impacts are expected to existing wastewater treatment facilities.

3.20.2.2.5 Environmental Justice

<u>Proposed CT/CC Facility</u>

Figure 3-4 demonstrates that there are a number of block groups within the vicinity of the proposed project that meet the criteria for consideration as both minority and low income populations under EO 12898. In accordance with EO 12898, agencies should consider the potential for disproportionate impacts to low income or minority populations resulting from multiple or cumulative exposure to human health or environmental hazards in the affected population. Examples of such hazards include contact with a chemical (e.g., asbestos, radon), biological (e.g., *Legionella*), physical (e.g., noise), or radiological agents (CEQ 1997).

Reduction of emissions with the retirement of the three coal units, in accordance with the EPA Agreements, could immediately benefit these EJ populations and regional population by improving air quality in and around their communities. Because the proposed plant is located in a designated industrial complex that is bounded by the Port of Memphis to the north and the Mississippi River to the west, special populations subject to EJ considerations are not present to the north and west. As described above, the nearest minority and low income populations are located more than 0.9 mi east and southeast of the proposed CT/CC site.

In conjunction with the proposed action, the potential for exposure of minority populations to environmental impacts (air emissions, wastewater, noise, etc.) are minimized. Air emissions are notably reduced with the proposed action relative to the existing ALF operations, thereby enhancing environmental quality for all populations within the Shelby County region. Wastewater effects from the plant are also minimized and controlled by using/discharging to the Maxson WWTP and do not represent a potential for exposure to EJ populations. Similarly, potential exposures from the proposed CT/CC facility that are associated with solid and hazardous waste are minimized and controlled such that there is no potential for exposure to resident low income/minority populations near the proposed CT/CC site. Finally, noise expected to be emitted from the proposed operation of the plant would attenuate to acceptable levels at nearby populations. Therefore, while some emissions from the proposed plant are expected, they either contribute to general improvements to environmental quality (air emissions) or are confined and controlled such that they do not represent a potential adverse environmental hazards to EJ populations in the vicinity of the proposed CT/CC site.

It should also be noted that opportunities would be provided to residents with some construction phase employment, thereby providing potential positive impacts to area low income and minority populations. Plant construction may also result in adverse effects associated with noise; exposure to fugitive dust, exhaust emissions, vibrations, increased traffic and generation of solid wastes. However, these effects are primarily short term, and localized to the proposed plant site. Additionally, because dust control measures would be used and because noise attenuates to acceptable levels near the residential areas, no significant impacts associated with the construction and operation of the proposed CT/CC facility are expected to occur to EJ populations.

<u>Natural Gas Pipeline</u>

Figure 3-4 also identifies low income and minority populations in the vicinity of the proposed natural gas pipeline. Pipeline construction would temporarily result in construction related noise, exposure to fugitive dust, exhaust emissions, vibrations, and generation of construction-related wastes. Such potential impacts would impact the general population, but would not disproportionately affect minority or low income populations. The proposed pipeline is located within an existing developed corridor designated for utility use, and pipeline construction is of a relatively short-term duration. Mitigation measures include implementing BMPs for controlling fugitive dust and proper maintenance of construction equipment for controlling emissions; recycling of construction waste, to the extent possible; and, minimizing land disturbance, and removing construction debris in a timely manner. Therefore, no significant impacts to local minority and low income populations are expected from pipeline 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 workplaces. 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 distribution pipelines.

3.21.1 Affected Environment

The routine operations and maintenance activities at the existing ALF reflect a safety-conscious culture and are activities performed consistent with OSHA and TCA standards and requirements and specific TVA guidance. Personnel at ALF 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 ALF's safety record which shows over the past three years only five OSHA Recordable Cases and zero Lost Time Cases reported.

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

Anhydrous ammonia is used as a reagent in the SCR systems. The ALF has an anhydrous ammonia system that is subject to the OSHA Process Safety Management standard (29 *CFR* 1910.119) and EPA's Risk Management Program rules (40 CFR Part 68). The ALF has a Process Safety Management program to minimize the potential for the accidental release of ammonia stored on site at ALF. A 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 68 also are implemented.

The potential off site consequences and emergency response plan are discussed with local emergency management agencies. These programs are audited by TVA no less than once every three years and by EPA periodically. The RMP must also be revalidated at five-year intervals and a synopsis of the program resubmitted to EPA. ALF 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 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 the pipeline. 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 Alternative

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

3.21.2.2 Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC)

Construction activities in support of the proposed CT/CC facility would be performed consistent with standards as established by OSHA and TCA requirements. Additionally, construction of the proposed pipeline would be performed in accordance with the Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 or specific MLGW guidance. During construction, customary industrial safety standards as well as the establishment of appropriate BMPs and job site safety plans would describe how job safety will 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 CT/CC facility would adhere to TVA guidance and be consistent with standards established by OSHA and TCA requirements. The proposed CT/CC facility would implement health and safety practices that would address and manage the reduction or elimination of occupational and public health hazards through implementation of safety practices, training, and control measures. While the proposed plant would see a possible reduction in associated hazards from wastes generated, including solid wastes, liquid wastes, discharges and air emissions, all wastes would be managed in accordance with applicable federal, state and local laws and regulations and all applicable permit requirements.

Additionally, the proposed CT/CC facility would use aqueous ammonia rather than anhydrous ammonia as a reagent in the SCR systems. ALF has an anhydrous ammonia system that is subject to the OSHA Process Safety Management standard (29 *CFR* 1910.119) and EPA's Risk Management Program rules (40 CFR Part 68). In contrast, aqueous ammonia, which is proposed for use at the CT/CC facility is a considerably safer form of ammonia. Nonetheless, TVA would use a Process Safety Management program to minimize the potential for the accidental release of ammonia stored on site. A RMP currently in place at ALF would be used to prevent an accidental release of ammonia. Therefore, worker and public health and safety during operation would be maintained and impacts would be minor.

The operation of the proposed pipeline would follow the applicable standards as prescribed by OSHA and TCA requirements as well as the Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 or specific MLGW guidance. Implementation of operational pipeline safety would manage and address pipeline monitoring and control; implementation of pipeline maintenance and integrity programs; performance of field surveys and pipeline inspections; right of way maintenance; and public awareness. Therefore, worker and public health and safety during pipeline construction would be maintained and impacts would be minor.

3.22 Unavoidable Adverse Environmental Impacts

Construction and operation of the proposed CT/CC facility and gas pipeline 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 2.4) to further reduce potential adverse effects to certain environmental resources.

Construction activities would temporarily impact 150 ac of undeveloped lands for the laydown areas for the CT/CC facility and 427 ac during installation of the gas pipeline.

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 off site residents along the pipeline route. 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 CT/CC facility 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 conclusion of new facility decommissioning at the CT/CC site. 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 acreage disturbed during construction of the facility is larger than that required for the actual structures and other ancillary facilities because of the need for construction parking areas, and construction material staging and laydown areas. Preparation of these on-site areas coupled with noise from construction activities, may displace some wildlife 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 principal change in short-term use of the project area would be the loss of vegetation within the 73.3 ac of permanent impacts for the proposed facility. The area is zoned for heavy industrial use and currently is not used for agriculture and does not support woody vegetation; therefore there would be no losses to agricultural activities or timber production. Additionally, the proposed actions occur within a landscape subject to on-going human disturbance and maintenance, therefore the short-term use of the land for the CT/CC facility and gas pipeline is not expected to significantly alter long-term, productivity of wildlife or other natural resources. Since the location of the proposed facility is currently zoned for industrial use, once the facility is decommissioned, the land could be available for other industrial and non-industrial uses.

There would be long-term effects on land use within the pipeline corridor due to restrictions on construction within the corridor. The ROW cannot support building construction for the life of the project, however this is an already existing utility corridor; therefore, there are no changes in long term uses.

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 ROW 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 CT/CC facility is not irreversibly committed because once the plant ceases operations and the facility is decommissioned, the land supporting the facilities could be returned to other industrial or nonindustrial uses. Similarly, the ROW for the gas pipeline would be committed irretrievable, but the 92 ac of ROW could be returned to other uses upon retirement of the line.

The materials used for the construction of the proposed site 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 CT/CC facility. 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

3.25.1.1 Identification of the Significant Cumulative Effects Issues

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 an already cleared landscape (i.e., the proposed CT/CC site) within an industrial park and within a previously developed ROW that is maintained in an early-successional state. 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, air quality, geology/soils hazardous materials/waste, floodplains, sensitive species, visual effects, noise, land use and 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, 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 Shelby County in the Vicinity of the Proposed CT/CC facility and the Proposed Gas Pipeline*. This geographic area provides an appropriate framework for the consideration of potential cumulative effects to terrestrial vegetation. This geographic area includes near off site areas and the 10-mi radius within Shelby County and encompasses lands on the proposed CT/CC site, near off site areas proposed for use as laydown during construction, and the existing MLGW ROW.

2. *Waters and Wetlands within McKellar Lake 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 CT/CC site, and wetland/aquatic resources potentially modified by the pipeline 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 3-35. 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. Several reasonably foreseeable actions (i.e., the North Second Street Corridor Improvement Project, and the Kirby Parkway Project) were identified within Shelby County, but these actions were eliminated from further consideration as they were outside the geographic areas of analysis.

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 3-35. 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 Maxson WWTP	Operations of T.E. Maxson Wastewater Treatment Facility including planned expansion	Past, Present, Reasonably Foreseeable Future
Existing MLGW TL Corridor	Gas and electric TL corridor located south and southeast of the existing ALF site	Past, Present, Reasonably Foreseeable Future
Operations of Frank C. Pidgeon Industrial Park	Operations within Frank C. Pidgeon Industrial Park including Nucor Steel, landfill, CN/CSX intermodal facility, etc.	Past, Present, Reasonably Foreseeable Future
Operations of Port of Memphis	Development and operations associated with Port within Presidents Island complex	Past, Present, Reasonably Foreseeable Future

3.25.3.1 Operations of the T.E. Maxson WWTP

The T.E. Maxson WWTP is located on lands immediately west of ALF. The plant began operation in 1975 and treats an average of 70 MGD of wastewater. The treatment regime currently consists of coarse bar screens, grit removal, fine bar screens, and primary treatment followed by high rate trickling filters, conventional activated sludge, and secondary clarification. Treated wastewater is discharged into the Mississippi River while the primary and waste activated sludge is sent to a covered lagoon system for anaerobic digestion. The digested sludge is dewatered and applied on-site at a location immediately east of the proposed CT/CC facility (City of Memphis 2014). In addition to the 80-ac area occupied by the Maxson WWTP, the City of Memphis also operates the 1000-ac Earth Complex located to the southeast of the proposed CT/CC site. This area is used for disposition of sludge and dirt from the wastewater treatment plant. Disposition is accomplished by excavating dirt and mixing it with sludge from operation of the plant and then spreading it out to dry. In addition, the City has reserved 120 ac immediately south of the wastewater treatment plant for future expansion (E.W. Moon Inc. 2008).

3.25.3.2 Existing MLGW Gas and Electric Transmission Line

The existing TL corridor extending south and southeast of the proposed project is a past action that also has on-going impacts as a result of vegetation maintenance. The existing line includes lattice-type structures that cross lands within the Frank C. Pidgeon Industrial Park and developed residential lands to the east. The proposed gas pipeline would be developed entirely within this established ROW. Previous installation of the existing gas and electric transmission lines included the clearance of trees and other woody vegetation under the structures and along the corridor. On-going vegetation maintenance within the corridor has kept it in an herbaceous condition free from trees and woody vegetation.

3.25.3.3 Operations of Frank C. Pidgeon Industrial Park

The Frank C. Pidgeon Industrial Park is a zoned industrial park located in the extreme southwest corner of Memphis. It is bounded on the north by McKellar Lake, on the west by the Mississippi River, on the east by the Canadian National Railroad, and the Mississippi State line on the south. All of the area lies within the Mississippi River flood plain. The park is protected from Mississippi River flooding by a levee system and encompasses a total of 5,620 ac. The industrial park contains a number of developed uses including the existing ALF plant, the Maxson WWTP, Nucor Steel, Electrolux, the City of Memphis Earth Complex, the CN/CSX intermodal facility, and other zoned industrial sites (E.W. Moon Inc. 2008).

3.25.3.4 Port of Memphis Operations

Commercial Port of Memphis operations are a past, present and future action within the project area immediately north of the existing ALF site. Port operations impose a variety of continuing stressors on the ecosystem of McKellar Lake and the adjoining Mississippi River ecosystem associated with barge movement and activities. These stressors typically include physical forces (i.e., shear, pressure), wave induced shoreline erosion, drawdowns, entrainment mortality of planktonic life forms, and sediment re-suspension (USACE 2004).

3.25.4 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the proposed CT/CC site and the natural gas pipeline location 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 degraded condition of the existing water resource. As is described in Subsection 3.12.2, there are water quality concerns including fish consumption advisories in many of the stream segments in the Horn Lake – Nonconnah watershed. In particular, the Nonconnah Creek Basin (HUC 08010211) includes 22 separate water body segments and is on the TDEC 303d list of impaired waters. The condition of these surface waters is a function of the contributing effects of many “other” actions within their watersheds that have resulted in habitat alteration, pollutant loading, and degraded 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 expansion of the Maxson WWTP, future developments within the Frank C. Pidgeon Industrial Park, and future operations of the of Port of Memphis have the potential to contribute to additional impacts to water quality. Future expansion of the Maxson WWTP and additional development within the industrial park would be expected to result in land disturbance and runoff to interior drainage systems and water bodies. On-going operations of the Port of Memphis would entail continued barge operations within McKellar Lake and the Mississippi River.

Under the proposed action, no surface waters would be directly impacted by construction of the proposed CT/CC facility or its laydown areas, and surface water use by ALF would be discontinued. Instead, gray water would be obtained from the Maxson WWTP for use in condenser cooling. For the proposed gas pipeline, it is expected that five waterbodies including Horned Lake Cutoff, Roboco Lake and Horned Lake Creek would be crossed using a directional drilling method, thereby avoiding impacts to water resources. Additionally, 10 smaller intermittent streams would be crossed by trenching methods that would incorporate BMPs to minimize impacts to surface water and water quality. Trenching activities associated with pipeline construction in the industrial park may be expected to result in some minor stormwater runoff and pollutant loading to interior drainage systems and water bodies. However, use of BMPs during construction would reduce such effects that the cumulative impacts are not significant.

Overall, the proposed CT/CC facility would not directly impact water resources, but would reduce overall water use by closure of the existing ALF plant, and avoid/minimize impacts associated with pipeline construction. The proposed action would not result in changes to current discharges from other facilities within the Frank C. Pidgeon Industrial Park that may be currently affecting surface water quality. Therefore, 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 future developments within the Frank C. Pidgeon Industrial Park and on-going operations of the Port of Memphis, have the potential to contribute to additional impacts to wetlands. Future development within the industrial park may result in unavoidable adverse effects to wetlands. However, such potential effects are expected to be reduced by avoidance and minimization measures. Unavoidable impacts are expected to be minor and subject to mitigation in accordance with Section 404 permitting requirements. Accordingly, potential future impacts to wetlands within the area would be expected to be minor and mitigated. On-going operations of the Port may be expected to exert continued stresses on the aquatic environment in conjunction with the effects of localized pollutant loading and barge operational impacts.

As described in Section 3.10, proposed construction activities have the potential for impacting wetlands and aquatic ecosystems by direct impacts from filling; trenching activities associated with gas line construction; and on-going periodic ROW maintenance activities. However, projected actions would be temporary and would impact less than 0.01 percent of wetlands within the Wolf River watershed and Mississippi Valley Loess Plains ecoregion. Additionally, potential impacts to wetlands associated with laydown areas and the proposed gas pipeline would be temporary and subject to use of BMPs and restoration measures that minimize long term impacts. No additional long term impacts to wetlands would occur that could contribute to regional trends in wetlands losses. Because impacts of the proposed CT/CC facility and the MLGW natural gas pipeline are minor and temporary, and because additional potential future development within the industrial park is expected to avoid, minimize or compensate for unavoidable impacts, cumulative effects to wetlands are not expected to be significant.

On-going activities at the Port of Memphis would have continuing stressors on the local aquatic ecosystem. However, use of raw water and the related impingement and entrainment of fishes would be discontinued with the proposed action, resulting in a minor beneficial effect on the aquatic resources of McKellar Lake. Therefore, a minor beneficial cumulative effect would occur to aquatic ecosystems 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 permanent effects to the proposed CT/CC site and temporary effects to laydown areas and the existing MLGW ROW. However, terrestrial ecosystems within these impacted areas and the surrounding lands within the Frank C. Pidgeon Industrial Park are generally previously disturbed and of low quality (see Section 3.5). Because all proposed construction activities would occur within an existing developed ROW or in other previously disturbed lands, 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)**
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Experience:	Professional Engineer and Certified Planner, 14 years in NEPA Compliance

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4.2 Other Contributors

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Federally Recognized Tribes

- The Chickasaw Nation
- Choctaw Nation of Oklahoma
- Jena Band of Choctaw Indians
- United Keetoowah Band of Cherokee Indians in Oklahoma

State Agencies

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- Kevin Brown, State Conservationist, Natural Resources Conservation Service
- David Draughon, Tennessee Department of Environment and Conservation, Division of Water Supply
- Terry Oliver, Deputy Commissioner, Tennessee Department of Agriculture, Ellington Agricultural Center
- Matthew Kisber, Commissioner, Tennessee Department of Economic and Community Development
- Paul Davis, Director, Tennessee Department of Environment and Conservation, Division of Water Pollution Control
- Robert Martineau, Commissioner, Tennessee Department of Environment and Conservation
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- Jennifer Barnett, State Historic Preservation Officer, Tennessee Division of Archaeology
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- David McKinney, Chief, Environmental Services Division, Tennessee Wildlife Resources Agency
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- Memphis Hispanic Chamber of Commerce
- Dr. Atkins, Billy Smith & Wasim Khokhar, Memphis/Shelby County Air Pollution Control
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- Mike Ball-AL House of Representatives (AL Governor appointee)
- Greg Cable-Graham County (NC) Manager (NC Governor appointee)
- Jean Elmore-Retired (MS Governor appointee)
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- Brock Hill-TDEC (TN Governor appointee)
- Mark Hommrich-Volunteer Barge & Transport
- Mark Iverson-Bowling Green Municipal Utilities
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- Brad Kreps-Nature Conservancy
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- Anne Davis-Southern Env. Law Center
- Wayne Davis-UT College of Engineering
- Catherine Glover-TN Chamber of Commerce & Industry
- Rodney Goodman-LifeSkills
- Jason Keith-MS Energy Institute & School of Chemical Engineering MS State University
- Wes Kelley-Columbia Power & Water Systems
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- Len Peters-Energy & Environment Cabinet (KY Governor appointee)
- Goodrich Rogers-Jackson County Econ. Dev. Authority
- Joe Satterfield-Retired (GA Governor appointee)
- Jack Simmons-TVPPA
- Stephen Smith-SACE
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Appendix A
Detailed Maps of Proposed Natural Gas Pipeline ROW

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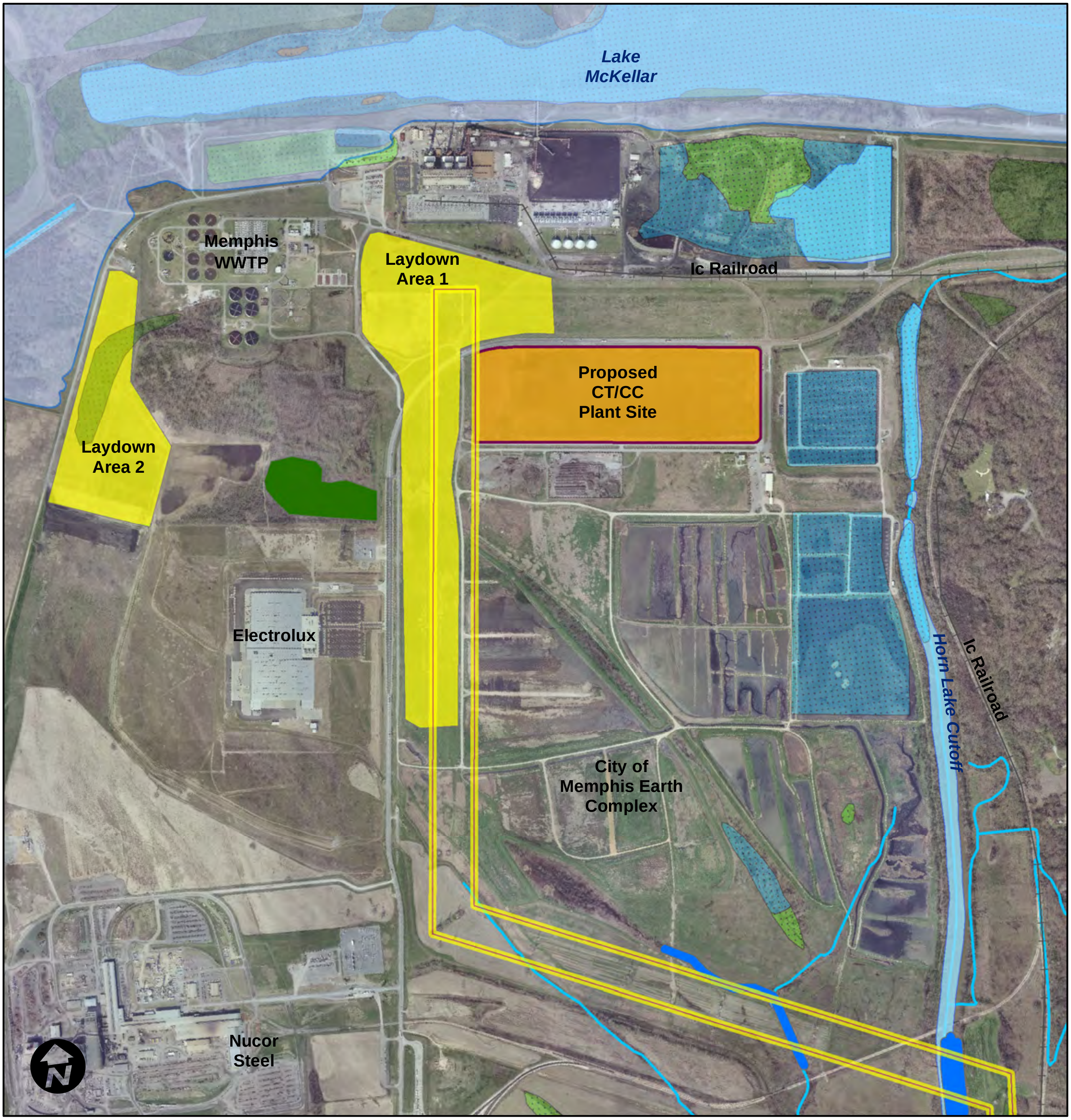

Legend

Field Delineated Stream

Field Delineated Wetland

- Forested/ScrubShrub/Emergent
- Emergent
- Stream Channel

- School
- Railroad
- USGS River/Stream
- Lake/Pond
- MLGW Right of Way
- Laydown Area
- Proposed CT/CC Plant Site
- 100 Year Floodplain

Wetland Type (NWI)

- Open Water
- Emergent
- Forested
- Scrub Shrub

Sheet 1 of 10

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Feet

TVA

TVA Allen Fossil Plant
Emission Control
Environmental Assessment

Job No.	3050140238
Drawn By:	BSM
Reviewed By:	WJE
Date:	7/24/2014

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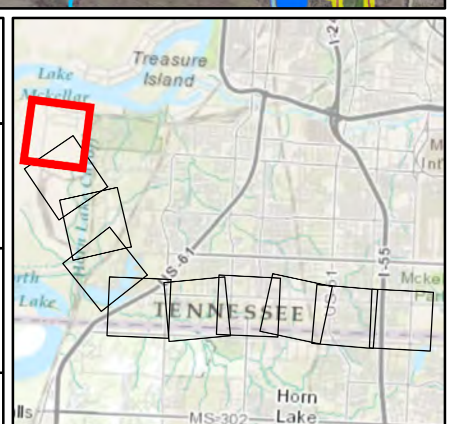

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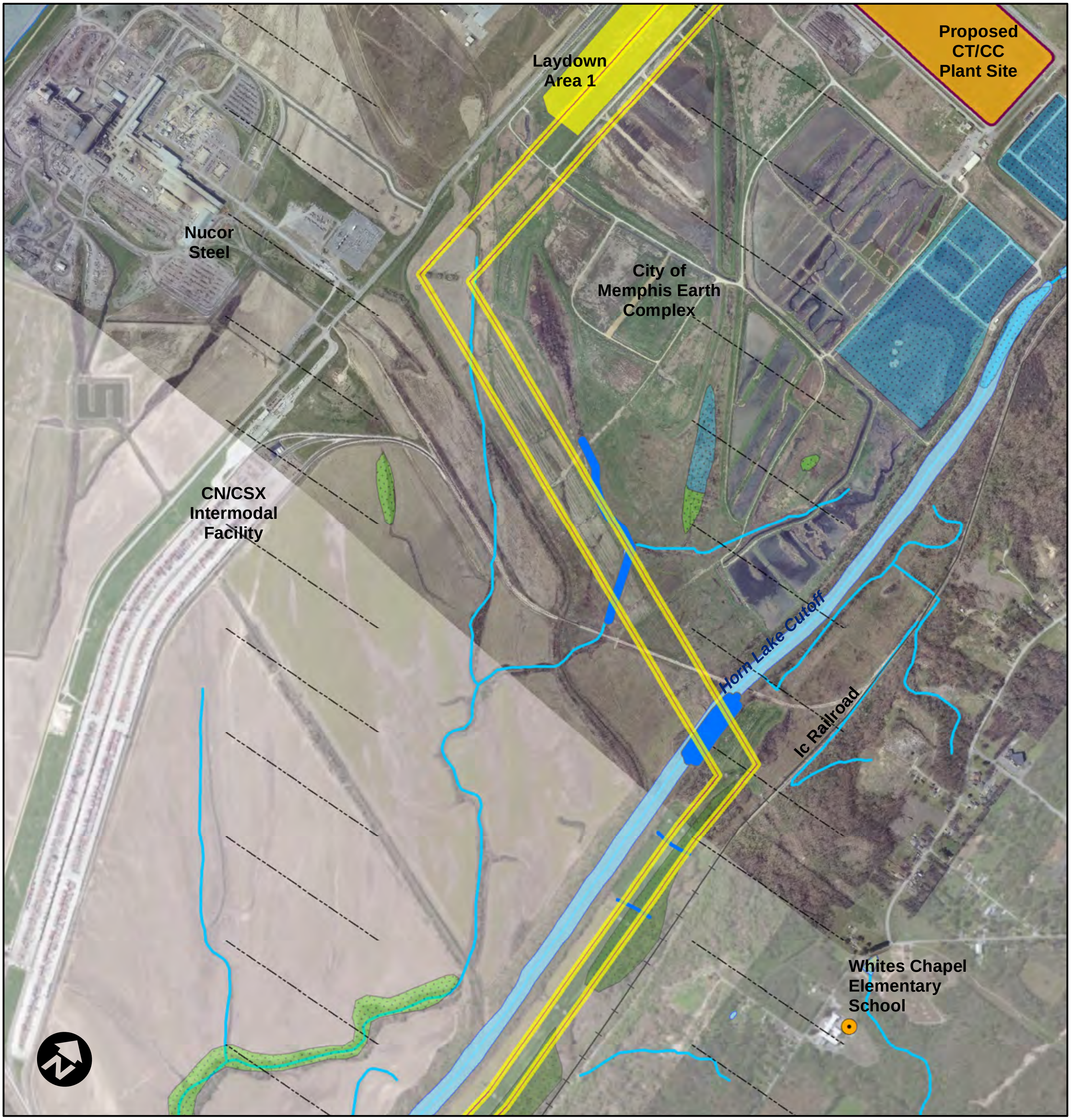

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Field Delineated Stream

Field Delineated Wetland

- Forested/ScrubShrub/Emergent
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Wetland Type (NWI)

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Sheet 2 of 10

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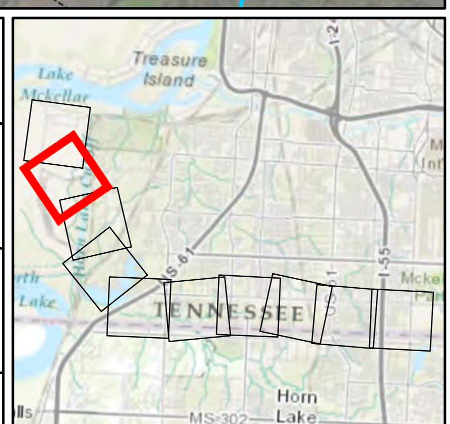

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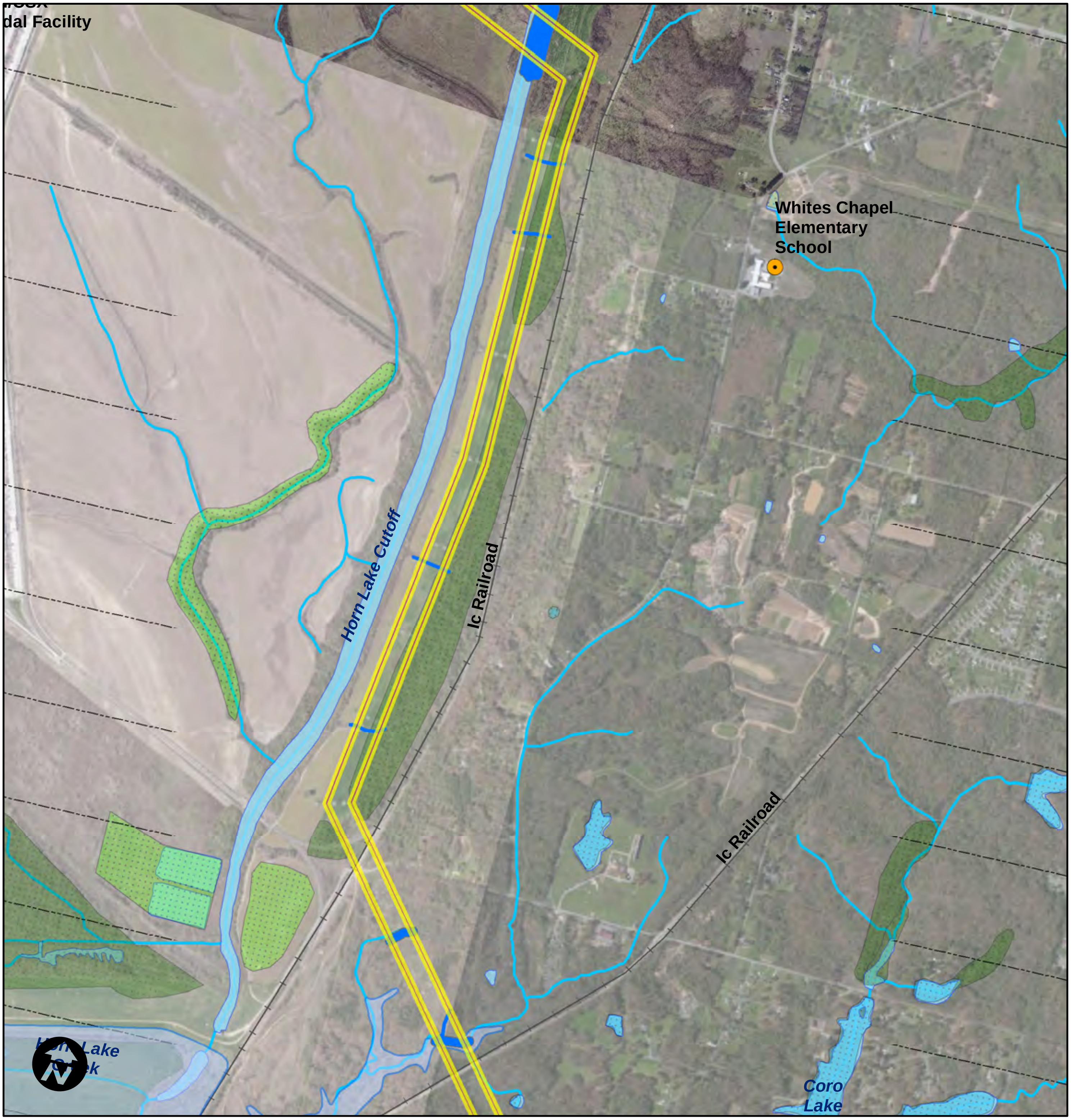

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Field Delineated Wetland

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Wetland Type (NWI)

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Sheet 3 of 10

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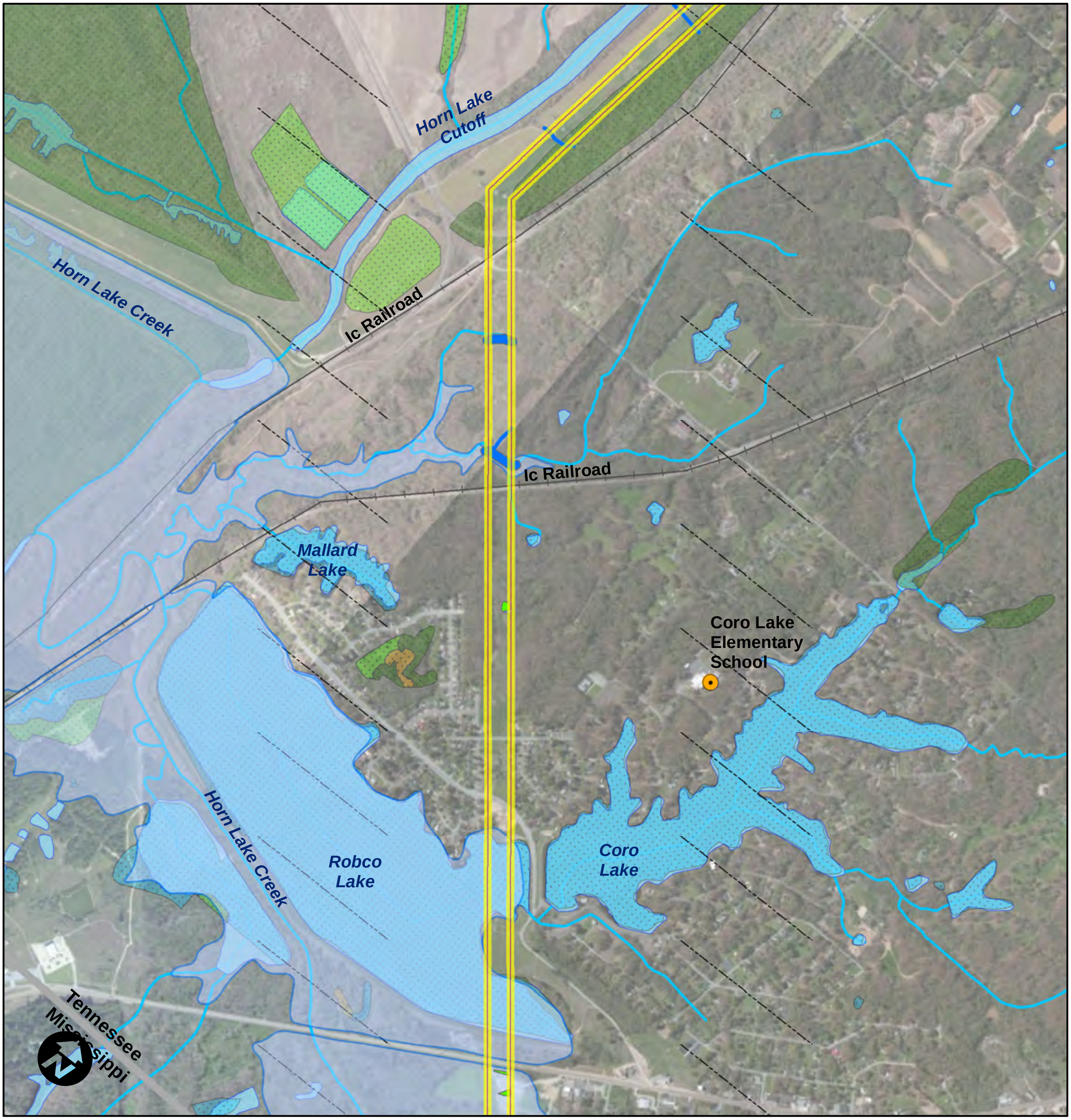

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Wetland Type (NWI)

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Sheet 4 of 10

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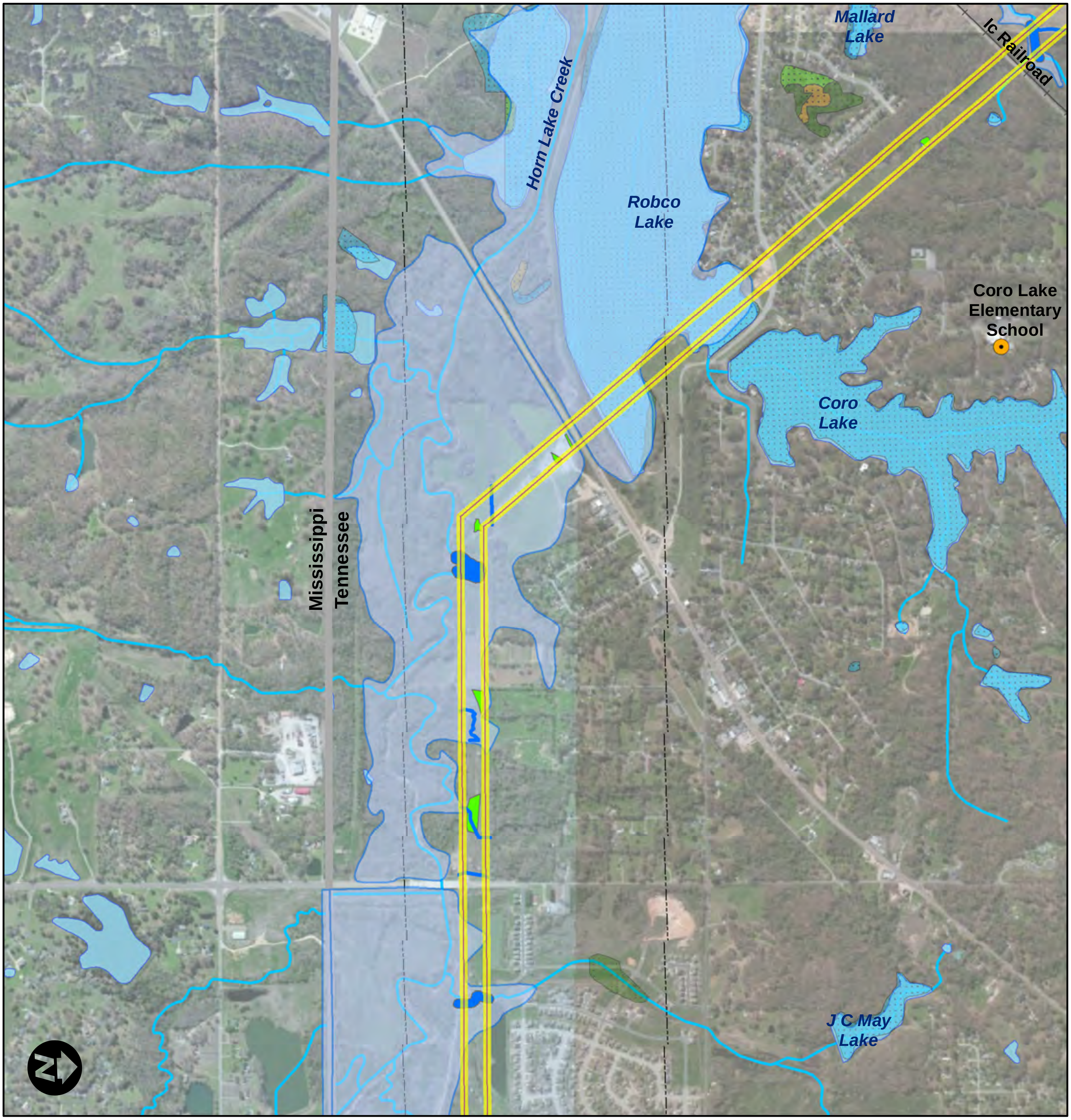

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Sheet 5 of 10

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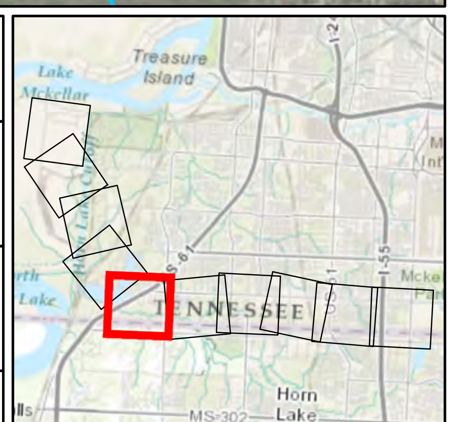

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Sheet 6 of 10

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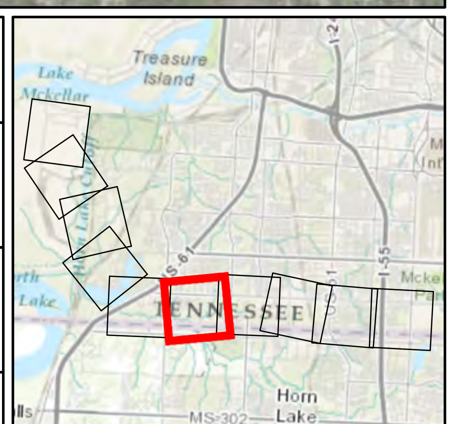

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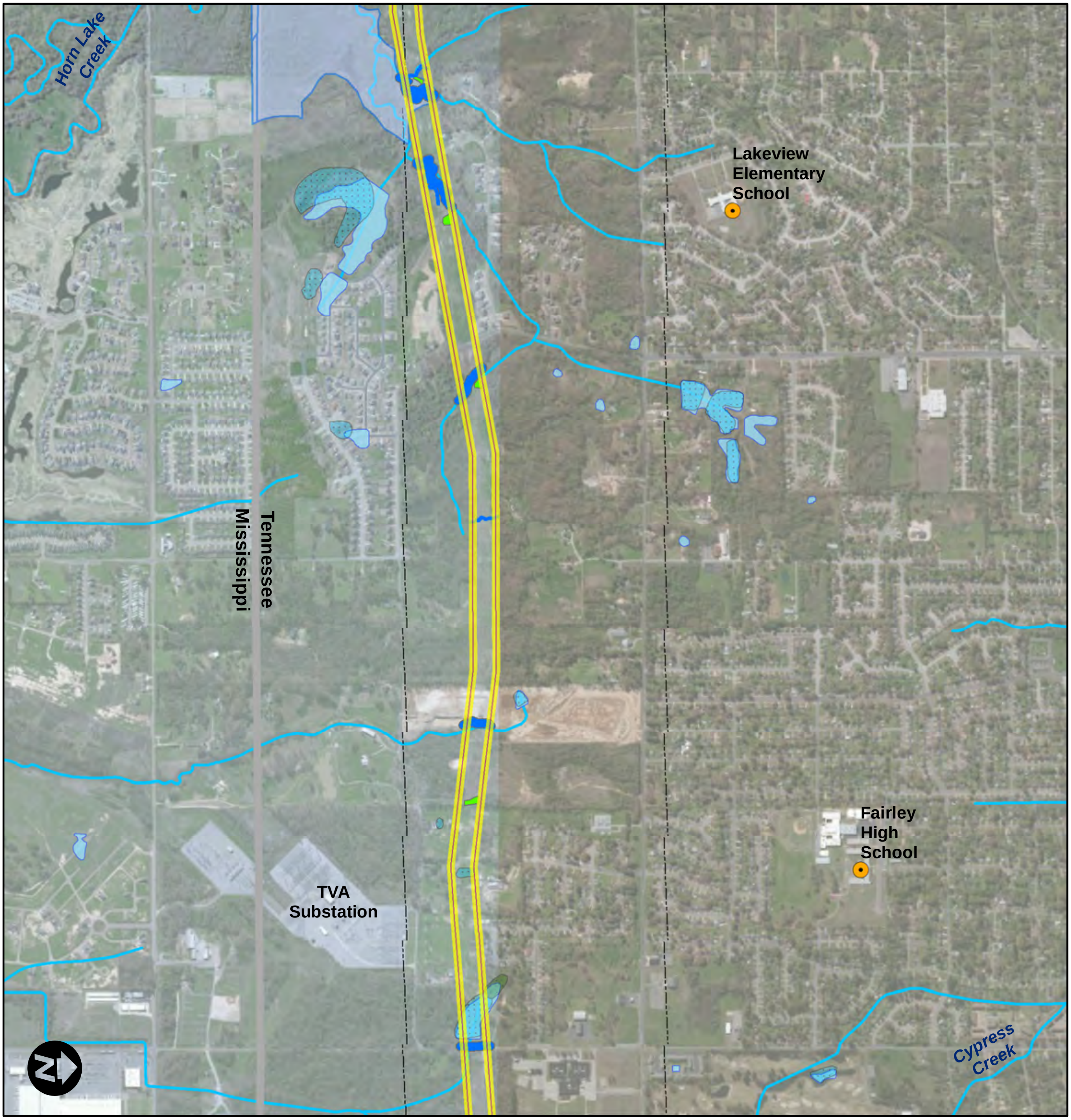

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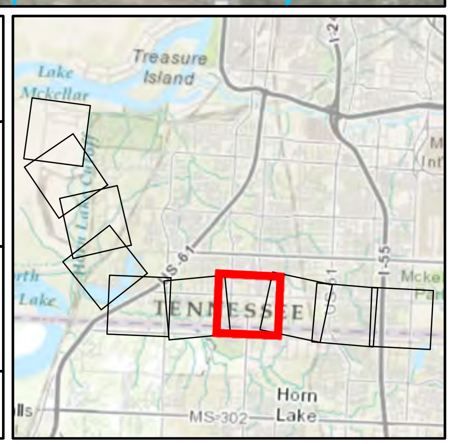

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Sheet 8 of 10

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**TVA Allen Fossil Plant
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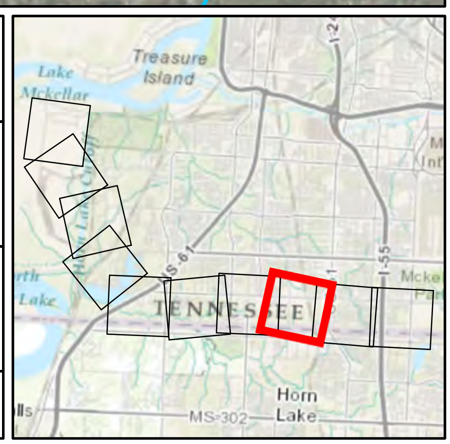

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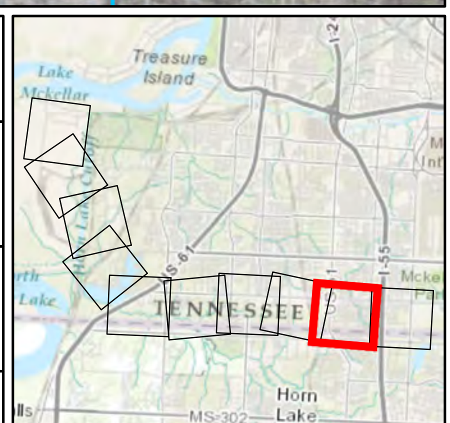

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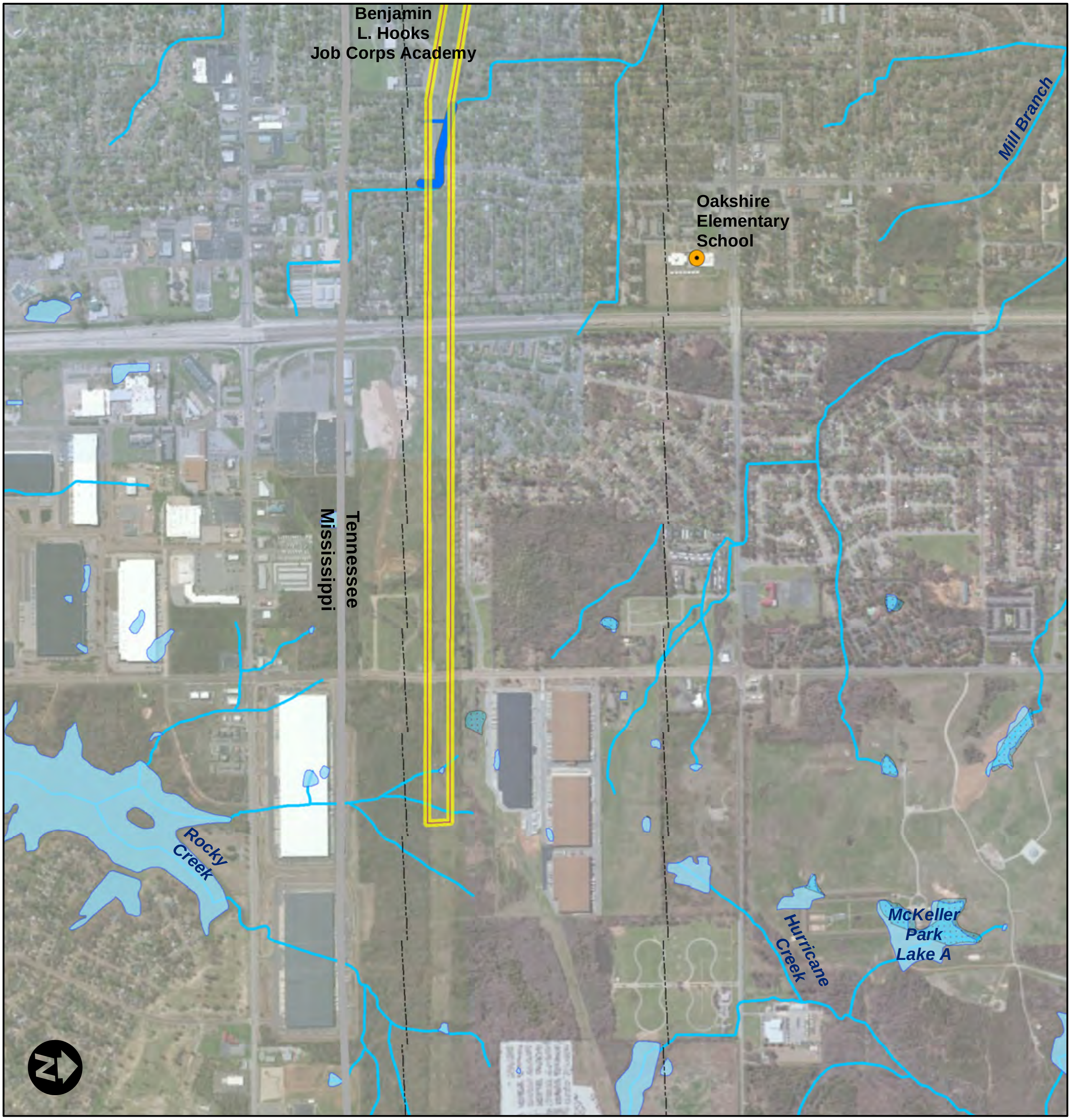

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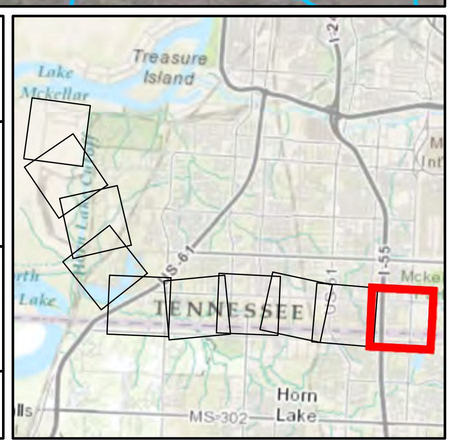

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Appendix B
Supplemental Information Regarding Off Site Transmission and Construction Power Supply

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Appendix B: Supplemental Information Regarding Off-Site Transmission and Construction Power Supply

1.0 Introduction

Additional off-site transmission improvements may be required based upon future decisions made by TVA and external analyses of the need for improvements to the transmission infrastructure by MLGW. Future decisions by TVA regarding the type of facility to be constructed on the proposed CT/CC facility site will determine the electric output of the facility. Based upon that decision, TVA will coordinate with MLGW who would conduct detailed studies to evaluate needed improvements to their regional transmission system to maintain system stability and integrity. Final planning, design and construction of any needed transmission improvements would be conducted by MLGW.

While specific improvements to the regional transmission system cannot be determined at this time, information is available to describe the range of actions and improvements that may be needed. Various uprate activities that may be conducted include: moving features that interfere with clearance, replacing and/or modifying existing structures, installing intermediate structures, modifying or replacing some of the existing conductor in order to increase ground clearance, adding fill rock or dirt (surcharge) around the base of existing structures, and working with the local power companies to modify their lines.

If future studies indicate that a new transmission line must be constructed, the process of siting the proposed transmission line would follow basic steps used by TVA to determine transmission line route. Prior to completing transmission line upgrades, however, site-specific reviews would be conducted to further investigate potential effects to the environment. If warranted, tiered NEPA documentation would be prepared.

2.0 Description of Current System and Needs

The current transmission system within the project area is made up of both high-voltage and distribution lines. MLGW provides electrical service within the City of Memphis and Shelby County, Tennessee through a network of 23 and 115-kV underground cable systems and 115 and 161-kV transmission lines. A system of 12 and 23-kV substations are interspersed throughout MLGW's service area and operated in conjunction with the aforementioned transmission cables and lines. TVA operates one 500-kV transmission line (Freeport-West Memphis), a series of 161-kV transmission lines and metering, microwave, and substations throughout the project area. Two transmission line corridors containing nine 161-kV transmission lines currently exist at the Allen Fossil Plant; one exiting from the south and one exiting from the east. TVA maintains ownership of only one of the 161-kV transmission lines (Allen Fossil Plant – Horn Lake), the remainder are owned by MLGW.

2.1 Identification of Affected Transmission Assets and Potential Upgrades

Both TVA and MLGW plan their transmission system according to industry-wide standards provided by the North American Electric Reliability Corporation (NERC) and the National Electrical Safety Code (NESC). The standards state that the system must be able to survive single-failure events while continuing to serve customer loads with adequate voltage and no overloaded facilities while maintaining adequate line clearances. Preliminary studies by both TVA and MLGW, however, indicate that the operation of the proposed CT/CC facility would require various upgrades throughout a four-county region (Lauderdale, Shelby, Tipton, and Weakley) to prevent overloading of the existing transmission system. While the general type of upgrade necessary is known (i.e., transmission line 'uprate' or substation 'equipment replacement'), further study is necessary to define specific engineering solutions at individual structures or spans along the length of the affected transmission lines. Section 2.2 below describes several types of work activities that can make up transmission line uprates.

Depending on the final configuration and additional electrical capacity of the proposed CT/CC plant, additional right-of-way and new transmission assets may be required to be constructed and operated. Similar to the general characterization of the type of transmission line upgrades, further study is necessary to define whether a new transmission line is necessary, and if it is, where a specific transmission corridor would be located. Sections 2.3 to 2.4 below describe the transmission siting process as well as the general construction, operation, and maintenance activities that would be used and employed in the event a new transmission line is required.

2.2 Description of Various Uprate Activities

Uprates are typically performed to increase electrical capacity of an existing transmission line and include the following: moving features that interfere with clearance, replacing and/or modifying existing structures, installing intermediate structures, modifying or replacing some of the existing conductor in order to increase ground clearance, adding fill rock or dirt (surcharge) around the base of existing structures, and working with the local power companies to modify their lines.

- *Moving Structures that Interfere with Clearance*: As more electricity is transmitted through the transmission line, the conductor temperature rises and the transmission line may sag. Structures located within the ROW may interfere with the ability to operate the transmission line safety and would be required to be moved.
- *Replacement or Modification of Existing Structures or Installation of Intermediate Structure*: Typical structure replacement, extensions or installation of intermediate structures is performed with standard transmission line equipment such as bulldozers, bucket trucks, boom trucks, and forklifts. The end result of this work is that the existing conductor is raised to provide the proper ground clearance. Disturbance is usually limited to an approximately 100 foot circumference around the work structure.
- *Conductor Modification*: Conductor modifications include conductor slides, cuts, or floating dead-ends to increase ground clearance. A cut involves removing a small amount of conductor and splicing the ends back together. A slide involves relocating the conductor clamp on the adjacent structure a certain distance toward the area of concern (i.e., "sliding" the clamp). No conductor is removed. A floating dead-end shortens the suspension insulator string of a structure to gain elevation at

the attachment point of the conductor, increasing a span's clearance. These improvements require the use of a bucket truck; disturbance is minimal and confined to the immediate area of the clearance issue.

- *Conductor Replacement*: If the existing conductor size cannot support the transmission line's electrical load, conductor must be replaced. Bucket trucks are utilized for access and stringing equipment. Reels of conductor would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road crossings to reduce interference with traffic. The new conductor would be connected to the old conductor and pulled down the transmission line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys. Wire pulls vary in length but are limited to a maximum of five mile pulls. Pull point locations depend on the type of structures supporting the conductor as well as the length of conductor being installed and are typically located along the most accessible path on the ROW (adjacent to road crossings or existing access roads). The area of disturbance at each pull point typically ranges from 200 to 300 feet along the ROW.
- *Adding Surcharge*: Adding rock or dirt (surcharge) to structure footing is sometimes required when height and/or loading modifications are made to a structure. These changes can create uplift on the existing tower footings or grillage, therefore requiring a stone base settlement to be placed around the existing footings. The additional burden prevents the tower from rising under certain conditions (i.e., weather conditions or conductor loading). Typical installation of surcharge is performed with tracked equipment with minimal ground disturbance. The stone is piled around the footings as required and the depth varies depending on the uplift on the affected structures.
- *Modification of Local Power Company Transmission Lines*: Local utilities distribution lines can intersect TVA transmission lines. If the local utility crossing does not have adequate clearance, TVA requests that the local utility lower or re-route the crossing.

After the required uprate work is completed, the ROW is revegetated using native, low-growing plant species in appropriate areas. Areas such as pasture, agricultural fields, or lawns are returned to their former condition.

2.3 Transmission Siting Process

If future studies indicate that a new transmission line must be constructed, the process of siting the proposed transmission line would follow basic steps used by TVA to determine transmission line route. These include the following:

- Define the study area,
- Collect data to minimize potential impacts to cultural and natural features,
- Locate potential connection points to TVA or MLGW transmission infrastructure,
- Generate general route segments that produce potential routes,
- Gather public input, and

- Incorporate public input into the identification of the transmission line route.

The first step in defining the study area is to identify connection points to the existing TVA or MLGW transmission system. These connection points could occur at existing transmission assets, or require the construction of new switching stations or substations to connect to the system. The study area will then be characterized in a variety of terms like, for example, environmental and cultural features, land use, and transportation features.

Data will be collected into a geographic information system (GIS), including United States Geological Survey (USGS) digital line graphs, and County tax maps. Typically aerial color orthophotography of the study area will be taken and images geo-referenced and digitized for use in the GIS. The photography will then be interpreted to obtain land use and cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. The use of GIS allows substantial flexibility in examining various types of spatially superimposed information. This system allows the multitude of study area factors to be examined simultaneously for developing and evaluating numerous options and scenarios to select the route or routes that would best meet project needs, which includes avoiding or reducing potential environmental impacts.

TVA uses a set of evaluation criteria that represent opportunities and constraints for development of transmission line routes. These criteria include factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and ROW acquisition costs being the most important elements. Application of these constraints is flexible, and TVA can, and does, deviate from them. Identifying feasible transmission line routes involves weighing and balancing these criteria and making adjustments to them as specific conditions dictate.

TVA develops a public communication plan that includes a web site with information about the project, a map of the alternative routes, and feedback mechanisms. Public officials are briefed on the project and property owners who could potentially be affected by any of the proposed alternatives are invited to a project Open House. Local news outlets are used to notify other interested members of the public of the Open House.

A 30-day public review and comment period is typically held following the Open House where TVA accepts public comments on the alternative transmission line routes and other issues. At the conclusion of the comment period, TVA may adjust the segments in response to the comments received and a preferred alternative route is announced. Affected property owners will then be mailed information showing the location of the preferred route on their property.

2.4 General Description of Right-of-Way Acquisition, Transmission Line Construction, Operation, and Maintenance

Right-of-Way Acquisition and Clearing - A ROW utilizes an easement that would be designated for a transmission line and associated assets. This easement would have required maintenance to avoid the risk of fires and other accidents. The ROW provides a safety margin between the high-voltage conductors and surrounding structures and vegetation. Depending on where a transmission corridor is located, it can be a combination of entirely new ROW, expanded (parallel to existing) TVA or MLGW ROW, or existing but vacant TVA or MLGW ROW. ROW width depends on the voltage of the transmission line. 69-kV transmission line ROW typically extends 75 feet in width, while 161-kV and 500-kV ROW typically extend 100 and 175 feet in width.

Easements are purchased from landowners for the new ROW giving the utility the right to construct, operate, and maintain the transmission lines, as well as remove “danger trees” adjacent to the ROW. Danger trees include any trees that are located beyond the cleared ROW, but that are tall enough to potentially impact a transmission line structure or conductor should the trees fall toward the transmission line. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could continue to occur on the property. However, the terms of the easement agreement prohibit certain activities, such as construction of buildings and any other activities within the ROW that could interfere with the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, all trees and most shrubs would be removed from the entire width of the ROW. Equipment used during this ROW clearing would include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote-handling equipment, such as a feller-buncher, in order to limit ground disturbance. TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, Transmission Construction Guidelines Near Streams and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012) would provide guidance for clearing and construction activities.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable, utilizing appropriate seed mixtures as described in Muncy (2012). Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices B, C, and D, and in Muncy (2012). Failure to maintain adequate clearance can result in dangerous situations, including ground faults. Native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

<u>Transmission Line Construction</u> - Access roads would be needed to allow vehicular access to each structure and other points along the ROW during construction. Typically, new permanent or temporary access roads used for transmission lines are located on the ROW wherever possible, and are designed to avoid severe slope conditions and to minimize stream crossings. Access roads are typically about 20 feet wide and are surfaced with dirt, mulch, or gravel. Culverts and other drainage devices, fences, and

gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction. However, in wet-weather conveyances (streams that run only following a rainfall), they would be left or removed, depending on the wishes of the landowner or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions.

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage during construction. This area may be on existing substation property, if available, or may be leased from a private landowner for the duration of the construction period. Properties such as existing parking lots or areas used previously as car lots are ideal laydown areas because site preparation is minimal. Selection criteria used for locating potential laydown areas include an area typically 5 acres in size; relatively flat; well drained; previously cleared; preferably graveled and fenced; preferably wide access points with appropriate culverts; sufficiently distant from streams, wetlands, or sensitive environmental features; and located adjacent to an existing paved road near the transmission line. Trailers used for material storage and office space would be parked on the site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner.

The transmission structure is the most visible element of the electric transmission system. Its function is to keep an adequate distance between the high-voltage conductors and the surrounding area. The transmission line structure type would depend on the line voltage, terrain, and whether the line is single circuit or double circuit.

Three conductors (the cables that carry the electrical current) are required to make up a single-circuit in alternating-current transmission lines. As an example, for 161-kV transmission lines, each single-cable conductor is attached to porcelain insulators suspended from the structure cross arms. A smaller overhead ground wire or wires are attached to the top of the structures. This ground wire may contain fiber optic communication cables.

Poles at angles (angle points) in the transmission line may require supporting screw, rock, or log-anchored guys. Some angle structures may be self-supporting poles or steel towers, which would require concrete foundations. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used.

Equipment used during the construction phase would include trucks, truck-mounted augers, and drills, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations (such as areas with soft ground) to reduce the potential for environmental impacts.

Reels of conductor and ground wire would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

Transmission Line Operation and Maintenance - Periodic inspections of transmission lines are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are performed in order to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

Management of vegetation along the ROW is necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. For a 161-kV transmission line for example, TVA standards, based on NESC requirements, require a minimum vegetation clearance of 24 feet. Vegetation management along the ROW would consist of two different activities: felling of danger trees adjacent to the cleared ROW (as described above in the ROW Acquisition and Clearing Section), and vegetation control within the cleared ROW. These activities occur on approximately 3- to 5-year cycles.

Management of vegetation within the cleared ROW would include an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed for each transmission line segment, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied by helicopter or from the ground with backpack sprayers or vehicle-mounted sprayers.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the United States Environmental Protection Agency (USEPA) are used.

Other than vegetation management, little maintenance work is generally required. The transmission line structures and other components typically last several decades.

2.5 Environmental Impacts of Transmission Facility Upgrades, Construction, and Operation

As described in Section 2.2, preliminary studies by both TVA and MLGW indicate that the operation of the proposed CT/CC facility would require various upgrades to the existing transmission system and depending on the final configuration and additional electrical capacity of the CT/CC facility, possibly require the construction and operation of new transmission assets. Further study and detailed engineering analysis is required in order to define the specific transmission upgrades necessary for each section of affected line, or the required voltage and general corridor that a new transmission line might occupy, if needed. Site-specific environmental reviews will be conducted at the completion of that analysis to examine potential environmental consequences in more detail.

Following is a listing of generic impacts of these activities (Table 2-1). This listing was compiled by reviewing the Environmental Impact Statements (EISs), Environmental Assessments (EAs) and other project planning documents for TVA transmission construction activities completed between 2005-2010. The construction activities characterized include construction of new transmission lines, substations and switching stations; upgrades to existing transmission lines; and expansions of existing substations and switching stations.

Table 2-1. Generic Impacts of Transmission System Construction Activities

Environmental Resource	Transmission Lines	Substations and Switching Station
Land Use		
Land requirements	Average of 12.1 acres/line-mile, range 5.2 - 22.7	Average of 14.3 acres, range 1.8 - 53
Floodplain fill	0	Average of 0.02 acres, range 0 - 0.29
Prime farmland converted	0	Average of 5.1 acres, range 0 - 29.1
Land Cover		
Forest cleared	Average of 6.0 acres/line mile for new lines, range 0.4 - 11.9	Average of 0.68 acres, range 0 - 2.7
Wetlands		
Area affected	Average of 0.76 acres/line mile, range 0 - 1.6	-
Forest area cleared	Average of 0.24 acres/line mile of new line, range 0 - 1.1	-
Stream Impacts		
Stream crossing	Average of 2.1 per mile of new line, range 0 - 7.1 Average of 2.3 per mile of existing line, range 0 - 17.9	n/a
Forested stream crossing	Average of 1.0 per mile of new line, range 0 - 1.8	n/a
Endangered and Threatened Species	11 of 57 projects affected federally listed endangered or threatened species, or species proposed or candidates for listing 23 of 57 projects affected state-listed endangered, threatened, or special concern species	n/a
Historic Properties		
	11 of 57 projects affected historic properties	n/a

2.4 Potential Mitigation Measures

As previously described, TVA's siting processes for transmission facilities, as well as practices for modifying these facilities, are designed to avoid and/or minimize potential adverse environmental impacts. The following routine measures are employed to reduce the potential for adverse environmental effects during any upgrades to or construction and operation of transmission lines:

- To retard the introduction and spread of invasive species in the project area, TVA would employ the standard operating procedure of revegetating with noninvasive plant species.

- Wet-weather conveyances that could be affected by the proposed transmission line routes would be protected by implementing standard BMPs, as identified in Muncy (2012).

- TVA would utilize BMPs, as described by Muncy (2012), to minimize erosion during construction and operation.

- Herbicides and herbicide-related fertilizers with groundwater contamination warnings would not be used.

- In areas requiring chemical treatment, only USEPA-registered herbicides would be used, in accordance with BMPs and label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts.

- To minimize adverse impacts on natural and beneficial floodplain values, the ROWs would be revegetated where natural vegetation is removed, as described in TVA's *Environmental Quality Protection Specifications for Transmission Line Construction.*

- To minimize adverse floodplain impacts, any new road construction in the floodplain would be done in such a manner that upstream flood elevations would not be increased.

- Potential wetland impacts, as vehicles and heavy equipment traverse the wetland areas, would be reduced to an insignificant level during the transmission line construction and ROW maintenance activities through implementation of appropriate BMPs (Muncy 2012).

2.5 Required Permits and Licenses

Permitting and licensing requirements would be reviewed on a site-specific basis after further study confirms the specific upgrades necessary or where a specific transmission corridor would be located if the construction of a new transmission line were required. Generally, however, a permit would be required from the state of Tennessee and the applicable county and/or municipality for the discharge of construction site stormwater associated with the construction of the transmission line. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required for burning trees and other combustible materials removed during transmission line construction. A Section 404 Nationwide Permit would be obtained from the USACE for the discharge of dredge or fill into waters of the United States, if applicable. A permit would be obtained from TDOT for crossing state highways during transmission line construction.

Further, the project would be reviewed to ensure conformity with Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), the Farmland Protection Policy Act (FPPA), the National Historic Preservation Act (NHPA), the

Endangered Species Act (ESA), Section 404 of the Clean Water Act, and EO 12372 (Intergovernmental Review).

3.0 References:

Muncy, J A. 2012. *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby Wilson. Norris: Tennessee Valley Authority Technical Note TVA/LR/NRM 92/1. Retrieved from <http://www.tva.com/power/projects/bmp_manual_2012.pdf> (n.d.).

TVA, 2011a. *Integrated Resource Plan: TVA's Environmental & Energy Future*.

TVA, 2011b. *Environmental Impact Statement for TVA's Integrated Resource Plan: TVA's Environmental & Energy Future*.

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Appendix C
Water Body Crossing Procedures and Pipeline Testing, Reliability, and Safety Information

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Erosion and Sediment Control Plan (E&SCP) Excerpt-
ETNG Water Body & Wetland Crossing Procedures

5.2.5 Various Types of Crossings

Construction at waterbodies will be conducted using two principal crossing methods, a "dry" crossing and a "wet" crossing. The "dry" crossing procedure is further divided into a flumed crossing and a dam and pump crossing. These methods are designed to maintain downstream flow at all times and to isolate the construction zone from the stream flow by channeling the water flow through a flume pipe or by damming the flow and pumping the water around the construction area. The overall objective is to minimize siltation of the waterbody and to facilitate trench excavation of saturated spoil. Unless approved otherwise by the appropriate state agency, pipeline construction and installation must occur using one of the two "dry" crossing methods for waterbodies state-designated as either coldwater or significant coolwater or warmwater fisheries. The flumed and dam and pump crossing methods are applicable to waterbodies up to 30 feet wide at the water's edge at the time of construction. The two "dry" crossings are further described below in Sections 5.2.5.2 and 5.2.5.3.

The "wet" crossing procedure involves open cutting the waterbody without isolating the construction zone from the stream flow. The objective of this method is to complete the waterbody crossing as quickly as practical in order to minimize the duration of impacts to aquatic resources. All streams, their classifications, timing windows, and crossing procedures will be identified in the Clearance Package/Permit Book and on the construction drawings. Table 6-1 outlines the general procedures to be followed at all waterbody crossings.

5.2.5.1 General Crossing Procedures

1. Dewater trench in accordance with the procedures described in Section 3.5.6.
2. For minor waterbodies:
   a. Place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.
3. For intermediate waterbodies:
   a. Less than 30 feet in width, place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.

Waterbody Crossings *Page 5-4* *E and SC Plan Effective January 17, 2005.doc*

b. Greater than 30 feet in width, spoil may be temporarily sidecast into the waterbody provided that site specific approval is received from the appropriate permitting agency.

4. For major waterbodies:

   a. Place all upland bank spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt laden water into the waterbody.

5. Restore and stabilize the banks and channel in accordance with Section 5.2.6.

5.2.5.2 Flumed Crossing

The flumed crossing method utilizes a flume pipe(s) to transport stream flow across the disturbed area and allows trenching to be done in drier conditions (Figure 30). The flume pipe(s) installed across the trench will be sized to accommodate anticipated stream flows. This method is utilized for perennial waterbodies (minor and intermediate) up to 30 feet wide that are state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. Flumes are generally not recommended for use on a watercourse with a broad unconfined channel, unstable banks, a permeable substrate, excessive stream flow, or where the installation and construction of the flume crossing will adversely affect the bed or banks of the stream.

1. Cross all minor waterbodies that are state-designated fisheries, as identified in the Clearance Package/ Permit Book, using a dry crossing technique (Figures 30, 31).

2. All construction equipment must cross state-designated fisheries on an equipment bridge as specified in Section 5.2.2.

4. The flumed crossing shall be installed as follows:

   a. Install flume pipe(s) after blasting and other rock breaking measures (if required), but before trenching;

   b. Properly align flume pipe(s) to prevent bank erosion and streambed scour;

   c. Use sand bags or equivalent dam diversion structure to provide a seal at either end of the flume to channel water flow (some modifications to the stream bottom may be required to achieve an effective seal);

   d. **Do not remove flume pipe** during trenching, pipe laying (thread pipe underneath the flume pipe(s)), or backfilling activities, or initial streambed restoration efforts unless authorized by agency permits; and

   e. Remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

5.2.5.3 Dam and Pump Crossing

The dam and pump method is presented as an alternative dry crossing procedure to the flumed crossing. The dam and pump crossing is accomplished by utilizing pumps to transport stream flow across the disturbed area (Figure 31). This method involves placing sandbags across the existing stream channel upstream from the proposed crossing to stop water flow and downstream from the crossing to isolate the work area. Pumps are used to pump the water across the disturbed area and back into the stream further downstream. This method is intended for use at perennial waterbodies (minor and intermediate) up to 30 feet wide and state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. The dam and pump procedure allows for more space and flexibility during trenching and pipe installation, which shortens the duration of time spent at the waterbody.

1. The dam and pump method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the work area, and where there are no concerns about sensitive species passage.

2. Implementation of the dam and pump crossing method will meet the following performance criteria:

   a. Use sufficient pumps, including onsite backup pumps, to maintain downstream flows;

   b. Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);

   c. Screen pump intakes

   d. Prevent streambed scour at pump discharge; and

   e. Monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

3. The dam and pump crossing shall be installed as follows:

   a. Install and properly seal sandbags at the upstream and downstream location of the crossing;

   b. Create an in-stream sump using sandbags if a natural sump is unavailable for the intake hose;

   c. Initiate pumping of the stream around the work area prior to excavating the trench;

   d. Screen all intake hoses to prevent the entrainment of fish and other aquatic life;

   e. Direct all discharges from the pumps through energy dissipaters to minimize scour and siltation;

   f. Monitor pumps <u>at all times</u> until construction of the crossing is completed; and

   g. Following construction, remove the equipment crossing and sandbag dams.

5.2.5.4 Wet Crossing

This construction technique is typically used to cross waterbodies that are non state-designated as well as intermediate and major waterbodies with substantial flows that cannot be effectively culverted or pumped around the construction zone using the dry crossing techniques (Figure 32). Non-state designated waterbodies include perennial warmwater streams not considered significant by the state, intermittent drainage ditches, and intermittent streams.

The wet-ditch crossing shall be installed as follows:

1. For minor waterbodies:

   a. Equipment bridges are not required at non state-designated fisheries (e.g. agricultural or intermittent drainage ditches). However, if an equipment bridge is used, it must be constructed in accordance with Section 5.2.2;

   b. Limit use of equipment operating in the waterbody to that needed to construct the crossing;

   c. Complete trenching and backfilling in the waterbody (not including blasting and other rock breaking measures) within 24 continuous hours; and

   d. If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline. The 24-hour timeframe starts as soon as the flume is removed.

2. For intermediate waterbodies:

   a. Limit use of equipment operating in the waterbody to that needed to construct the crossing. All other construction equipment must cross on an equipment bridge as specified in Section 5.2.2; and

   b. Attempt to complete trenching and backfill work within the waterbody (not including blasting and other rock breaking measures) within 48 continuous hours, unless site-specific conditions make completion within 48 hours infeasible.

3. For major waterbodies:

   a. Company will develop site-specific crossing plans to be submitted for approval by the FERC and the appropriate permitting agency; and

   b. Construct the crossing in accordance with the measures contained in this Plan to the maximum extent practical.

5.2.6 Restoration

1. Return all waterbody banks to preconstruction contours or to stable angle of repose as approved by the EI.

2. Use clean gravel or native cobbles for the upper 12 inches of trench backfill in all waterbodies identified in the Clearance Package/Permit Book as coldwater fisheries.

3. For wet crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing the crossing. For dry crossings, complete bank stabilization before returning flow to the waterbody channel.

4. Limit the placement of riprap to the slopes along the disturbed waterbody crossing.

5. Install erosion control fabric along waterbodies with low flow conditions (Figure 33).

6. Revegetate disturbed riparian areas with conservation grasses and legumes in accordance with the recommended Upland Seed Mix in Appendix B. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes within 100 feet of waterbodies shall be mulched with 3 tons/acre of straw.

7. Remove all temporary sediment barriers when replaced by permanent erosion controls or when restoration of adjacent upland areas is successful as specified in Section 8.1.

8. Install a permanent interceptor dike and a trench plug at the base of slopes near each waterbody crossed. Locate the trench plug immediately upslope of the interceptor dike. Permanent interceptor dikes may not be installed in agricultural areas.

6. WETLAND CROSSINGS

6.1 Definition

The term "**Wetland**" as used in this Plan includes any area that satisfies the requirements of the current Federal methodology for identifying and delineating wetlands. Wetland areas have been delineated prior to construction and are identified on the construction drawings.

The wetland crossing procedures described in this Plan comply with the Section 404 Nationwide permit program terms and conditions (33 CFR Part 330). The requirements outlined below do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures including workspace and topsoiling requirements, will apply to these agricultural wetlands.

6.2 General Procedures

6.2.1 Clearing and Grading

1. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction drawings. With written approval from the FERC for site-specific conditions, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet.

2. Wetland boundaries and buffers must be clearly marked in the field with signs and /or highly visible flagging until construction-related ground disturbing activities are complete.

3. Restrict extra work areas (such as staging areas and additional spoil storage areas) to those shown only on the construction drawings. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. If site-specific conditions do not permit a 50-foot setback, the Company can receive written approval from the FERC to locate these extra work areas closer than 50 feet from the wetland.

4. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with DOT regulations.

5. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment or operate normal equipment on timber riprap, prefabricated equipment mats or terra mats on the working side of the ROW during clearing operations. Do not use more than two layers of timber riprap to stabilize the ROW.

6. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place. Immediately remove all cut trees and branches from the wetland and stockpile in an upland area on ROW for disposal.

7. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require removal of tree stumps from under the working side of the ROW.

8. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.

9. Cleared materials (slash, logs, brush, wood chips) shall not be permanently placed within wetland areas.

6.2.2 Temporary Erosion and Sediment Control

1. Install sediment barriers immediately after initial ground disturbance at the following locations:
   a. Within the ROW at the edge of the boundary between wetland and upland;
   b. Across the entire ROW immediately upslope of the wetland boundary to prevent sediment flow into the wetland;
   c. Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent, off ROW wetland; and
   d. Along the edge of the ROW as necessary to contain spoil and sediment within the ROW through wetlands.

2. Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete in accordance with Section 8.1.

6.2.3 Crossing Procedure

1. Minimize the length of time that topsoil is segregated and the trench is open.

2. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.

3. Perform topsoil segregation in accordance with Section 3.5.3.1 and trench dewatering in accordance with Section 3.5.6.

4. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

5. Use "push pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

6. Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.

7. Install a permanent interceptor dike and a trench plug at the base of slopes near the boundary between the wetland and adjacent upland areas. In addition, install sediment barriers as outlined in Section 3.5.2. Permanent interceptor dikes shall not be installed in agricultural areas.

8. Restore segregated topsoil to its original position after backfilling is complete. When required, additional fill material imported from off the ROW must be approved by the EI. The original wetland contours and flow regimes will be restored to the extent practical.

6.2.4 Cleanup and Restoration

1. Revegetate the ROW with annual ryegrass at 40 lbs/acre PLS or with the recommended Wetland Seed Mix in Appendix B, unless standing water is present.

2. **Do not use lime or fertilizer in wetland areas.**

3. Mulch the disturbed ROW only when required by the appropriate land management or state agency, as identified in the Clearance Package/Permit Book.

4. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons/acre of straw for a minimum of 100 feet on each side of the crossing.

5. Remove all timber riprap and prefabricated equipment mats upon completion of construction.

6. Develop specific procedures in coordination with the appropriate land management or state agency, where necessary, to prevent the invasion or spread of undesirable exotic vegetation (such as purple loose strife and phragmites).

7. Ensure that all disturbed areas permanently revegetate in accordance with Section 8.1.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful as specified in Section 8.1.

Gas Pipeline Testing, Reliability, and Safety

Hydrostatic testing is the last step in pipeline construction. This consists of running water, at pressures higher than will be needed for natural gas transportation, through the entire length of the pipe. This serves as a test to ensure that the pipeline is strong enough, and absent of any leaks of fissures, before natural gas is pumped through the pipeline. Prior to conducting the testing, a Hydrostatic Testing Discharge permit would be obtained from the Tennessee Department of Environment and Conservation as required by state regulations.

The hydrostatic tests would last as long as needed to minimize potential impacts to receiving stream and bank surfaces. Testing needs to allow sufficient time for withdrawal to not significantly impact the wetted surface of the stream, a 24-hour testing period, and sufficient amount of time to empty the pipe without causing significant impacts to the receiving stream. The test water would contain no chemical additives. At the time of this test, the pipe would be new and uncontaminated, minimizing possible impacts to the receiving water.

Depending in part on which route is selected, potential sources for hydrostatic test water may be groundwater. In the event hydrostatic test water is needed at a remote location, it could be withdrawn from nearby streams and trucked to the hydrostatic test site. The feasibility of using water from small creeks along the route would be determined by evaluating the amount of flow at the time of construction. Withdrawal of water from small streams, especially during low-flow periods, would be done at a rate which would minimize the impact to the capability of these streams to meet their designated uses.

At the conclusion of each test, the water would be discharged at the permitted discharge point at a rate designed to minimize impacts to the adjoining land and receiving streams. Test water would be discharged through a discharge structure to prevent erosion of the stream banks. In extreme cases where the local drainage could not support the discharge volume, the water would be trucked back to another point as allowed by the permit and released there in a controlled manner. Any installed discharge structures would be removed when all testing was complete.

In order to ensure the efficient and safe operation of the extensive network of natural gas pipelines, pipeline companies routinely inspect their pipelines for corrosion and defects. This is done through the use of sophisticated pieces of equipment known as pigs. Pigs are robotic devices that are propelled down pipelines to evaluate the interior of the pipe. Pigs can test pipe thickness, and roundness, check for signs of corrosion, detect minute leaks, and any other defect along the interior of the pipeline that may either impede the flow of gas, or pose a potential safety risk for the operation of the pipeline.

In addition to inspection with pigs, there are a number of safety precautions and procedures in place to minimize the risk of accidents. In fact, the transportation of natural gas is one of the safest ways of transporting energy, mostly due to the fact that the infrastructure is fixed, and buried underground.

The natural gas pipeline would be designed, constructed, operated, and maintained in accordance with DOT *Minimum Federal Safety Standards* as outlined in 49 CFR Part 192. The proposed pipeline would be inspected annually to investigate for signs of failed pipe integrity. Any unusual situation or condition would be inspected immediately by TVA. Leak surveys are instrumental in early detection of leaks and can reduce the likelihood for pipeline failure.

The proposed pipeline would include features designed to increase overall safety and protect the public from potential failure. Such features may include but are not limited to having shut-off valves at each end of the pipeline that close in the event of an abnormal event.

There are potential hazards associated with natural gas, the primary component of which is methane, an odorless, colorless, and tasteless material. Natural gas is lighter than air and would therefore not settle to ground level as does propane.

Before placing the pipeline in service, TVA would prepare a procedures manual for operation, maintenance, and emergencies, as required under 49 CFR Part 192. The standards specified in 49 CFR Part 192 include a requirement to establish an Emergency Plan with written procedures to minimize the hazards from a natural gas pipeline emergency. Key elements of the plan would include procedures for:

- Identifying and classifying emergency events, such as gas leaks, fires, explosions, and natural disasters,
- Establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response,
- Making personnel, equipment, tools, and materials available at the scene of an emergency,
- Protecting people first and property second, and making them safe from actual or potential hazards, and
- Implementing emergency shutdown of system and safely restoring service.

Cathodic protection systems would be installed along the pipeline to prevent pipeline corrosion. On unprotected pipelines, corrosion can be a major source of pipeline failure. The cathodic protection system imparts a current to the pipeline to offset natural soil and moisture corrosion potential. Cathodic protection systems would be inspected to ensure proper operating conditions for corrosion mitigation.

In summary, design criteria for safety would include but not be limited to the following:

- Pipeline would be inspected annually,
- To meet cover requirements, pipe would be covered with no less than three feet of backfill,
- Natural gas would disperse into the atmosphere when exposed,
- Surface markers would be placed to designate the buried line,
- Emergency procedure would be developed in the event of failure, and
- Pipeline would have an emergency shutdown system.

With these measures and adherence to applicable federal safety standards, potential hazards associated with the operation of the proposed pipeline would be minimal.

Appendix D

Emission Control Project Allen Fossil Plant NEPA Review Process

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Appendix D

EMISSION CONTROL PROJECT
ALLEN FOSSIL PLANT
NEPA REVIEW PROCESS

The National Environmental Policy Act (NEPA) requires federal agencies, including the Tennessee Valley Authority (TVA), to consider the potential environmental impacts of actions they propose to take that will impact the physical environment before making a final decision to proceed. Specifically, NEPA requires the preparation of an Environmental Impact Statement (EIS) for a major action significantly impacting the quality of the human environment. The purpose of an EIS is to assess the potential environmental impacts of the proposed action and alert the federal agency decision maker and the public to those impacts before a final decision to proceed with the action is made. Regulations or procedures guide implementation of the statute.

TVA is subject to and complies with two sets of regulations or procedures that implement NEPA. These are the regulations promulgated by the Council on Environmental Quality (CEQ) at 40 C.F.R. parts 1500-1508 and TVA's own NEPA procedures which supplement CEQ's regulations. TVA's NEPA procedures were adopted through a rulemaking process with public notice and opportunity for comment. TVA initially published its final NEPA procedures in the *Federal Register* in 1980 and later amended them after public notice and comment and republished them in the *Federal Register* in 1983. 48 Fed. Reg. 19,264 (Apr. 28, 1983). CEQ approved TVA's initial and amended procedures. Internally, TVA's "NEPA Program and Valley Projects" staff currently oversees TVA's compliance with NEPA.

CEQ's regulations and TVA's NEPA procedures identify three levels of NEPA review. The most detailed and time-consuming level of review is an EIS. EISs are comprehensive, detailed documents often exceeding 300 pages exclusive of appendices and typically take 12 to 36 months or longer to complete. EIS processes provide opportunities for public comment, including a minimum mandatory 45-day comment period on draft EISs. Section 5.4 of TVA's NEPA procedures provides that certain actions "normally" require an EIS including large water resource projects, major power generating facilities, and uranium mining and milling complexes. This refers to the construction of such facilities, not their continued operation. This section also requires the preparation of an EIS for "any major action, the environmental impact of which is expected to be highly controversial." The controversy must be about the significance of environmental impacts, must have valid scientific underpinnings, and must be substantial. What is "substantial" requires consideration of the number of people raising legitimate environmental concerns in the context of the potentially affected population and whether other expert agencies have environmental concerns.

The lowest level of NEPA review applies to those actions determined to fall within one or more of the Categorical Exclusions (CEs) identified in TVA's NEPA procedures. Section 5.2 of the procedures identifies 28 categories of actions that were predetermined during the rulemaking process normally to not result in significant environmental impacts and to not require an EIS. Neither CEQ's regulations nor TVA's procedures require that CEQ applicability determinations be documented. However, it is TVA's practice to prepare a "Categorical Exclusion Checklist" to document its CE determinations for a number of its CEs. An opportunity for public comment on a CE is not required and TVA does not provide one.

The middle level of NEPA review is an Environmental Assessment (EA). EAs are more concise, less detailed documents than EISs, and can be as short as 10 to 15 pages. However, it is TVA's practice to provide substantial information in its EAs, and TVA's EAs often exceed 50 pages depending on the number of resources analyzed and the complexity of analyses. Neither CEQ's regulations nor TVA's NEPA procedures require public comment on draft EAs, but TVA normally provides a 30 day comment period. The purpose of an EA is to determine whether a proposed action that is not categorically excluded is a major action with significant impacts on the quality of the human environment. If it is, an EIS is required. If it is not, TVA concludes the EA process by issuing a Finding of No Significant Impact (FONSI), allowing the TVA decision maker to decide whether to proceed with the action.

TVA prepared an EA for the proposed retirement of the three coal units at its Allen Fossil Plant and the construction of a natural gas power plant. TVA released the draft EA to the public on July 2, 2014 and provided 37 days for comment. Notice of the availability of the EA was published in local newspapers and on TVA's agency internet site. TVA also provided the public an opportunity to comment on a draft FONSI for the proposed action, assuming TVA would conclude after completing the EA that no environmental impacts would be significant. Because the EA provides the foundation for the significance determinations summarized in the FONSI, TVA considered comments on the EA to be comments on the draft FONSI as appropriate. In addition to these opportunities for public comment, TVA held a public meeting in Memphis on July 8 to provide information about the proposed action and obtain comments.

Approximately 1,500 people or entities submitted comments. Of these, approximately 1,300 were form comments created and submitted by the Sierra Club. TVA considered all substantive comments in completing the EA.

The EA "tiers" from the "Final Environmental Impact Statement for TVA's Integrated Resource Plan" (March 2011) (IRP EIS). Tiering is a process in CEQ's regulations and TVA's procedures that allows an agency to go from a broader NEPA review, typically an EIS, to a more site-specific NEPA review without readdressing the issues or repeating in detail the information and analyses in the broader review document. 40 C.F.R. §1508.28. TVA provided extensive opportunities for public participation during the preparation of the IRP EIS. These included public comment periods and webinars during which members of the public could ask questions about IRP analyses and make comments. TVA also assembled and regularly met with a group of interested individuals from a variety of organizations, including the Sierra Club, the Southern Alliance for Clean Energy, TVA customers and distributors, and State officials from Tennessee and Kentucky. Participants were provided numerous opportunities to review and comment on ongoing IRP analyses.

The IRP EIS contains analyses of the need for electricity from the TVA power system, different kinds of energy resources, and strategies for meeting projected future demand for electricity including continued operation or retirement of its coal-fired power plants, the addition of more renewable resources, and expanded use of energy efficiency programs. The IRP EIS summarizes TVA's analyses of the environmental impacts of alternative strategies using different combinations of energy resources including air quality and solid waste impacts.

Amy B. Henry, Manager
NEPA Program & Valley Projects
Environmental
Tennessee Valley Authority

Appendix E

Public and Agency Comments Received on Draft EA and TVA's Response to Comments

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Introduction

A Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) were released for comment on July 2 and July 18, 2014; respectfully. The comment period for both closed on August 8, 2014. The Draft EA was transmitted to state, federal, and local agencies and federally recognized tribes. It was also posted on TVA's public NEPA review website. A notice of availability including a request for comments for the Draft EA was published in newspapers serving the Memphis area. Comments were accepted at a public open house held at Memphis' Amtrak Central Station Boardroom on July 8, 2014. Comments were also accepted through August 8, 2014, via TVA's website, mail and e-mail.

Approximately 1,500 people provided comments. Of these, approximately 1,300 were form letters that were created and submitted by the Sierra Club. TVA carefully reviewed all of the substantive comments that it received. Comments were categorized by topic and in some cases summarized to avoid repetition in the responses. The comments and TVA's responses are provided in this appendix. Authors for each comment are provided.

This EA tiers from TVA's 2011 Integrated Resources Plan (IRP) Environmental Impact Statement (EIS). For that EIS process, TVA provided numerous opportunities for public review and comment, including two written comment periods, five public meetings, and several webcasts during which participants could make comments and ask questions. TVA also established a review group consisting of various stakeholders including users and distributors of TVA electricity, state agencies, academia, the Department of Energy, and environmental advocacy groups (the Sierra Club and the Southern Alliance for Clean Energy). This review group met frequently throughout the IRP process with TVA staff preparing the IRP and EIS and provided comments on TVA's analyses and results on an ongoing basis. Volume 2 of the IRP EIS contains the comments TVA received and TVA's responses to them. The IRP EIS can be found at http://www.tva.com/environment/reports/irp/archive/index.htm.

EA vs. EIS

Comments:

- Compliance with the National Environmental Policy Act requires a full Environmental Impact Statement.
  (*Commenter: TN Chapter of the Sierra Club*)

- Whether the electricity is unavailable because it is unaffordable or because the generation is unreliable, its lack will have negative impacts on the human environment - exactly the issue that must be addressed by a proper NEPA evaluation, including conducting a full EIS.
  (*Commenter: Wyatt, Tarrant & Combs, LLP and Energy Ventures Analysis, Inc.*)

Response:

TVA agrees that lack of reliable, affordable electricity can have negative impacts on the human environment. Providing reliable, affordable electricity is one of TVA's primary goals. We consider reliability and affordability of electric service on a system-wide basis. See TVA's 2011 Integrated Resource Plan (IRP) and associated Environmental Impact Statement (EIS). Potential reliability effects of different alternative energy resources also were considered for the proposed action here--retiring the three Allen coal units and building a natural gas power plant--and have been summarized in the Environmental Assessment (EA). The purpose of an EA is to determine whether a proposed action will result in significant impacts to the quality of the human environment. Based on the analyses of potential impacts, including consideration of the comments it has received, TVA has not identified any significant environmental impacts.

Proposed Plant Size

Comments:

- While TVA's proposal to replace Allen is good in terms of air quality, TVA's proposal for a large gas fired plant is inadequate because it doesn't analyze the size of a new power plant needed considering all of the alternatives.
  (*Commenter: Sue Williams*)

- Building a larger than needed gas plant is not the answer to meeting our energy needs now or in the future.
  (*Commenters: 871 participating members of the Sierra Club*)

- It would seem to be in TVA's best interests to build a smaller natural gas plant at ALF in conjunction with development of renewable energy resources in and around the greater Memphis area, and retain the flexibility to deploy other small, dispersed natural gas facilities to replace lost capacity from additional coal unit retirements.

  While it is true that the total combined footprint of solar and wind projects would be greater than the proposed natural gas plant, it does not follow that the associated impacts would be much greater. Building a smaller natural gas plant results in limiting the potential environmental impacts, including air pollution, greenhouse gas emissions, and water consumption.
  (*Commenters: Southern Alliance for Clean Energy*)

- The agency [TVA] assumptions also ignore the long-term benefits of building the smallest possible gas fired generation facility in order to minimize capital investment, debt and interest costs. The Tennessee Chapter of the Sierra Club opposes replacement of the 800 megawatts of coal fired generation with a natural gas fired facility of the same size; certainly nothing larger can be justified and a proper alternative analysis would demonstrate that a much smaller plant is the best choice.
  (*Commenter: TN Chapter of the Sierra Club*)

- TVA has provided no explanation or justification for any increased need for electricity at Allen.
  (*Commenter: Wyatt, Tarrant & Combs, LLP*)

- Please consider making the natural-gas plant smaller and increasing your use of clean, renewable energy sources. One advantage of that would be that you would not have to build excess capacity at this time, since renewable sources can be augmented in the future as needed (through the mounting of solar panels on local rooftops, for example). Other advantages would include producing less pollution, promoting fracking somewhat less, and having more to fall back on if the supply of natural gas gets interrupted. (*Commenter: Daniel Case*)

- If additional generation capacity is to be added, it is recommended that it be discussed, including rationale (which may tier back to IRP documents) and consideration of potential direct and cumulative impacts associated with the proposed action. (*Tennessee Department of Environment and Conservation, Office of Policy and Planning*)

Response:

Section 2.2.4 of the EA, Alternative F - Construct a Renewable Energy Source (Wind or Solar), includes a discussion of size considerations for TVA's proposed plant. This section states that the power need in the Memphis area is approximately 600-800 MW. TVA is considering sizing the proposed gas plant from 600 MW to 1400 MW. At the low end, there would be no need to secure additional capacity or energy from another energy resource, renewable or traditional, to meet the specific reliability needs of the Memphis area.

Increasing the size of the proposed natural gas plant above 600-800 MW would reduce the need for other energy resources to meet system-wide needs. TVA considers varying levels of investment in different kinds of energy resources. This is done on a system-wide basis and was most recently addressed in the context of the 2011 Integrated Resource Plan (IRP). The IRP directs TVA to continue to plan for a balanced portfolio of resources over the long term. This balance includes conventional resource types such as nuclear, coal, gas, and hydro as well as renewable resources and energy efficiency. We achieve this balance across our entire system instead of at a specific site. For example, TVA presently integrates approximately 1,500 MW of Midwestern wind power by leveraging our entire generating fleet to get the optimum benefit of the wind generation while maintaining system reliability.

This system-wide balancing helps inform and guides decisions at specific sites, such as Allen. As discussed in the Response to Mixed Energy Resources, TVA has considered the environmental impacts of various energy resources in the EIS supporting its 2011 IRP from which this EA tiers. At Allen, TVA determined that the cost of increasing the size of the proposed gas plant above the minimum amount required would be substantially less than adding comparable renewable energy resources because of the savings achieved by scaling up the plant size. The increased size will also improve TVA's overall grid responsiveness, balancing and turndown capability, and the ability to accommodate additional renewable energy resources if economically justifiable.

Reliability/Security/Demand

Comments:

- It is ridiculous to put all our eggs in one basket. What if the natural gas supply is disrupted?
  (*Commenter: Bill Runyan*)

- The supply of natural gas will be disrupted in the case of natural disasters such as earthquakes.
  (*Commenters: Victor Bondar, Susan Caldwell, Bill Runyan, Judith Rutschman, Lisa Zguta, Michael Coplon*)

- TVA barely mentions any reliability concerns that necessarily arise when a large electric plant that supplies electricity for hundreds of thousands of homes and businesses is dependent on a single gas pipeline.
  (Commenter: Wyatt, Tarrant & Combs, LLP)

- It could pose a dangerous gamble to have Memphis entirely dependent on gas as a fuel source.
  (*Commenters: 871 participating members of the Sierra Club*)

- Thousands of miles of pipeline crisscross this nation. Keeping them and pumping station safe is not even being considered as a serious issue. Yet many of the Power Plants depend on these very lines to deliver the gas to their site. Our Congress is looking at trying to protect the grid and spending billions of dollars for solar shields but nothing on the protection of the source of fuel, the pipelines and pumping stations. The grid is depending on these pipelines being there but a small accident could take out thousands of Megawatts of generation. The gas line for the Allen Plant CC is the same line that supplies both Southaven CC and the Allen CTs. If an interruption happened to this line about 2400 MWs would be lost in the Memphis area plus all of the MLGWs gas supply for some amount of time. During the 2014 winter vortex, MLGW came to the Allen CT site and told the employees "under no circumstances were they to start the Allen CT on gas". In 2007 MLGW came to the Allen CT site and chained the gas supply valves closed because of the shortage of gas. Now they want us to put all the generation in the area on their pipeline. This sounds crazy to me. If we install these gas fired units at Allen, everything west of the Tennessee River will be dependent on gas for TVAs largest customer.
  (*Commenter: Noel Mizell*)

Response:

TVA's 2011 Integrated Resource Plan calls for a balanced mix of resources to ensure the lowest overall cost to the ratepayers. TVA achieves this balance across its entire generating system, which includes nuclear, coal, hydro, gas, renewables, and energy efficiency. Natural gas is one component of a balanced portfolio.

Texas Gas Transmission (Texas Gas) is the interstate pipeline which serves the Allen and Lagoon Creek natural gas combustion turbines in addition to the Southaven natural gas combined cycle site. Texas Gas is one of three interstate pipelines that have the potential to serve the proposed gas plant via the MLGW distribution system. ANR

Pipeline and Trunkline Gas Company are the other two Interstate pipelines. These three pipelines are comprised of parallel pipelines and this provides redundancy and enhances reliability.

To ensure natural gas supply reliability TVA often subscribes for Firm Transportation (FT) for its combined cycle fleet, reserving a fixed amount of natural gas transportation capacity. TVA's combustion turbine fleet operates for far fewer hours a year than the combined cycle fleet, and may utilize Interruptible Transportation (IT). During periods of peak natural gas demand, a natural gas pipeline may need to reduce or deny flow for all IT shippers due to the higher priority of FT shippers on its pipeline. Much of TVA's combustion turbine capacity has fuel oil available for continued operation if IT were to be reduced or curtailed. These natural gas transportation practices are consistent with TVA's reliability expectations and are reviewed periodically for adequacy. The availability of back-up fuel oil also would ameliorate the impacts of a natural disaster that disrupted natural gas transportation for a limited period of time.

Comment:

- Wells relying on horizontal drilling and fracking are depleting rapidly and the long-term outlook for plentiful gas from these newer technologies is disputed making increased reliance on natural gas risky.
  (*Commenters: TN Chapter of the Sierra Club*)

Response:

The Department of Energy reports that initial production from individual horizontal wells (*e.g.*, fracking of shale gas) does decline rapidly, but notes that the production rate over a long period of time depends greatly on the location of the fracture as well as the geological makeup of the formation. National Energy Technology Laboratory, U.S Department of Energy, *Environmental Impacts of Unconventional Natural Gas Development and Production* (May 29, 2014). Despite the initial depletion of individual wells, the Energy Information Administration forecasts that shale gas production will grow from 10 Tcf (trillion cubic feet) in 2012 to 19.8 Tcf in 2040 to become 53 percent of total natural gas production by 2040. Energy Information Administration, *Annual Energy Outlook 2014*. TVA considers supply-demand uncertainties that affect the pricing of fuels, but supplies of natural gas are expected to continue to increase at least through 2040.

Comment:

- Unpredictable and hard to manage extreme weather events are increasing and natural gas availability and price will be affected.
  (*Commenters: TN Chapter of the Sierra Club*)

Response:

This assertion is not supported by the commenter. Experts disagree about whether extreme weather events are increasing or decreasing. *See* Statement of Dr. Roger Pielke, Jr., to the Subcommittee on Environment of the Committee on Science, Space, and Technology, United States House of Representatives (December 11, 2013).

Comment:

- TVA off-handedly states that fuel oil might be considered as an alternative backup fuel source. However, TVA totally ignores both the cost and the environmental impacts of constructing and maintaining those facilities or of transporting and unloading the fuel oil. Nor does it address the environmental consequences of either the inevitable daily spills of fuel or a catastrophic discharge of the hundreds of thousands of gallons of fuel oil that would have to be stored on site to insure that residents and businesses of the Shelby County/Memphis area have a reliable electricity source.
  (Commenter: Wyatt, Tarrant & Combs, LLP)

Response:

TVA currently has eight million gallons of fuel oil storage that backs up the existing combustion turbines located on the Allen plant site directly adjacent to the proposed CT/CC site. A short pipeline could be constructed from these oil tanks to the proposed gas plant. Transportation and handling of fuel oil would continue to be operated in accordance with procedures currently followed at the site.

Comment:

- TVA improperly minimizes potential impacts from regional and national increases in natural gas demand, infrastructure requirements and construction of a new gas supply line.
  (*Commenter: Smith Management Group*)

- The EA ignores the effects of fuel switching on domestic demand for natural gas.
  (Commenter: Wyatt, Tarrant & Combs, LLP)

- Regional pipeline capacity is designed to deliver the necessary gas supplies for heating and industrial production. TDEC OEP recommends discussion of any transmission [gas pipeline transmission] network capacity impacts of the proposed new pipeline, particularly as it relates to the needs of regional power generators and/or the proposed Allen CT/CC plant in the Final EA.
  (C*ommenter: Tennessee Department of Environment and Conservation, Office of Environmental Programs*)

Response:

Texas Gas Transmission (Texas Gas) is the interstate pipeline which serves the Allen and Lagoon Creek natural gas combustion turbines in addition to the Southaven natural gas combined cycle site. Texas Gas is one of three interstate pipelines which have the potential to serve the new natural gas units that are planned for the Allen site via the MLGW distribution system. ANR (ANR) Pipeline and Trunkline (Trunkline) Gas Company are the other two Interstate pipelines. These three pipelines are comprised of parallel pipelines and this provides redundancy and enhances reliability.

If TVA's Board of Directors approves the proposed plant, TVA would contract for the delivery of the necessary amount of gas to fuel the plant. Our natural gas supply review indicates that all of the Interstate pipelines that connect with MLGW's natural gas distribution system have sufficient firm natural gas transportation capacity available individually to transport the natural gas required for any natural gas fired generation configuration under consideration by TVA. It does not appear that any mainline natural gas transmission improvements will be required to accommodate TVA's future natural gas needs at Allen.

However, the amount of natural gas needed to fuel the largest plant considered in the EA (a 1,400 MW CC plant) annually would be 0.3% of 25 Tcf. Less natural gas would be needed for a smaller CC or CT. The amount of gas used by the proposed natural gas plant would be trivial compared to the nearly 25 Tcf of natural gas produced annually in the U.S. today, which is projected to increase to almost 40 Tcf in 2040. Therefore, the amount of natural gas used for the proposed new plant would have no noticeable effect on natural gas production volumes or infrastructure.

Comment:

- Including the most recent announcement to retire Allen 1-3, TVA would be retiring 7,383 MW of coal-fired capacity, much more than the upper limit of 4,700 MW evaluated in the 2011 IRP. We urge the TVA Board to freeze in place any further premature coal plant closure steps until it completes the current IRP.
(*Commenter: Wyatt, Tarrant & Combs, LLP and Energy Ventures Analysis, Inc.)*

Response:

The 2011 IRP planning direction for coal retirements provides a range of up to 4,700 MW, but TVA analyzed retirements of up to 7,000 MW in the EIS supporting the IRP. The EPA Agreements require TVA to retire 2,222 MW of capacity in the context of 18 identified coal units over a period from 2012 to 2018. In November 2013, the TVA Board decided to retire 8 additional coal units with a total capacity of 2,879 MW. Recently, TVA also has indicated that it plans to retire the two remaining units at its John Sevier plant in accordance with the EPA Agreements and Shawnee Unit 10, the Atmospheric Fluidized Bed Combustion unit that has not operated for some time. The capacity of these units is 474 MW. The capacity of all retired or committed to be retired units totals 5,575 MW. The capacity of the three Allen units is 744 MW. If the TVA Board decides to retire these units, the total retirement capacity would be 6,319 MW, less than the amount analyzed for TVA's 2011 IRP. (All capacities are stated as maximum net dependable capacities.)

Comment:

- Allowing for a 15% reserve factor, TVA load carrying ability will be only 28,369 MW by summer of 2015. The TVA peak loads have exceeded that level many times in both summer and winter. By 2015, TVA will require 32,000 MW plus 15% reserves or 36,800 MW, of dependable capacity and this is likely to grow going forward. The proposed TVA plan will contribute to a capacity deficit which could well be over 8,000 MW by 2015, just as the regional markets are deficient extra capacity due to plant retirements. This could lead to significant reliability situations and potential rolling blackouts IRP.
(*Commenter: Wyatt, Tarrant & Combs, LLP; Frank Clemente; and Roger Babb and Frank Clemente)*

Response:

TVA is not sure of the source of these figures. Our summer net capability reported in our 2013 10K was 36,594 MWs and our plans ensure resource adequacy, including maintaining a 15% planning reserve, for the future. In fact, TVA analyzed gas plant options with a higher net capability than the existing coal plant that could help address future needs. TVA maintains a very reliable system and will continue to do so.

Gas Pipeline Construction

Comments:

- Reliable and timely detection of failure of any part of a natural gas pipeline is critical to ensure the safety and reliability of the natural gas infrastructure. TDEC recommends that TVA explore optical and non-optical method(s) of lead detection to ensure safety and reliability with MLGW, and note those in the Final EA.
  (C*ommenter: Tennessee Department of Environment and Conservation, Office of Environmental Programs*)

- TDEC's Division of Water Resources (DWR) has reviewed the DEA and recommends including discussion of how TVA and/or MLGW will deal with any potential "blowouts" of bentonite drilling mud during horizontal drilling for the gas pipeline.
  (C*ommenter: Tennessee Department of Environment and Conservation, Division of Water Resources)*

Response:

The new high pressure pipeline that would serve the proposed Allen gas fired generation project would be built and operated by MLGW. TVA will have no role in its construction or operation. It will meet DOT 49 CFR Part 192 which has the standards incorporated by reference such as the American Petroleum Institute (API) and American Society for Testing and Materials (ASTM).

Project Timeframe

Comments:

- TVA's concern that transmission upgrades to utilize renewable energy resources as the sole replacement generation technology may require 8 to 10 years to develop. This may be a reasonable conclusion for the scale of renewable energy contemplated in Alternative F. This conclusion is not reasonable with respect to less cumbersome transmission needs associated with renewable energy projects providing only a portion of the total need. Solar projects are typically relatively quick to develop, particularly when developed on brownfields or agricultural lands with poor or non-arable soil conditions. It is entirely possible that wind developers have projects nearing the public phase in the West Memphis area that have not yet come to TVA's attention.

  TVA may have reasonably determined that it needs to make a decision to proceed with construction of a combined cycle plant by August of 2014. If TVA determines that a portion of the need can and should be met with resources other than combined cycle units, then it does not need to select and proceed with those technologies with the same urgency.
  (*Commenter: Southern Alliance for Clean Energy)*

- TVA's findings regarding the 8-10 year timeframe to provide infrastructure for delivery of 1,400MW of generation from power purchase agreements are not applicable to the smaller renewable energy collection and transmission system described above.
  (*Commenter: Southern Alliance for Clean Energy)*

- The 8-10 years TVA asserts would be required to replace ALF nameplate capacity ignores the reality that scattered, but geographically proximate, arrays could be operational in a few months to one or two years so that a large part of the Allen fossil capacity could be replaced by 2018 if TVA actively worked to construct or to support and encourage the construction of numerous 20 to 50 MW arrays and numerous small arrays.
  (*Commenter: TN Chapter of the Sierra Club*)

Response:

The ability to accommodate large-scale renewables is limited by the availability of this type of generation as well as the time required to construct the necessary transmission facilities. It is important to recognize that renewable resources such as wind and solar possess different operating characteristics, including the inability to dispatch the units and the intermittency of the resource. Wind generation does not produce electricity when the wind is not blowing and solar generation does not produce electricity during the night. As articulated in the EA, dispatchable (reliable) generation of 600 to 800 MW must be located in the Memphis area to provide necessary real and reactive power. It may be possible, however, to add smaller amounts of renewable generation within the timeframe required by the EPA Agreements. This would increase overall environmental impacts because the impacts from the smaller gas plant would be similar to the proposed Allen plant and in addition there would be impacts from the smaller renewable energy facilities. This is addressed further in the Response to comments about the Proposed Plant Size.

Project Cost

Comments:

- There is no detailed side-by-side comparison of costs, impacts and benefits with other valid alternatives.

  There is no specific information presented that supports costs for either alternative.
  (*Commenter: Smith Management Group)*

- TVA's finding that the capital costs of renewable energy generation render it unviable is wholly unsupported by evidence and contrary to recent decisions by utilities and regulators across the country. TVA should revisit cost assumptions in the Draft EA for solar installations to reflect the most recent costs and cost projections it has obtained in its resource planning process. Similarly, estimates of wind power costs developed in TV-RIX for use in TVA's resource planning process indicate that those costs are also dropping.
  (*Commenter: Southern Alliance for Clean Energy)*

- TVA has failed to comply with its mandate to provide reliable, lowest-cost electricity to its ratepayers.

Continued use of coal at Allen is clearly the lowest cost alternative. As such, it must be TVA's preferred alternative in keeping with TVA's statutory mandates.

Alternative C referenced in the EA, the FGD retrofit, should have been selected as the option providing the lowest system electricity prices.
(*Commenter: Wyatt, Tarrant & Combs, LLP; Energy Ventures Analysis, Inc., Frank Clemente; and Babb and Clemente)*

Response:

The TVA Act directs TVA to deliver low-cost, reliable power to the Valley while also promoting economic prosperity and the wise use and conservation of the natural resources of the region. In addition, § 113 of the Energy Policy Act of 1992 requires TVA to conduct a least-cost planning program for the selection of new energy resources. This requires much more than a simple comparison of construction and fuel costs for specific energy resources. TVA is directed to take into account such things as diversity of resources, reliability, and risk factors on a system-wide basis in order to provide its customers "adequate and reliable electric service" at the lowest system cost. We evaluate all generation types in the context of the overall resource portfolio to ensure that we meet the needs of the TVA system at the lowest feasible cost. Our evaluations also include various site-specific factors, such as those described in this assessment regarding transmission needs in the Memphis area.

When evaluating resource alternatives, TVA seeks to minimize the total system cost over the long term planning period. Total cost includes fuel, operations and maintenance (O&M), and capital costs. Each resource alternative is characterized by its performance characteristics and its fixed and variable cost. Resources with different characteristics have differing operational and cost impacts within the generation portfolio. For example, an alternative with a high variable cost will be dispatched less than one with a lower variable cost, with the balance of generation supplied by other resources across the TVA system. A higher capacity resource may eliminate or delay the need for future construction of generating units or the deployment of other energy resources. This cost avoidance or delay is quantified in a portfolio evaluation of resource alternatives. The operational flexibility of alternatives are also quantified within the portfolio evaluation.

TVA has completed a thorough evaluation of various Allen alternatives within TVA's generation portfolio. The result of this evaluation for scrubbing the three coal units is summarized in Alternative C, Emissions Controls: "Evaluations performed by TVA indicate that the overall system cost for Alternative C is similar to the proposed action, but that each alternative possesses a different risk profile." TVA thinks there is greater risk of higher costs in the future from environmental regulations for coal generation than for natural gas generation.

TVA has examined Exhibit 3 of the EVA appendix which only includes alternative-specific costs at the Allen site and does not addresses portfolio effects. For example, the EVA analysis does not include the value of the larger capacity of the combined cycle unit. Therefore, the Exhibit 3 comparison cannot be used to indicate which alternative would provide the least system cost to the TVA ratepayers over the long term.

Additionally, the Exhibit 3 comparison appears to omit or use different costs from TVA's estimates in several areas, including:

- Capital and O&M costs for compliance with expected water and solid waste regulations (e.g. Effluent Guidelines, Clean Water Act 316(b), Coal Combustion Residuals, etc.)
- CO_2 regulation costs
- On-going plant capital investment
- Reagent costs for environmental control systems
- Heat Rate: a gas-fired plant would use state-of-the-art CT technology, resulting in an improved heat rate relative to the EVA assumption. The corresponding lower fuel cost ($/MWh) would cause a new CC to have significantly higher annual capacity factors than the EVA estimate, reducing the total cost ($/MWh) of a CC lower than the EVA estimate.

With regard to the renewable options, TVA has similarly completed a portfolio analysis to determine the least-cost resource decision. TVA did consider the cost information gathered through the IRP and TVRIX process (identified in the SACE comment above) as outlined in the revised response to Alternative F in the final EA. As described in earlier responses, renewable generation is intermittent, not dispatchable, and requires that the facilities …"be sized significantly larger than the proposed CT/CC facility in order to deliver comparable generating capacity, which would contribute to substantially increasing cost."

Comment:

FGD retrofit also has the potential to reduce cost by providing Allen greater fuel flexibility as the scrubbed station could switch to nearby Illinois Basin coal which can be delivered at a lower cost than the Powder River Basin coal currently used at Allen.
(Commenter: Wyatt, Tarrant & Combs, LLP; Energy Ventures Analysis, Inc.)

Response:

TVA disagrees with that conclusion which ignores costs of reagents and other factors. The delivered price of Powder River Basin coal to Allen is very competitive with the delivered price of Illinois Basin coal. Coal from the Illinois Basin with higher sulfur content would require greater quantities of scrubber reagents.

Price of Natural Gas and Fracking

Comments:

- How does TVA propose to avoid the variation - mostly increase - in the price of fracking produced natural gas?
(*Commenter: Lynn Strickland*)

- Cost fluctuations and disruptions in natural gas supplies could cause problems for consumers and result in higher rates.
(Commenter: Mary Gibson)

- I was not happy to hear that the TVA is closing the Allen coal-fired plant in Memphis, TN and replacing it with a natural gas plant. I am assuming that this natural gas will come

from fracking, or at least most of it. The more Americans understand about fracking, the more they hate it.
(*Commenter: Penny Gharanfoli*)

- Long term projections of natural gas availability and price may be precarious based on the present status quo in fracking that may not hold in the future: increased supply and reduced 'local' pricing. It's certainly feasible that environmental factors associated with fracking may prove over time to be prohibitive to its practice (earthquakes, poison groundwater). If fracking production proceeds, it's certainly feasible that natural gas prices could rise significantly if an export market is developed to recover 'international' prices. Wouldn't either of these scenarios, both feasible, undermine projections supporting such a large and long-lasting natural gas-only plant? Is there no way to (economically) integrate renewables into your plan?
(*Commenter: Wade Gibson*)

- A major consideration in the construction of a natural gas electrical generation plant is the current price of fuel. One of the main justifications for replacing the Allen Fossil plant is the current pricing of natural gas which is forecasted to remain steady. However, one only has to look no further back than this past winter to see the incredible spike in gas prices to know this assumption is unrealistic if not reckless. Another factor on gas prices will be the pending increase in export of natural gas abroad. This will have a direct effect of increasing gas prices which will in turn will drive our electricity rates to unforeseen levels. On the other hand, coal prices have remained relatively steady for many years and there is an ample, proven supply not subject to seasonal or speculative spikes. (*Commenter: Mike McElya*)

- TVA needs to maintain a reasonable level of coal generation in their portfolio as a hedge against attacks on fracking for natural gas supply and any subsequent price volatility of natural gas. (*Commenter: Stephen Lane*)

- Gas is a commodity and the price is driven by the free market: In 1999 the gas prices began to change from less than $2 prior to 1999 over $10 by the end of 2000. After the stock market crash and business slowed down, prices went lower to near $2. But by 2003 the price climbed well above $5 and one date was over $18, 2004 thru 2008 the price was volatile with lower around $5 and highs above $13 with average of around $7.50, 2008 the market and business was sliding again and the price went down below $2 but average stayed about $4.25, until the winter of 2014 with the polar vortex and the price jumper to above $8.

  As you read these snippets of information [various news articles were provided] you see the price changes with supply and demand every day. Exporting of the liquefied natural gas adds another player that can affect the price of the natural gas as well as the commodities investor. When the natural gas is exported overseas, the power companies will need it to make electricity, the investor wants to make a profit and the homeowner wants to heat their home, the most economical way as possible, all from natural gas.

  Supply of Natural Gas from fracturing or fracking is also questionable. Earth quakes with destruction of property and loss of life is going to cause people to force changes in when, where and how the process will be use, if at all. Oklahoma has gone from be 17th in nation for earth quakes to number 2 only behind California. There have been 230 earth quakes since Jan 1 2014, which people are blaming on fracking. TVA Board

Members knows firsthand what happens when gas fired units are dependent on gas and the supply or demand changes in a negative way. You sell assets for pennies on the dollar. That's how TVA got several of the Combined Cycle sites, like Magnolia, Southaven and Caledonia to name a few.
(*Commenter: Noel Mizell*)

- Most immediate is the risk of limited availability and price increases [of natural gas].

  TVA's assumptions about the cost of natural gas does not recognize the lesson of recent history that when significant number of energy consumers fuel shift in the same short period the price of gas goes up dramatically.

  Another supply and price factor is the "Red Queen Effect" of fracked gas wells - running as fast as you can to stay in one place and having to run twice as fast to get ahead.

  Federal Energy Regulatory Commission (FERC) and Department of Energy (DOE) permitting for Liquefied Natural Gas exportation increases the likelihood that domestic prices will no longer be shielded from the international prices.
  (*Commenter: TN Chapter of the Sierra Club*)

  It is extremely unwise to put all our eggs in one basket. It is highly probable that natural gas prices will rise at least by 150% by 2040, due to EPA regulations alone. Because our natural gas is sold on the international market, it will not necessarily be available for domestic use and the gas exports may lead to a tripling of natural gas prices. The supply of natural gas will be disrupted in the case of natural disasters such as earthquakes. Additionally the prices for natural gas will go up.
  (*Commenters: Victor Bondar, Susan Caldwell, Bill Runyan, Judith Rutschman, Lisa Zguta, Michael Coplon*)

Response:

See Response to Comments under the Reliability/Security/Demand topic. Fuel price uncertainty is a factor considered by TVA when it does energy resource planning and asset-specific resource decisions. One of the most important ways that TVA addresses fuel price uncertainty is by relying on a balanced portfolio of generating resources, including coal, nuclear, gas, hydro, renewables, and energy efficiency. Extensive analyses that TVA did for both its 1995 IRP and its 2011 IRP concluded that a balanced portfolio allows TVA to maintain the lowest rates possible over a variety of possible future conditions and fuel price environments, reducing the risk of relying more heavily on any specific resource.

TVA recognizes that future natural gas prices are uncertain. We examine multiple gas price forecasts and include sensitivities around gas prices into our analysis. Fracking techniques have contributed to the significant increase in natural gas supplies which is the reason for current low natural gas prices. It is possible that future environmental regulations may limit the use of fracking and that this would result in lower future supplies of natural gas, but neither DOE nor EIA are predicting that natural gas production from shale gas (fracking) will decrease.

TVA is following the environmental issues associated with fracking, especially how EPA responds to these issues because EPA could, through regulation, increase the cost of fracking by making it more difficult or limiting it. However, EPA has recognized that development of shale gas resources can have important benefits and has said:

"Responsible development of America's shale gas resources offers important economic, energy security, and environmental benefits. EPA is working with states and other key stakeholders to help ensure that natural gas extraction does not come at the expense of public health and the environment." http://www2.epa.gov/hydraulicfracturing

Increased exports of natural gas also may drive up prices, contributing to the uncertainties about future gas prices. EIA, however, is predicting that the United States will export 5.8 Tcf of natural gas or only 18 percent of total natural gas supply by 2040. Energy Information Administration, *Annual Energy Outlook 2014*.

Power Rates

Comments:

- Switching to gas will raise cost for everyday people.
(*Commenter: Michelle Roberson*)

- For our end user Sierra Club members, reliance on natural gas means frequent increases in the cost of electricity which could be avoided to the extent that TVA reduces usage by efficiency programs that directly benefit end users.
(*Commenter: TN Chapter of the Sierra Club*)

- Working men and women, their families and the low-income segments of society will be hit hardest by any decision of TVA which would unnecessarily increase the cost of electricity for its ratepayers.

  A fundamental fallacy of TVA's analysis is that it assumes people will continue to use electricity even if they can't afford to pay for it.

  TVA has a duty to provide this vital resource to its ratepayers at the lowest possible cost, and its failure to consider the effects of its decision on the human environment in its NEPA analysis is unacceptable.
(*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

TVA has determined that when risks are considered the proposed natural gas plant likely will be the lowest cost option. When evaluating resource alternatives, TVA seeks to minimize the total system cost over the long term planning period. Total cost includes fuel, operations and maintenance (O&M), and capital costs.

Fuel price variability is a very important factor considered by TVA in deciding which alternative to implement. TVA performs sensitivity analysis on fuel prices to inform decisions on resource alternatives, including Allen. TVA's 2011 Integrated Resource Plan calls for a balanced portfolio of generating resources, including coal, nuclear, gas, hydro, renewables, and energy efficiency. This balanced portfolio serves as a hedge against fuel price volatility as it allows TVA to adjust generation to address short term price fluctuations. As articulated in the 2011 IRP and supporting analysis, TVA believes that a balanced portfolio allows TVA to maintain the lowest rates possible over a variety of future scenarios and fuel price environments.

Mixed Energy Resources

Comments:

- How about mixed resources: solar, gas, coal, corn.
(*Commenter: Sheila Towns*)

- I applaud the efforts to reduce coal emissions by replacing our Allen Steam Plant. But, it is short sighted to consider only natural gas as the only fuel source. We should be considering other sources as well. It would be the beginning of making us more energy efficient and less dependent. Let's continue to make our great state of Tennessee a leader by adding alternative methods of fuel for our needs.
(*Commenter: Grace Rutschman*)

- Has TVA considered combining a smaller gas plant, a synchronous condenser, energy efficiency, and purchased power in order to meet its needs?
(*Commenter: Stephen Smith*)

- Coal is a valuable resource that does belong in our energy mix?
(*Commenter: Arthur Asbury*)

- Seek out a 4-pronged alternative to use reusable fuel: solar, wind, biomass, hydro (newer techniques that do not require a dam).
(*Commenter: Dan Wygant*)

- Please transition to a mix in Memphis.
(*Commenter: Mary Headrick*)

- TVA could build or solicit development of up to 880 MW ac nameplate solar tracking systems in and around the greater Memphis area. Solar systems using single-axis tracking technology located in the western portion of the TVA service territory would deliver 68% net dependable capacity, according to the current assumptions in the IRP process, which could thus supply up to 600 MW ac net dependable capacity. Approximately 11 square miles of land could be required for solar systems with nameplate capacity of 880 MW ac. These could be spread out across 20-30 sites depending on available land, transmission constraints and reliability concerns.
(*Commenter: Southern Alliance for Clean Energy*)

  Depending on market availability, TVA could build or solicit development of 800 MWs nameplate wind generation, a figure we have selected to illustrate the potential opportunity for development subject to limitations discussed below. Using TVA's current assumption that the net dependable capacity for wind projects in the TVA region is 14% (which may prove to be an underestimate), the wind resources could supply up to 110 MWs net dependable capacity (or more if TVA's net dependable capacity estimate is low).

  Technology and performance information has been supplied to TVA through the Tennessee Valley Renewable Information Exchange (TV-RIX) process.

  Proposed high voltage direct current (HVDC) projects including Clean Line and Pattern Energy projects are likely to provide substantial power to meet demand that would otherwise be served by the Allen project. Even if TVA determines that the schedule for completing of these projects would not be adequately secure for the Purpose and Need

for the project, designing the project to include less generation and greater availability of reactive power compensation produced at ALF would provide prudent anticipatory support to the development of these highly cost-effective renewable energy generation projects.
(*Commenter: Southern Alliance for Clean Energy*)

Response:

When considering replacement of traditional generation facilities with intermittent renewable resources, such as wind and solar, several factors must be considered, including firm capacity, energy, reliability, and ability to dispatch. The capacity factor of a gas generating unit is greater than that of a solar or wind facility, therefore a greater amount of wind or solar capacity is required to match gas generation levels. Because wind and solar are subject to weather patterns for their fuel, utilities must size more of these resources or supply backup generation of a different fuel type to deliver the equivalent generation to a gas unit during times of system peaks (often hot summer days or cold winter mornings). Solar, for instance, would deliver little capacity during critical winter peak periods early in the morning such as the January 2014 polar vortex event. Additionally, even when energy levels are equivalent on an annual energy basis, solar and wind are still “must take” power resources that generate energy at varying levels throughout the day. Because these resources cannot be dispatched on demand at desired levels they are not directly comparable to gas-fired units. Solar and wind resources do provide benefit by being non-emitting generation resources, but from an operational perspective must work in tandem with traditional power sources.

For these reasons, TVA anticipates that its additional capacity and energy needs will be met with a diverse set of resources, including more nuclear from Watts Bar Unit 2, increased energy efficiency, increased renewable resources, and additional gas generation. This approach provides the lowest cost approach for our customers and ensures that our resources are balanced to maintain the high reliability requirements of our transmission system and local power companies’ distribution systems.

Renewable Technologies

Comments:

- The environmental benefits which would be realized by an adequate analysis and implementation of a much greater investment in energy efficiency and renewable energy would greatly benefit our west Tennessee members immediately and eventually all our Tennessee members who are end users, rate paying customers of TVA.

  The Clean Line will provide a surplus of renewable energy to the region around the Allen Plant.

  TVA’s renewable energy alternatives discussion fails to provide analysis or even broach the subject of distributed solar PV arrays that would be developed by the local Electric Membership Corporations and municipal distributors and that could substantially supplement or replace TVA power generated by central, fossil fueled facilities.

  The EA fails to evaluate how rapid and aggressive locally focused renewable energy programs and policies could allow a much smaller investment in a gas fired facility. Alternative F is an abysmally incomplete and over simplified analysis of solar photovoltaic (PV) generation as a major contributor to replacing the capacity lost by closing the Allen fossil units. One hundred percent replacement of ALF by PV generation at a nearby single site frames the alternative so that it must be rejected. (*Commenter: TN Chapter of the Sierra Club*)

- Thank you for the recent decisions to retire your most outdated coal plants in the Tennessee Valley. As TVA drafts its long-term energy plan that will determine how we meet our energy needs in the future, I respectfully urge you to continue transitioning away from coal use. TVA's coal-burning plants like Allen in Memphis harm our health and the climate. The Allen plant, for example, is the biggest polluter in Shelby County. Keeping the Allen plant running, or replacing it with gas-fired power, means more pollution in our community that already suffers some of the worst air pollution in the region.

  The best path forward is replacing coal-burning plants with improved energy efficiency measures and clean renewable energy sources, like wind and solar. Investments in these clean energy technologies will protect the health of our families, lower energy bills, and create high-paying jobs and new economic opportunities in the Tennessee Valley. Specifically, TVA should set goals to double its renewable energy resources portfolio within the next decade. TVA can also work with its local power companies to improve the efficiency of our homes, businesses and industries by achieving an annual energy savings of at least 1 percent. TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers.
  (*Commenters: 431 participating members of the Sierra Club*)

- The country of Portugal derives 60% of its power from wind & solar. Is there any excuse why we can't approximate that success?! Remember when this country used to lead & set the pace. It's overdue for the U.S to reverse and move to the front of the pack in so many areas we've fallen behind in. It's time as a nation to become an inspirational force again wouldn't you agree.
  (*Commenter: Jack Engard*)

- Continuing to release stored sun energy into the environment is irresponsible. It also shows a lack of innovation on the part of business leaders. Following the lines of least resistance leads to a downward spiral. It's time for the nation's utility companies to mature and develop energy in the context of sustainable lifestyles. The current direction is leading toward a destructive one. And, the sad part is no one will read this, let alone respond.
  (*Commenter: Charlie Palmgren*)

- Renewable and clean energy are the future!
  (*Commenter: Angela Minor*)

- TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers. Remember the sun?
  (*Commenter: Richard Law*)

- For the sake of our children and grand-children, please do all you can to move toward conservation and renewables.
  (*Commenter: Nancy Munro*)

- Specifically, TVA should set goals to compound renewable energy resources portfolio and incentivize efficient but lower per-user energy consumption. TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers and customers.
  (*Commenter: Mary Headrick*)

- Memphis has an abundance of sun and rooftops, so solar power needs to be factored in before we spend money on an oversized natural gas power plant. There is also an opportunity for wind power from Oklahoma; while the environmental impacts of a line may need to be further addressed, it deserves a realistic consideration.
  (*Commenter: Sue Williams*)

- The draft environmental assessment lists various options for replacing the Allen coal plant, but does not seriously consider renewable energy resources, like wind and solar.
  (*Commenters: 871 participating members of the Sierra Club*)

- You have taken the first step to clean air by planning to close the coal burning plant. Now take the second step and replace the plant with one that makes energy from a cleaner source than gas, solar or wind.
  (*Commenter: Beverly Morris*)

- As a concerned citizen of Shelby County, I am disappointed and dismayed that the plan for the Allen plant replacement does not include any renewable energy production; rather TVA is looking to the single energy source of natural gas.

  There is no reason to be solely dependent on natural gas when other alternatives exist. Energy can be purchased from Clean Line. TVA could and should support installation of solar arrays wherever possible. When the coal fired plant was installed in the fifties, we did not have the renewable energy sources that are so readily available today. In the face of climate change and the issues surrounding natural gas, TVA would be unwise and irresponsible to not make renewable energy resources a major part of the sources for electrical energy for Memphis and the surrounding area. The costs of failure to act responsibly are grave.
  (*Commenters: Victor Bondar, Susan Caldwell, Bill Runyan, Judith Rutschman, Lisa Zguta, Michael Coplon*)

- We seek to provide healthy and affordable sources of energy to protect our local and global community while meeting our need for economic sustainability. We call on the Tennessee Valley Authority to help us clean up our community with clean, renewable energy sources by closing the Allen Steam Plant.
  (*Commenter: NAACP, Memphis Branch*)

- Buy more power from Clean Line and use solar panels. We will eventually run out of natural gas. We need to invest in infrastructure for the future.
  (*Commenter: Bill Runyan*)

- Work with the Sierra Club to open renewable, clean energy plants that will provide energy and keep this beautiful state clean and healthy.
  (*Commenter: Greta Buckman*)

- TVA should invest in retrofitting coal plants into solar and wind plants for generations to come and have a clean air environment to live in.
  (*Commenter: Sherry Allen*)

- Wind and solar should be actively pursued by TVA.
  (Commenter: Aubrey Lee)

- Germany now gets 75% of its electricity from renewable sources and there is no reason why the same can't be done in our beautiful country.
  (*Commenter: Penny Gharanfoli*)

- Natural gas is not a renewable source of power. Please give more consideration to renewable energy.
  (Commenter: Stanley Smith)

- Memphis has a million acres of warehouses, all with flat roofs, what a place for solar panels. We have a fast-rushing river, what a place for turbines.
  (*Commenter: Dan Spector*)

- The sooner we can move to solar and wind, renewable non fossils, the better.
  (*Commenter: Carol Katz*)

- Glad to see that the Allen TVA plant is closing this coal burning/CO_2 emitting problem should have been closed a long time ago. This is long overdue. Based on the plans viewed, it appears that TVA is going to continue to focus on fossil fuels at the expense of renewable energy. I think this is a problem. This plant needs to include a variety of energy sources, not just natural gas. This change also doesn't include any mention of renewable energy. TVA should also include renewable sources to replace the Allen plant. Wild and solar could be used to provide energy needs. This is important for green jobs and to reduce CO2 emitting pollutants that contribute to climate change. TVA, please move forward with more use of renewable energy and less focus on fossil fuels.
  (*Commenter: Mary Gibson*)

- I would have liked to see some effort to integrate renewable energy production into your plan (e.g., solar).
  (*Commenter: Wade Gibson*)

- Consider renewable sources along with natural gas.
  (*Commenter: Margaret Skinner*)

- There is plenty of land in TN for solar - along the interstates and rest areas for example.
  (*Commenter: Edgar Gehlert*)

- We recommend you plan for optimum use of solar, bio-fuel, and wind (esp. the large excess capacities in Texas and Oklahoma with modern distribution to Memphis TVA).
  (*Commenter: Don Gamblin*)

- More renewables, more energy efficiency programs (owned and rental property, offices, factories, warehouses). More support for electric vehicle research (battery technology), new technology (nuclear fission).
  (*Commenter: Dennis Lynch*)

- The age of renewables is here.
  (*Commenter: Chris Lunghino*)

- The Draft EA lists various options for replacing the Allen coal plant, but does not seriously consider renewable energy resources, like wind and solar and energy efficiencies.
  (*Commenter: Catherine Stevens*)

- What will it take to have TVA allow MLGW to purchase an amount of power from a renewable energy producer like the Clean Line wind or a company leasing a significant amount of warehouse roof? Is there a reason for not including renewable energy in the generation source to replace the Allen Fossil Plant? Since TVA is attempting to replace the electricity production of the Allen Plant Why is no consideration being given to incorporating renewable energy as a lead source?
  (*Commenter: Lynn Strickland*)

- The planned phase-out of the Allen Plant is described as an "Emission Control Project" to reduce pollutants - sulfur dioxide and many others - that are linked to numerous and serious health problems. Being a coal-fired plant without carbon capture, it also is a heavy contributor to the greenhouse gas pollution behind dangerous climate warming. It is to assure avoidance, through renewable-source energy, of the health- and climate endangering pollution that (GP) Switch subscribers accept the extra cost burden for their electricity.

  Retirement of the Allen Plant coal generators - for age and cost and other reasons - provides an opportunity for TVA to transition to 21st century, renewable energy on a more appropriate and effective scale then through the small (GP) Switch program. IT would be my hope that, at this juncture of formal, required EPA Clean Air Agreements, the Agency would replace the Allen plant's output with clean, renewable energy generation. TVA should not make costly, multi-decade investments toward replacing one fossil fuel with another, even if cleaner burning one.

  Although the Environmental Assessment suggests no significant negative impacts from building a natural gas plant to replace Allen, the far better, positive-impact choice would be serious investment in energy efficiency to reduce electricity consumption, and in climate safe, non-polluting renewable energy sources.

  I urge TVA to make a large energy-efficiency and green-power switch, not one from a coal fired to a lesser but still destructive, natural-gas fossil generating plant.
  (*Commenter: Frances Lamberts*)

- Please replace this coal plant with renewables and energy efficiency. Data contained in your previous IRP confirms that this is a realistic option. It is time for TVA to take a leadership role in the renewable energy future of the country. This is your opportunity. Please make the most of it.
  (*Commenter: Gary Bowers*)

- Please consider the long term effects of replacing the Allen plant with a sustainable energy source.
  (*Commenter: Peter Ford*)

- Please invest the revenues from coal and other fossil fuels on truly clean, renewable energy sources.
(Commenter: Randy Blevins)

- Solar costs are dropping. Solar energy generation is growing at exponential rates. There's plenty of rooftops, parking lots and sunny green and brownfields in the Memphis area to take advantage of the huge benefits to both the public and to the TVA grid of replacing Allen with solar and with wind from the Clean Line when it is available.
(*Commenter: Mary Mastin*)

- Open up the Green Power Partners to its original proposed capacity and you don't even have to come up with the capital to build a solar plant. People and businesses all over the state will take advantage of the program and build their own installations.
(*Commenter: Patrick Connelly*)

- Has TVA considered renewables to meet its needs?
(*Commenter: Stephen Smith*)

- TVA should re-evaluate solar power and wind power projects located near Memphis, in combination with reactive power solutions, to meet all or part of the remaining capacity need.

  Even if PPA contracts for wind development near Memphis are significantly higher, TVA's finding that the required amount of land for renewable energy generation makes it not viable is wholly unsupported by evidence.

  By sizing renewable energy facilities based on net dependable capacity, rather than nameplate capacity, TVA can ensure that it will have sufficient capacity to meet its peak needs.

  The Draft EA is also insufficient by failing to acknowledge the reduction of long-term environmental impacts of generation through additional energy efficiency and renewable energy projects that are not feasible within the timeframe for construction of a new natural gas plant. Although building such projects would not necessarily reduce the environmental impact associated with construction of a new gas plant, these projects would reduce the need for increased generational output of the plant over its operating life. Renewable energy and energy efficiency reduce air pollution, carbon emissions, water consumption and waste generation, not to mention reduction of upstream environmental impacts associated with the production of natural gas (effects of which are not discussed in the Draft EA).
(*Commenter: Southern Alliance for Clean Energy*)

- This comment is coming from an Arkansan who is within the corridor of the proposed Plains and Eastern Clean Line project. It has been in the news lately that the Sierra Club is weighing heavily upon the TVA to consider this project to supplant the Allen Coal plant. I would just like to ask you to consider not only the customers of the TVA, but also the hundreds of private landowners within the 700 mile, 200' wide corridor for this project. Most landowners within this corridor from the panhandle of Oklahoma to the eastern end in Tennessee would be required to give up rights to a portion of their generations-old land via eminent domain. Many of these landowners are not even aware that this is being discussed. This would be an unprecedented move to allow a private, for-profit, venture-capitalist, highly speculative company the right of eminent domain over

private property owners. Thank you for your time and consideration. There are many things at stake here.?
(*Commenter: David Ulery*)

- I am writing to you as a resident of Arkansas who has been following the TVA's process regarding Clean Line's proposed Plains and Eastern Line. I understand that the Sierra Club has been encouraging you toward a combination of wind, solar, and limited gas as a replacement for the closing Allen plant.

  I have to confess, my family's land and home are on the proposed route for Plains and Eastern, so I am by no means a neutral observer. The idea that this private company could take and clear cut our land against our will is absolutely heartbreaking. That said, my objections to this line go beyond my own family story.

  I think it's curious that a club dedicated to conservation could advocate for a source of energy that requires the clear-cutting of 700 miles of land in a strip 200' wide which crosses multiple streams and wildlife areas. What's more, the proposed line will, by Clean Line's own admission, possess the capability of transmitting coal produced electricity.

  Given that the Sierra Club plainly considers wind as only part of a three-legged source stool, would it not make more sense, environmentally and financially for Tennessee to invest in locally produced sources of power (Especially in light of the new draft EPA rule which does not allow imported green energy to count toward carbon reduction levels).

  As someone who would pay dearly for you to receive that small portion of wind energy, I have to beg you, neighbor to neighbor, to consider that as well in your reckoning. Thank you for your time.
  (*Commenter: Alison Millsaps*)

Response:

TVA has revised Section 2.2.4 of the EA, Alternative F - Retire ALF, Construct a Renewable Energy Source (Wind or Solar). The EA now describes in greater detail the issues associated with using renewable energy sources to replace generation at the Allen site. This Section of the EA discusses TVA’s generation requirements, location requirements, the size of the proposed facility, TVA’s system needs, economic considerations and other relevant issues associated with the comments above. TVA considers investment in different kinds of energy resources on a system-wide basis and was most recently addressed with TVA’s Board in the 2011 Integrated Resource Plan (IRP).

Comment:

- TVA’s finding that the intermittent nature of solar and wind generation would have to be compensated with backup generation or energy storage technology is unsupported by its recent research in support of the forthcoming Integrated Resource Plan.
  (Commenters: Southern Alliance for Clean Energy)

Response:

It is important to recognize that renewable resources such as wind and solar possess different operating characteristics, including the inability to dispatch the units and the intermittency of the resource. In many cases these factors, along with the expected generation profile, require that some form of backup power, often provided by gas-fired generation or another quick-response unit, be operated to balance the intermittent nature of the renewable resource. Recent work on the forthcoming Integrated Resource Plan has focused on several of these resource characteristics, including net dependable capacity, as a means for compensating for these differences with conventional generation. In any case, the non-dispatchable nature of wind and solar resources presents significant operational challenges, especially in situations like Memphis with significant local reliability needs.

Grid Maintenance vs. Behind the Meter Solar

Comment:

- I assume there is a $0.01 (sample) per KWH in all power sold by TVA. Behind the meter consumed power could be perceived as not paying fair share of grid maintenance. Is there a way to calculate an "availability" fee for solar producers that do not sell their power to the grid to fairly collect their fair share of grid maintenance?
(*Commenter: Lynn Strickland*)

Response:

As one of TVA's generation resource options, solar energy provides various benefits and costs that are dynamic in nature and require careful consideration. Currently, TVA and a group of regional stakeholders are developing a methodology to capture the value of distributed generation resources called the Distributed Generation – Integrated Value (DG-IV). The initial focus of this group is to assess the DG-IV value for solar photovoltaic resources. Additional information can be found at http://www.tva.gov/dgiv website, which will serve as a focal point for communication related to this process. As this methodology continues to progress, further information will be provided at this website.

Support for Development of Clean Energy Programs

Comments:

- TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers while improving the quality of life of all citizens of the Valley. Producing and selling more electricity is not the solution to all of our needs, given the realities of destruction of our mountains, pollution of streams, increasing instability of our weather, and rising levels of carbon in out atmosphere. I hope that you will make the decisions necessary to help turn the Tennessee Valley and its people toward a less consumptive, less destructive, and more life sustaining path.
(*Commenter: James Polk*)

- TVA should not trade coal for gas, another expensive fossil fuel which pollutes our air. The best path forward is replacing the Allen coal plant with clean energy that will protect the health of our families, lower energy bills, and create high paying jobs in Memphis.
(*Commenters: 871 participating members of the Sierra Club*)

- I and the Sierra Club support TVA's plan to retire the Allen coal plant in Memphis, but it needs to be replaced with clean energy.
  (*Commenter: Richard Gilbert*)

- TVA started with a renewable source, hydroelectricity. Please go back to your roots and build sustainable clean energy systems.
  (*Commenter: Vincent Harriman*)

- Please consider Clean/Green alternatives. We should be building newer higher efficient plants with every update, not staying the same.
  (*Commenter: Brian and Ginger LaRose*)

Response:

See response to comments under Renewable Technologies and Energy Efficiency topics. TVA's diverse energy portfolio includes a variety of resources including renewable energy produced from sustainable and often naturally replenished sources (e.g., solar, wind, methane, hydro). While these technologies do not emit the air pollutants or generate the ash produced by coal-burning plants, the environmental impacts of solar, wind, and hydro facilities can vary widely depending upon the size, location, and required transmission construction. In addition to costs, reliability, and other factors, TVA considers the environmental impacts of constructing and operating "clean energy" projects just as it does with other types of generation.

Comment:

- What are the requirements to partnerships with TVA to help in providing a more effective way of providing clean energy?
  (*Commenter: James Lennard*)

Response:

TVA provides a suite of energy efficiency and renewable energy program offerings for various market segments, including for home, business, and industry. Each program has various participation requirements, therefore we suggest going to our website (www.tva.gov) to explore the specific type of program that is most appropriate for you.

Energy Efficiencies

Comments:

- Has TVA considered energy efficiencies to meet its needs?
  (*Commenter: Stephen Smith*)

- Memphis can produce as much as 800 megawatts of renewable energy and energy efficiency at NO capital cost to TVA.
  (*Commenter: Lynn Strickland*)

- Too much energy waste has already been created in our country by not updating the energy efficiency of our buildings (manufacturing, commercial and residential).
  (*Commenter: James Polk, Catherine Stevens*)

- TVA can also work with its local power companies to improve the efficiency of our homes, businesses and industries by achieving an annual energy savings of at least 1 percent. Please be a leader in both these regards!
(*Commenter: Nancy Munro*)

- We need TVA's help to become more energy efficient. A report this past year found that Memphis has the most deteriorated housing of all major cities (Commercial Appeal: Memphis metro area rates dead-last in survey 'healthy' housing report, October 2, 2013). Some of the money that would go into an oversized electric plant should be used for rehabilitating leaky homes. In addition to doors or windows that won't close tightly and roofs that leak air or allow rain in, homes with central air leak tremendous amounts of air through improperly sealed ducts. These repairs could bring significant energy savings to residents and jobs for our community, and TVA has a moral duty to help fund them. Additionally, there are new standards coming online for things like central AC and heater fans, plus more energy efficient appliances. Like the new fluorescent or LED light bulbs, these will reduce demand as they are installed because of worn out equipment.
(*Commenter: Sue Williams*)

- The draft environmental assessment lists various options for replacing the Allen coal plant, but does not seriously consider improved energy efficiency.
(*Commenters: 871 participating members of the Sierra Club*)

- The EA fails to evaluate how large reductions in demand could be accomplished by aggressive energy efficiency programs and policies.
(*Commenters: TN Chapter of the Sierra Club*)

Response:

Section 2.2.2 of the EA presents Alternative D - Retire, ALF, Rely on Energy Efficiency. As discussed, current projections indicate that if significant resources were devoted to energy efficiency programs, energy could yield the cumulative potential annual generation of ALF by the end of fiscal year 2019. However, this would be across the entire TVA system, and it is unlikely that sufficient energy efficiency savings of this magnitude would be achieved in the Memphis area by the time the ALF coal units would have to be retired. To continue to reliably serve the Memphis area, generation in the Memphis area is required.

Energy efficiency remains a key component of the overall balanced portfolio TVA is planning, and our energy efficiency portfolio is expected to continue to grow in the future.

TVA, in partnership with Memphis Light, Gas and Water, delivers energy efficiency and demand response programming to residential, commercial, and industrial end-users in the Memphis area. Costs for these programs are accounted for through TVA's non-fuel operations and maintenance expense. System-wide since 2008, TVA's energy efficiency and demand response programs have contributed the equivalent of approximately a 1,000 MW combined cycle power plant to the TVA system. Energy efficiency and demand response programs are a part of TVA's balanced portfolio strategy and continue to grow on a system-wide basis, but this does not eliminate the need for TVA to also maintain existing generating capacity and build new units to meet system demand.

Greenhouse Gas/Climate Change

Comments:

- Using gas as a fuel not only pollutes our air but increases the global warming effect - and no single issue presents a more serious concern. The issue needs to be seriously addressed by every responsible agency, company and citizen.
(*Commenter: Margaret Schreck*)

- Maximizing the reduction in greenhouse gas emissions should be a goal of the alternatives analysis. The EA targets only two concerns - the reduction in sulfur dioxide and the maintenance of a "balanced portfolio" of centralized, industrial scale fossil fueled generation to supply TVA and its distributor, Memphis Light, Gas & Water. Ignored are the goals of maximum reduction in use of fossil fuels and emission of greenhouse gasses.
(*Commenter: TN Chapter of the Sierra Club*)

Response:

Section 3.2.1.3 of the EA has been revised to provide more information about greenhouse gas emissions. The catalyst or need for the proposed action here is responding to the requirement in the EPA Agreements in the context of the achieving a more balanced portfolio, a directive from TVA's 2011 IRP and EIS from which this EA tiers. TVA appreciates that the Sierra Club, a private organization that sets its own agenda, has embraced the reduction of greenhouse gas emissions as its primary objective. TVA as a public entity and the supplier of electricity to over nine million people, has responsibilities that rest on its mission to advance the social and economic well-being of the residents of the Tennessee Valley region.

TVA system CO_2 emissions have been reduced over 30% below 2005 levels due to additional gas and zero emitting generation and lower system demand. Replacing the coal fired Allen units with a natural gas combined cycle plant would provide additional reductions in air emissions, including CO_2, while providing the cost effective, dispatchable power required by December 2018 to ensure electrical power reliability for the Memphis area. A natural gas CC plant would emit approximately 50% less CO_2 per unit of generation compared to a modern coal fired plant with controls to meet current regulatory requirements for existing plants.

Comment:

- Please engage in the discussion comparing the carbon footprint per decade and megawatt hour for a 'newer' coal plant with environmental protective features to the carbon footprint of a new natural gas turbine electric plant. Compare for the probable life of the newest plant.
(*Commenter: Mary Headrick*)

Response:

The Electric Power Research Institute (EPR) compares CO_2 emissions in metric tons/MWh as follows:

New Pulverized Coal - 0.84
Natural Gas Combined Cycle - 0.37

Based on this information, generally speaking, coal facilities produce more than twice the CO_2 emissions of natural gas plants.

Gray Water Usage from the Adjacent Wastewater Treatment Plant and Use of Biogas

Comments:

- TVA proposes using “gray water” from the nearby WWTP, but does not review the capacity, stability, water quality issues or access/construction impacts that should be evaluated before a decision is made with respect to a new facility.
(*Commenter: Smith Management Group)*

- I remember reading about the water usage of Allen vs. the Grey water from the treatment plant - all six pumps running will use less amps than a hair dryer on low, and betting your electrical production on the H_2O treatment plant water output is not the wisest decision. We tried it as the record low of the Mississippi River and it wasn’t even close. Snow the public on biogas usage. MLGW is selling it by the truck load because we can’t get the gas into the units! No monies are supplied for the plant’s budget to do so on a realistic basis!
(*Commenter: Stan Craig)*

Response:

In Sections 1.4.3 and 2.2.7 of the EA, TVA discusses the proposed plan to use water for condenser cooling from the adjacent Maxson wastewater treatment plant (WWTP) rather than from naturally occurring source water bodies (e.g., McKeller Lake). TVA recognizes this opportunity to reduce the use of natural resources in the Memphis area. The proximity of the proposed facility to the Maxson WWTP makes the use of grey water feasible for all uses that are currently fulfilled by McKeller Lake water.

The proposed gas plant would use approximately 4-8% of the gray water available from the WWTP. TVA would treat the gray water as necessary for use in the gas plant and would return approximately 1-2% of the treated water back to the WWTP. Currently the WWTP produces over 100 million gallons per day (MGD). The maximum that TVA would use is approximately 7-10 MGD.

In addition, as discussed in Sections 1.4.1 and 2.2.1, the proposed gas plant would be equipped to burn a greater percentage of biogas from the adjacent wastewater treatment plant than is burned at the coal plant. This aspect of the project provides important benefits in maximizing the use of this renewable energy source.

Purchased Power

Comment:

- Has TVA considered purchased power to meet its needs?
(*Commenter: Stephen Smith*)

Response:

Yes. See Section 2.2.5 of the EA presents Alternative G - Retire ALF, Upgrade TVA's Transmission System/Rely on Power Purchase Agreements.

Alternatives

Comments:

- There is a lot of information in this report but most of it is spun to support the installation of gas fires CC at the Allen Plant. It was written to support the decision not to question the decision.
  (*Commenter: Noel Mizell*)

- TDEC recognizes that a number of additional alternatives were considered but eliminated from further discussion and appreciates TVA's inclusion of rationale regarding decisions to eliminate additional alternatives from discussion.
  (*Commenter: Tennessee Department of Environment and Conservation, Office of Policy and Planning*)

- TDEC's Office of Energy Programs (OEP) notes concurrence with TVA's conclusions regarding alternatives (nonviable) noted in Sections 2.2.2 [Alternative D - Retire ALF, Rely on Energy Efficiency], 2.2.4 [Alternative F - Retire ALF, Construct a Renewable Energy Source (Wind or Solar)], and 2.2.7 [Alternative Locations for Proposed CT/CC Plant] in particular.
  (*Commenter: Tennessee Department of Environment and Conservation, Office of Energy Programs*)

Response:

Comments noted.

Comments:

- The alternatives considered and reviewed are too limited. The Purpose and Need statement in the EA is too narrow and is designed to support the preferred alternative, rather than to allow evaluation of other reasonable alternatives consistent with the "Clean Air Act Agreements" referenced in the EA (Consent Decree or CD). Only 2 alternatives were evaluated in any detail (Alternative A and B). Alternative A is a false choice since it is inconsistent with the CD requirements. Therefore, only one alternative was seriously considered. Although the EA identifies other alternatives (Alternatives C-H), they are only discussed and dismissed in a cursory manner due to the narrow focus of the project's Purpose and Need and perhaps to further support the preferred alternative.
  (*Commenter: Smith Management Group*)

- The Draft EA fails to adequately consider an appropriate range of alternatives, including in particular an alternative that optimizes available resources to meet the project Purpose and Need.
  (*Commenter: Southern Alliance for Clean Energy*)

Response:

The basis for the purpose and need for the proposed action is identified in Section 1.3 of the EA. The Smith Management Group fails to identify what it thinks would be a more appropriate purpose and need. TVA acknowledges that the No Action alternative is not consistent with the requirements of the EPA Agreements, but we are required to include this alternative by applicable regulations. The No Action alternative provides the baseline from which the effects of the proposed action can be appropriately judged. TVA did consider a range of different alternatives. The EA identifies these alternatives, provides information about them, and explains why they were not evaluated in greater detail. This is consistent with regulations promulgated by the Council on Environmental Quality to which TVA is subject. 40 C.F.R. § 1502.14(a).

Comments:

- TVA bundles several general options for a Natural Gas facility (range of CTs and CT/CC options) without thoroughly evaluating any specific type, providing actual power generating requirements or comparing specific configurations with other valid alternatives.
(*Commenter: Smith Management Group*)

- The EA presents the choices as a range of output capacity by varying mixes of combustion turbines and/or combined cycle generators. The EA does not present sufficient information so that the public or even experts may comment on the quantified environmental impacts or cost effectiveness of specific plant configuration.
(*Commenter: TN Chapter of the Sierra Club*)

- TVA's failure to adequately describe its preferred alternative precludes an adequate NEPA evaluation. TVA does not really define Alternative B. The above plant configurations will have vastly different capital costs and environmental loadings. Consequently, the two facilities would have very different load profiles.
(*Commenter: Wyatt, Tarrant & Combs, LLP and Energy Ventures Analysis, Inc.*)

Response:

Comments noted. The EA provides information about a range of gas plant configurations and has added additional information about the generating needs of the Memphis area. This is more than sufficient for an EA level review that requires only brief discussions and analyses. 40 C.F.R. § 1508.9(a).

Comment:

- TVA did not provide any criteria for determining which facility should add Flue Gas Desulfurization (FGD) systems and which should be retired, nor did it provide any review of the environmental impacts of retirements and FGD installation on a system-wide basis. Without providing the criteria for determining optimal placement of FGDs or a detailed review of FGD alternatives and potential impacts at Allen, TVA did not adequately review implementing the FGD alternative at Allen.
(*Commenter: Smith Management Group*)

Response:

The EPA Agreements require TVA to reduce SO_2 emissions from all three coal units at Allen either by installing scrubbers or retiring those units. Section 2.2.1 of the EA provides information about the FGD or scrubber alternative and provides references to two other EAs that address wet and dry scrubber systems in more detail. Detailed engineering would be required to determine the "optimal" placement of the scrubbers on the coal plant site. If the decision is made to scrub the plant rather than retiring it, detailed engineering activities would be initiated and optimal locations would be determined then. Section 2.1.2.1 indicates that if the decision is made to build the proposed natural gas plant and retire the three coal units, virtually all of the coal-related systems at the plant would be shutdown.

Comment:

- TVA should reconsider other generation needs of the project, specifically the natural gas combustion turbine ("CT") units should be delayed and either scaled back or cancelled.
  (*Commenter: Southern Alliance for Clean Energy*)

Response:

CTs are integral components of a combined cycle plant. If they are "cancelled," it would not be possible to construct a combined cycle plant. The number of CTs in a CC plant, however, can vary. The EA considers CC configurations that consist of two or three CTs, referred to as 2 on 1 and 3 on 1 systems. The EA also considers constructing a CT-only plant that could consist of up to four CTs.

Comment:

- TVA should fully evaluate comparative impacts and benefits of pursuing a combination of energy resources, rather than relying singularly on natural gas, and inappropriately dismissing feasible alternatives through a specious all-or-nothing analysis.

  The Draft EA fails to include an alternative consisting of precisely the "balanced portfolio of generation resources" identified in the Purpose and Need statement. TVA should not view the Allen decision in isolation.
  (*Commenter: Southern Alliance for Clean Energy*)

Response:

TVA's 2011 IRP and EIS lay out the potential components of a balanced portfolio in the context of ranges for various energy resources on a system-wide basis. The TVA Board did not direct staff to achieve any precise percentage of resources when it approved the IRP. The Allen analyses and decision are being considered in the context of the overall direction to achieve a more balanced portfolio of energy resources on the TVA system.

Comment:

- The Draft EA excludes reasonable alternatives that should have been included in TVA's analyses, and includes an improper "no-action" baseline.
  (*Commenter: Southern Alliance for Clean Energy and Energy Ventures Analysis, Inc.*)

Response:

The No Action Alternative provides the baseline from which the proposed action and alternatives can be considered. TVA acknowledges that this is not consistent with the purpose and need for this proposed action and the EPA Agreements. However, applicable regulations require TVA to evaluate the No Action alternative in this EA.

Comment:

- TVA unreasonably failed to consider an alternative in which a combination of natural gas, renewable energy, and reactive power compensation could be optimized to meet TVA's Purpose and Need for the project.

  The Draft EA unreasonably omits consideration of the reactive power delivered by renewable energy.

  The Draft EA should be revised to include, in addition to the CT or CC options laid out in Alternative B, three additional options for meeting TVA's needs at ALF. (*Commenter: Southern Alliance for Clean Energy*)

  - Up to 600 MW of dependable capacity supplied by utility-scale solar generation and/or wind generation, delivered via existing transmission lines or relatively small new transmission lines (e.g., 0-20 mile connections of 161 kV or less).
  - Up to 200MVArs of reactive power compensation devices such as synchronous condensers or Stativ Var Compensators (SVCs), built in combination with new generation at ALF.
  - Design requirements for the new natural gas generation at ALF to ensure that it can supply excess MVArs to meet reactive power requirements during periods in which the plant is not operating at full real power output.

Response:

TVA has responded elsewhere in this Appendix to the utility-scale solar and/or wind generation options and the combination alternative that the Commenter identified.

Synchronous condensers could provide dynamic reactive support to the area which would help with voltage stability issues around Memphis. However, one of the problems to overcome in this area is thermal overload which results from the loss of MWs (real power) with Allen offline. This is largely due to the amount of load in the Memphis area. As a result, significant megawatts (600-800 MW minimum) are required at Allen to serve load around Memphis even with synchronous condensers. A gas plant of this magnitude would also provide the required reactive support for the area, negating the need for condensers.

If synchronous condensers are combined with generation as suggested, this could cause increased fault levels above the capability of the existing Allen switchyard. To correct this, TVA would have to rebuild/overhaul the entire switchyard at Allen. Additional studies would be needed to assess impacts to other transmission equipment in the area. For these reasons, TVA does not consider synchronous condensers to be a viable option at Allen .

The proposed CT/CC plant would have the capability to supply MVArs independently of MW (real power). However, typically a combination of MVArs and MW are generated to meet the needs of the overall TVA system.

Comment:

- How about you look into drilling down to earth's core (Near Power Plant) and use this non carbon energy.
  (*Commenter: Edgar Gehlert*)

Response:

There is not sufficient information provided in this comment for TVA to respond to it. Additionally, TVA is unaware of any current technology that would allow it to drill to the earth's core.

Comment:

- Memphis and the Mississippi River go together. You should find an appropriate location, build a land barrier in such a way as to form an island to isolate a section of the river, and build a dam and water powered power plant to replace the Allen coal plant.
  (*Commenter: Joseph Benson*)

Response:

Constructing a hydro-power dam on the Mississippi River would require the approval of the U.S. Army Corps of Engineers and perhaps other regulatory agencies. Based on TVA's experience with constructing the Tellico Dam and trying to construct the Columbia Dam on the Tennessee River system, it would not be possible to get a Mississippi River hydroelectric dam reviewed, approved, designed and constructed by the time TVA would be required to retire the three Allen coal units (December 31, 2018).

Comment:

- The state-of-the-art emission controls not considered by TVA for the Allen Plant would allow Allen to continue to use the least cost resource - coal - while fully complying with all emission requirements.
  (*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

Scrubbers are state-of-the-art emission controls. TVA discusses the scrubber alternative in the EA at Section 2.2.1.

Comment:

- In 2011 TVA issued its Integrated Resource Plan and associated environmental impact statement in which it analyzed its system needs and the environmental impacts of various alternatives for meeting those needs. TVA's preferred alternative for Allen at that time was to install scrubbers to maintain the use of coal at that plant.
  (*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

The TVA Board approved the budget for a scrubber project at Allen in August 2011, conditioned on completing environmental reviews and analyses. The Board withdrew that authorization in August 2012 in light of changing environmental and economic factors. This EA and related analyses consider current information and data to help inform the decision that the TVA Board will be asked to make soon.

Nuclear Fuel Source

Comments:

- Please build a Thorium reactor. I suggest that you build a Nuclear plant. Cleaner, Safer, Cheaper.
  (*Commenter: James White*)

- Coal related chemical dumped into the river in W. Va. Cost still counting. I would suggest looking into the 4th generation Nuclear (DOE) safe and smaller than present plants. More solar is good, but you need a base load and 4th generation can do that.
  (*Commenter: Edgar Gehlert*)

Response:

TVA considers various resource types to meet future projected energy needs. Our analysis suggest that the needs of Memphis and the surrounding area can best be met by intermediate or peaking generation, such as that provided by gas plant, rather than base load power as provided by a nuclear plant. In TVA's 2011 Integrated Resource Plan, the recommended planning direction included expansion of nuclear capacity, with nuclear supplying a larger percentage of TVA's balanced portfolio of generation sources. TVA is adding 1,150 MWs of new nuclear generation at Watts Bar Unit 2 in December 2015 to address future base load power needs.

Using thorium as a reactor fuel has been tried in the United States in several different reactors. Previous experience in those trials did not lead to its adoption because its performance in light water reactors did not live up to expectations. Different thorium/uranium fuel combinations have been studied. However, those fuel types are far from being ready for NRC fuel qualification testing. In addition, the NRC would need to develop regulations to cover thorium fuel types in light water reactors. Based on the NRC approval times and requirements, commercial use of thorium fuel types in the United States is at least 15 years away from feasibility if the existing technical issues are resolved. This is beyond the time at which TVA would have to retire the three Allen coal units.

Existing Allen Plant

Comment:

- TVA ignores its recent investment in SCR for NOx control at Allen and other investments that will be required to meet current regulatory deadlines prior to the Consent Decree's compliance date of December 2018. The EA did not discuss whether this investment

has successfully achieved emission control required by the Consent Decree. Nor does it address whether the existing SCR and the addition of FGDs will enable the current plant to meet the April 16, 2015 deadline for reducing emissions as mandated by 40 CFR 63, which is prior to the scheduled decommissioning date of 2018.
(*Commenter: Smith Management Group*)

Response:

The SCRs on the three Allen coal units were installed and operational in FY2001 to FY2003 before the effective date of the Consent Decree. TVA is currently meeting its obligation under the Consent Decree to continuously operate these systems. SCRs control NOx, not SO2. The EPA Agreements recognize this by noting that for NOx reduction purposes, SCRs already have been installed on the three units. Consequently, the agreements only require TVA to take action at Allen to reduce SO_2 emissions either by installing scrubbers on the three units or retiring them. TVA expects to be able to comply with EPA's Mercury and Air Toxic Standards (MATS), 40 CFR 63, without additional major capital investment.

Converting the Existing Allen Fossil Plant Back to Natural Gas

Comments:

- Short and to the point: $500 million for 500 MW or 750 MW? Unit 1 at Allen is already piped to burn 30% of fuel rate in overfired gas, but no one wants to do the repairs to do this. The gas headers to each unit as designed by MLGW were demetered in 1989-90 and again in 2004 meeting design specs. MLGW put a new gas header across McKeller in the 90's and we still don't try and utilize it. The last gas test we ran was for the overfired gas to reduce NOX and SOX and was successful but the cost of it was higher than coal. Gas was half then of what it is now. If you are looking at a billion dollars, go to gas and bring the turbines back to design and you'll have 990 MW designed by 930 MW actual. We have generated 910 MW gross on coal. Surely it can be seen of the benefits of burning gas in the units as designed rather than a new gas only across the road. (*Commenter: Stan Craig)*

- I believe Allen has the capability of being fired by gas when it was built. If so, have you considered refurbishing that capability? It would probably not be as efficient as a new plant nor as reliable because of the old boiler tubes and other plant equipment. On the other hand, I would think it would be cheaper and quicker. Technology and other external factors are changing so fast that a cheaper alternative that is not as good as the long-term one but would give you 5-15 years to let events develop might be attractive. *(Commenter: Robert Hereford*)

Response:

In Section 2.2.3 of the EA, TVA presents Alternative E - Convert ALF to Natural Gas Fuel. TVA has studied the technical feasibility, anticipated performance level, and approximate cost of converting ALF to natural gas fuel. As discussed, although this alternative is technically feasible, the plant's operational efficiency would be adversely impacted. The converted units' fixed O&M and operating cost ($/MWh) would be higher than the operating costs of a gas-fired plant. Other characteristics of the converted units such as start times, load ramp rates, and minimum up and down times would remain the same as the coal units. Given the expected capacity factors at the Allen site (driven by the need for transmission system support in Memphis), the combination of high operating costs and reduced unit flexibility renders the gas conversion unreasonable relative to other options. In addition, this alternative is not permitted in the EPA Agreements. A provision in those agreements would allow TVA to do this in lieu of retiring the units or installing scrubbers only if EPA, in consultation with the other parties to the agreements, agrees to this in its sole discretion. Whether EPA would agree to this and the time needed to obtain such agreement is unknown. Because of all the factors discussed, this alternative was not considered reasonable.

Coal Ash Handling

Comments:

- The EA states that all the byproduct had to hauled miles to a certified landfill but we don't have to use that process. The issue of hauling the byproduct of the process of the scrubber was only looked at the cost not how to reduce the cost. We can leave the precipitators in service and then only haul the byproduct away. This one change would reduce the hauling by about 80%. It would also keep the Harsco Company in business and add additional jobs for the local economy.
(*Commenter: Noel Mizell*)

- TDEC's Division of Solid Waste Management (SWM) has reviewed the DEA and recognizes that the preferred alternative will prevent future generation of coal ash.
(Commenter: Tennessee Division of Environment and Conservation, Division of Solid Waste Management)

- Page 20 of the EA indicates that approximately 300,000 tons of coal combustion residuals (CCR) will be generated per year under Alternative C. However, there is no source or basis for this estimate, rendering any credible evaluation impossible. TVA also states on page 20 of the EA that CCR management capacity at Allen is limited. However, TVA did not provide sufficient information to verify the extent of land required to manage CCR under current practices or under other optimized practices.
(*Commenter: Smith Management Group*)

- TVA did not consider alternative use for CCRs generated from continued use of coal at the Allen plant or markets for FGD byproducts (e.g., gypsum). It only referenced landfilling.
(*Commenter: Smith Management Group*)

- TVA asserts that limitations on its ability to dispose of ash from Allen's coal-fired boilers make the use of coal at Allen unfeasible. TVA had no problem finding solutions for those same difficulties three years ago when it and its Board of Directors approved the use of coal at Allen.

  TVA bemoans a lack of space for additional ash disposal, and it cites that as a reason not to consider scrubbing. Yet, it did not consider the possibility of disposing of additional ash on the 73 acres it has already leased for construction of the gas plant.

  TVA raises concerns regarding the disposal of ash at Allen, and it advances those challenges as part of the reason that FGD at Allen should not be seriously considered.

Presently, TVA is able to recycle a large portion of the ash from Allen….In the latest EIA data, TVA reports that all bottom ash is being sold.
(*Commenter: Wyatt, Tarrant & Combs, LLP and Energy Ventures Analysis, Inc.*)

Response:

The total ash plus dry scrubber reaction solids (coal combustion residuals or CCR) generated by the three coal units if the decision is made to scrub them in tons per day (tpd) was estimated to range from 300 to 496 tpd. The ALF plant site is limited in available space to install a new landfill. TVA approached Memphis Gas, Light, and Water (MGL&W) about utilizing their existing 200-acre Class I solid Waste Landfill adjacent to ALF for a CCR landfill. MGL&W rejected this. TVA also approached the Port Authority at Memphis about using the 73-acre site identified for the proposed gas plant across the road from ALF for a CCR landfill, but this was rejected too. The lease for the 73-acre site expressly prohibits using it for a landfill. TVA also conducted a regional siting study in 2010 for disposal of CCR material. The study showed that for a minimum 10-year landfill life, TVA would need to transport the dry ash plus scrubber product approximately 50 miles from ALF.

TVA currently sells fly ash from the Allen coal plant for use as fill material on Corps of Engineer dike construction projects. There is, however, substantial uncertainty about the ability to continue to do this and about the ability to market any kind of CCRs in the future in light of EPA's proposal to regulate CCRs either as hazardous or solid wastes. If TVA scrubbed the coal units, this also would change the chemistry of the CCRs. The new CCR would have to be analyzed and evaluated to determine if it was suitable for reuse. The chemistry of CCR depends on the scrubber technology that is used. Wet scrubbers produce gypsum and fly ash separately. The scrubbed coal plant would have to be designed to separate fly ash and gypsum which increases the cost of construction. The gypsum from this process could be sold and reused if there is a buyer. A dry scrubber results in a mixture of fly ash and gypsum and there is less likely to be a market for this. Even if it was determined that TVA could sell CCR from a scrubbed coal plant at Allen, this does not eliminate the need for a new landfill.

Comment:

- If the ALF plant remained in operation according to the No Action alternative, this would necessitate the construction of a new landfill or the use of an offsite landfill for the disposal of CCR. This information should be discussed as a consequence of the No Action alternative or the appropriate NEPA document should be referenced as a related environmental review.
(*Commenter: Tennessee Department of Environment and Conservation*)

Response:

Section 3.17.2.1 has been edited to reflect this change.

Comment:

- Based on TDEC's knowledge, there are no commercial Class II landfills in this region, the waste streams listed could be disposed of in a Class I landfill.
(*Commenter: Tennessee Department of Environment and Conservation*)

Response:

Table 3-21 in the EA has been edited to reflect this information.

Comment:

- Section 3.17.2.2.1 “Proposed CT/CC Facility,” the “Operation” subheading includes waste descriptions for Selective Catalytic Reduction (SCR) catalyst, sludge from potable water chlorine removal, and cooling tower fill. TDEC recommends that this description should note that these are special wastes which must be approved by TDEC Solid Waste Management (SWM) before offsite disposal occurs.
(*Commenter: Tennessee Department of Environment and Conservation*)

Response:

Section 3.17.2.2.1 has been edited to note special wastes which must be approved by TDEC.

Coal Site Decommission and Demolition

Comments:

- This alternative disregards site decommission and demolition costs\impacts (e.g., ash pond closure or potential asbestos, lead, mercury, PCB and fuel oil remediation).
(*Commenter: Smith Management Group*)

- Perhaps the most egregious deficiency in TVA’s evaluation of its preferred alternative is its refusal to acknowledge the extraordinary environmental and economic impact of decommissioning the Allen coal units and their ancillary structures.
(*Commenter: Wyatt, Tarrant & Combs*)

Response:

TVA is not required to decommission or demolish the three coal units if it decides to retire them. It ceased operating its Watts Bar coal plant in 1982, but did not propose to demolish it until 2011, 29 years later. Before doing that, TVA prepared an EA. See http://www.tva.com/environment/reports/wbf_deconstruction/index.htm. If TVA proposes to decommission or demolish the three Allen units in the future, it would conduct another environmental review before making this decision. If TVA included analyses in this EA about decommissioning/demolition impacts, it is likely that those analyses would be too dated to rely on when TVA eventually proposed such an action. Additionally, decommissioning/demolition and plant closure requirements likely will have changed.

Lifecycle of Methane and Coal

Comments:

- Did the EA analyze the full lifecycle of methane?
(Commenter: Stephen Smith)

- The EA ignores emissions and potential impacts from natural gas extraction, processing, storage and transportation. A total life cycle analysis of carbon emitted between coal and natural gas should be evaluated more thoroughly.
  (*Commenter: Smith Management Group*)

Response:

The EA has been modified to include more information about the lifecycle of natural gas production and associated impacts. See Section 3.2.2.2.1, *Life Cycle Natural Gas Production*.

Resource Impacts

Comments:

- Upon review of all the project locations, TDEC's Division of Natural Areas (DNA) finds that the project is located in a previously disturbed area with limited suitable habitat for rare species. As such, TDEC's DNA does not anticipate any impact to rare, threatened, or endangered species within the project vicinity and has no specific comments regarding the proposed action and alternatives.
  (*Commenter: Tennessee Department of Environment and Conservation, Division of Natural Areas*)
- TDEC's Division of Underground Storage Tanks (UST) has reviewed the DEA and has found that there are no tanks in or around the location of the proposed action.
  (*Commenter: Tennessee Department of Environment and Conservation, Division of Underground Storage Tanks*)

Response:

Comments noted.

Comment:

- By reducing the fuel requirements at ALF, the upstream environmental consequences such as land development required to build natural gas wells are reduced. The Draft EA does not contain sufficient information to reach the conclusion that the total land use impacts associated with renewable energy development are greater than the environmental impacts associated with building, obtaining fuel, and operating the maximum 1,400 MW natural gas power plant described in the Draft EA. In fact, TVA recently issued a draft programmatic environmental assessment that outlines how solar power development can proceed with no significant or acceptable environmental impacts.
  (*Commenter: Southern Alliance for Clean Energy*)

Response:

As discussed in the EA, a wind or solar facility would require significantly more land than the proposed natural gas plant that would be located on a 73-acre site in an industrial park. Elsewhere in its comments, SACE indicates that 11 square miles of land would be required for an 880 MW solar facility. TVA recently completed an EA for two solar facilities with a combined output of 40 MW that would require 325 acres. See http://www.tva.com/environment/reports/strata/index.htm. SACE asserts that the entire acreage committed to natural gas production and the proposed gas plant would be more than a comparable solar or wind facility, but provides no support for this.

This comment assumes that a TVA decision to build a natural gas plant would have a noticeable or material affect on upstream natural gas production infrastructure. That is at best speculation and highly likely to be untrue. Currently, almost 25 Tcf of natural gas is produced annually in the United States and this is expected to increase to almost 40 Tcf in 2040. The amount of natural gas needed to fuel a 1,400 MW combined cycle natural gas plant annually would be 0.3% of 25 Tcf. The amount of gas used at a 1,400 MW plant would be trivial compared to the amount produced nationally and would have no noticeable effect on natural gas production infrastructure.

Comments:

- To support its conclusion that gas construction will have no significant impact on the environment, TVA excludes from its analysis the economic and environmental impacts of the construction of a 13 mile, 30-inch diameter, high-pressure gas transmission line.

  Similarly, gas construction would necessitate installation of additional on-site electric transmission lines as well as water lines to and from the Maxson Waste Water Treatment Plant. The cost and environmental effects of this necessary construction are totally ignored by TVA, solely for the purpose of making gas construction seem appropriate.
  (*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

To the extent information is available, the EA addresses the potential impacts of the gas pipeline that would have to be constructed to serve the plant, the electrical connection of the gas plant to the Allen switchyard (new transmission lines), and the gray water lines to and from the Maxson Waste Water Treatment Plant in appropriate sections in Chapter 3 of the EA. MLGW would construct the gas pipeline and gray water lines and more detailed information about the potential impacts of these actions depend on future decisions by MLGW.

Environmental Regulations

Comment:

- TVA discusses the types and timing of emerging environmental regulations that introduce uncertainty regarding future environmental costs for coal alternatives. TVA does not fully evaluate the referenced uncertainty in the EA, and that same "uncertainty" can be ascribed to many other new, pending and proposed regulations from EPA - Emission Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units, and guidelines that apply to crude oil and natural gas production, transmission and distribution. The EPA recently published a document outlining plans for further evaluation of improvements in methane emission control from natural gas pipelines, which could have significant impacts upon gas supply and cost.
  (*Commenter: Smith Management Group*)

- One of those factors referenced by TVA in the EA is the proposed regulations which comprise the so-called “Clean Power Plan.” Those proposed regulations are, of course, not law, and they are therefore not appropriate evaluation criteria.
(Commenter: *Wyatt, Tarrant & Combs, LLP; Energy Ventures Analysis Inc.; and Babb and Clemente*)

Response:

TVA agrees that the range of uncertainty in future environmental regulatory requirements is significant for all fossil fuels, coal and gas. This is taken into account in TVA’s Integrated Resource Planning process. Compared to coal-fired generation, however, a natural gas plant poses less risk of impact from future regulatory requirements due to lower air emissions, reduced water impacts, and no coal combustion by-products. Ignoring the potential implications of future regulatory requirements would be irresponsible and § 113 of the Energy Policy Act of 1992 requires TVA to take into account risks and environmental compliance costs in its least-cost system planning process.

Air Quality / EJ

Comments:

- TDEC’s Division of Air Pollution Control (APC) has reviewed the DEA and recognizes that the proposed project will have positive impacts to air quality at both the local and regional levels.
(*Commenter: Tennessee Department of Environment and Conservation, Division of Air Pollution Control*)

- TDEC’s Office of Energy Programs (OEP) has reviewed the DEA and recognizes that the proposed action will result in reduced greenhouse gas emissions resulting from energy generation.
(*Commenter: Tennessee Department of Environment and Conservation, Office of Energy Programs)*

Response:

Comments noted.

Comments:

- I think the plan is in need of some revision. Gas should not be the only path to take. I suggest this because I have bronchitis, allergies and even in my home I sometimes have breathing problems due to poor insulation of my home and our climate in Memphis, TN. The air quality really needs improving as soon as possible. It will help the future generations breathe cleaner air. Please make sure that all the sources are used together in implementing this plan.
(*Commenter: Shelia Taylor Jones*)

- The National NAACP through its affiliates across the country have made a commitment to address what we perceive as “Environmental Justice” in communities of color across the nation who also happen to be of low income. We have seen the urban sprawl force communities of people of color into areas of toxic waste and air pollution.

"Cold Blooded- Putting Profits Before People" is a report distributed by the NAACP documenting the impact of coal fired power plants on the community's health and its contribution to climate change. Researchers evaluated 378 of the worst performing coal fired plants in the country. Thank goodness the Allen Steam Plant was not one of them. But the message was clear. Coal fired plants are relic of the past. They negatively impact the health and wellbeing of entire communities, especially those located in close proximity to the plants, which always tend to be near low income communities and people of color with little means to protest this injustice.

Today, I speak on behalf of the 45,000 Memphians located within 3 to 6 miles of the Allen Steam Plant in parts of zip code 38109. These children and families have been disproportionately subjected to coughing, wheezing, and nasal inflammation and asthma since the installation of the Allen facility in the 1950's. This injustice would not have been tolerated in any other community. The only way to eliminate the harmful effects of these plants is to close them in favor of cleaner sources of fuel. Now is the time to move on discussion from refitting this plant to building a new clean energy plant to serve the needs of the community. It is our understanding that TVA has made progress in this effort in other communities which we applaud. But 60 years is more than enough time to make a change in this community.
(*Commenter: NAACP, Memphis Branch*)

- Thank you for the recent decisions to retire your most outdated coal plants in the Tennessee Valley. As a lifelong sufferer of asthma and with many family members suffering with the same malady, it is even more pleasing for me and most certainly for many more individuals and families that you have chosen to make this move.

  The Allen plant, for example, is the biggest polluter in Shelby County. Keeping the Allen plant running, or replacing it with gas-fired power, means more pollution in our community that already suffers some of the worst air pollution in the region. My son's family considered moving there and, thankfully, decided against it after my daughter-in-law received her MD. A wise choice considering the terrible air quality, my son's asthma and his family history. I'm sure others like them took this quality of life issue into account in considering the Memphis area as a place to live, work and raise their families. Sadly, while it is too late for my husband's family, TVA can now live up to its legacy of being a leader in clean, affordable power and taking care of its workers and their families.
  (*Commenter: Patricia Gray*)

- I live in East Tennessee and I do not want to breathe poisoned air. So therefore, I thank you for the recent decisions to retire your most outdated coal plants in the Tennessee Valley.
  (*Commenter: Rosalind Andrews*)

- Being labeled the biggest polluter in Shelby County is a shameful thing to be noted for! Let's work to shuck this label!
  (*Commenter: Beverly Morris*)

- TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers. I and my family have suffered the consequences of dirty air and I have evaluated the potential health effects of numerous air pollutants as a scientist; the health effects of particulates and other effluents from coal-fired plants are well-documented and significant. (*Commenter: Nancy Munro*)

Response:

The Allen plant was built in the 1950's by Memphis Light Gas and Water (MLGW), leased to TVA in 1965, and purchased outright by TVA in 1984. Through 2011, TVA spent approximately $5.4 billion on emission controls at its fossil-fuel plants to help TVA generate power as cleanly as possible. This includes installation of selective catalytic reduction systems at Allen to reduce nitrogen oxide emissions by about 90 percent. Allen is equipped with electrostatic precipitators that capture ash from the burning coal. The use of low-sulfur coal from the western United States limits emissions of sulfur dioxide. .

As indicated by comments from the Division of Air Pollution Control, the proposed replacement of the three coal units at Allen with a natural gas plant is expected to improve air quality in the Memphis area as well as regionally. Section 3.1 of the EA addresses air quality and compares emissions from the coal units with those of the gas plant.

With respect to future emissions, the potential CT/CC facility was evaluated using conservative, worst-case assumptions for plant size and operation. TVA identified the operating scenario with the highest emissions for each pollutant and compared those emissions to the current actual baseline emissions for the three coal-fired units that would be replaced. Based on these scenarios and assumptions, replacement of the three coal-fired units with the CT/CC facility would result in a net decrease in all regulated air pollutant emissions except for CO. In the case of CO, the projected worst case scenario resulted in an increase of less than 10% in CO emissions. Overall, TVA's proposed action will contribute to improved air quality in the Shelby County area.

Installation of FGD systems at ALF would meet the need of reducing SO2 emissions, as required by the EPA Agreements. Actual SO2 emissions from the ALF coal-fired units are 11,461 tons/yr. If dry FGD systems were installed, SO2 emissions would be reduced to approximately 2,900 tons/yr. This assumes 96% SO2 removal while burning a coal blend with an equivalent SO2 content of 3 lbs/MMBtu. The proposed option of a CT/CC plant operating in gas-fired mode would emit about 15 tons/yr of SO2.

Comment:

- Shelby County has some of the worst air quality in the region, exceeding safety limits set by the U.S. EPA.
  (*Commenter: Sue Vaughan*)

Response:

As discussed in Section 3.1 of the EA, the Memphis area and Shelby County meet all of the national air quality standards set by U.S. EPA that are designed to protect human health and the environment except for the ozone or smog standard. Respecting the ozone standard, TDEC has petitioned EPA to designate the area as now attaining that standard based on recent air quality data. TVA's proposed action should help to further improve air quality in the area.

Comment:

- Affordable electricity is necessary to expand economic opportunities and to prevent income inequality from becoming even worse.

  The poor and elderly are likely to be disparately impacted by electric rate increases, which impact not only degrades the human environment, but invokes notions of environmental justice.
  (*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

TVA's goal is to continue to provide reliable, affordable electricity to the public it serves. We think the proposed action will help us do that.

Employment and Economic Impacts

Comments:

- According to TVA published information there will be an approx. 100 employee reduction required to operate the proposed gas plant. This only takes into consideration the people on TVA payroll. When contractors and other companies related to the operation of a coal plant are considered, the number of eliminated positions is actually 150-175 at a minimum. This also does not include the 300+ employees brought in during short term maintenance operations. Also impacted by this reduction will be a number of companies that recycle coal by-product for other preferential uses.

  Without factoring in the reduction of the affected TVA positions, the losses associated with the contractor and related companies payroll will be well in excess of 18-20 million dollars a year. These figures are very conservative direct wage and benefit amounts and have not factored any multipliers that would normally be associated with an economic impact study. The direct TVA positions associated with the reductions would most likely lead to at least another 8-10 million in lost wages for the area.
  (*Commenter: Mike McElya*)

- I think an effort should be made for a clean coal burning plant. Please make an effort to save every job at TVA Allen….most of the individuals there are long-term employees.
  (*Commenter: Michelle Roberson*)

- Do not close! This is good for the workers that live in the Memphis area. This will allow them to work here at home and not have to travel away from their family.
  (*Commenter: Bobby Lockett*)

- Please leave the plant open for workers that work in the area. I don't want my husband to have to leave and go out of town to work!
  (*Commenter: Veronica Blaine*)

- My dad works at the TVA plant here in Memphis. I don't want him to leave us to go work out of town.
  (*Commenters: Bobby Lockett Jr., Brandon Lockett*)

- Retiring coal plants requires serious consideration of TVA workers and communities that have depended on them in the past. TVA has a track record of caring for its workers, and it must assist those impacted by a decision to retire this coal plant.
  (*Commenters: 871 participating members of the Sierra Club*)

- The Allen Plant not only provides employment for the annual TVA people, 135 dedicated employees, but also many other people working outages. The plant brings in approx. 30 million dollars per year to the local economy. Allen is the most diversified plant in the TVA system and one of the most profitable and reliable fossil plants in the valley. After the initial construction of the new Combine cycle plant, TVA will spend about 10% of this amount in the area, which is its largest customer. The loss of the Allen Steam Plant will also cause the loss of several good paying jobs at the Harsco Company who reclaims the bottom ash from Allen to use as sand blasting grit and shingle grit. Barge traffic will be reduced and more jobs lost in that business. Local businesses that provide all kinds of services will be lost; some are delivery companies, electrical supplies, industrial cleaning supplies, heavy equipment suppliers, crane services and this list is just some of the larger accounts.
  (*Commenter: Noel Mizell*)

- Create a cleaner environment and jobs at the same time.
  (*Commenter: Christine Simoneau*)

- TVA acknowledges that its preferred gas construction alternative would result in the loss of at least 100 full-time jobs at Allen. This is because it takes fewer employees to operate and maintain a gas plant than a coal plant. TVA's numbers are artificially low because they do not take into consideration the ancillary jobs that will be lost.

  The installation of scrubbers at Allen would allow TVA to use coal from the Illinois Basin, which would include coal produced in Western Kentucky. That change in sourcing would lead to an increase in mining-related jobs in Western Kentucky, as well as maintaining the jobs currently existing at the Allen plant.
  (*Commenter: Wyatt, Tarrant & Combs, LLP and Energy Ventures Analysis, Inc.*)

Response:

Section 3.20 of the EA addresses potential socioeconomic impacts. Fewer people would be needed to operate the proposed natural gas plant compared to the three coal units at Allen. Jobs would be lost. TVA estimates that payroll expenditures would fall approximately $12.5 million annually. This would not be a reflection on the quality and capabilities of the men and women who work at Allen, many of whom have served TVA well for a long time. It is an unfortunate consequence of transitioning the TVA generating system to a more balanced portfolio. However, the coal units are expected to continue to operate until late 2018 so these job losses would not occur immediately. This will give potentially affected employees more time to adjust to the proposed reduction in jobs. As it has done at other locations, TVA would work with Allen staff to try to find employment at TVA or elsewhere.

As noted in Section 3.20, the proposed action would have related adverse secondary effects on the economy. However, these effects would be small in the context of the total local and regional economies. In Shelby County, approximately 180 jobs could be indirectly affected, which is small relative to the 400,000+ employees in the County.

Indirect effects to annual retail sales and annual city/county sales and property tax revenue is projected to be minor.

Minimizing labor costs and producing power in the least-cost way is necessary for TVA to fulfill its mission of keeping rates low. The lower rates resulting from the addition of a new gas-fired power plant will provide monetary benefits to the over 9 million residents of the Tennessee Valley for many years to come. Since any of TVA's expenditures, whether labor or capital, must be funded by ratepayers, any positive multiplier effects attributable to increased TVA expenditures would be largely offset by reductions in ratepayers' disposable income. Thus, in this situation multiplier effects are minimal for the TVA service territory as a whole.

As stated earlier in this appendix, while installation of FGD controls at Allen could allow TVA to consider use of higher-sulfur coal from the Illinois Basin, other consequences such as higher costs for scrubber reagent and waste handling could negate the cost savings asserted by the commenter. TVA would assess total delivered fuel costs when entering into coal purchase contracts. The use of Illinois Basin coal cannot be automatically assumed, and would not be guaranteed over the long term. Given the numerous other factors that would affect mining-related jobs in Western Kentucky, there is not a clear correlation with addition of scrubbers at ALF.

Earthquakes

Comment:

- On page 58, the DEA discusses liquefaction/lateral spreading, landsliding, and ground settlement resulting from earthquake hazards noting that such "can be mitigated, if present, by various geotechnical and structural design measures, including ground improvements and foundation design." TDEC OEP recommends that in the Final EA, TVA identify specific steps or actions that will be taken to minimize such impacts to the CT/CC plant, fuel lines, and transmission assets planned under plant operation.

  The DEA reports the proposed Allen CT/CC plant and natural gas pipeline's primary earthquake hazards is the New Madrid Seismic Zone. TDEC Office of Energy Programs recommends that TVA consider in the Final EA short and long term fuel supply options(s) that would be utilized to restore power to the Memphis area should a seismic event cripple the pipeline infrastructure but not render the Allen CT/CC plant inoperable. (*Commenter: Tennessee Department of Environment and Conservation, Office of Energy Programs*)

Response:

The CC plant and all on-site equipment and infrastructure will be constructed to meet all International Building Code (IBC) and site-specific seismic requirements. Under the IBC, foundations, load-bearing walls, structural and non-structural elements would be designed and reinforced to withstand seismic loads calculated for the Memphis area. Some nonstructural components could include architectural features, mechanical components, electrical components, fire protection systems and plumbing systems.

The gas pipeline will be constructed by MLGW. It will meet the Department of Transportation DOT 49 CFR Part 192 which incorporates by reference such standards as the American Petroleum Institute (API) and American Society for Testing and Materials (ASTM). DOT 49 CFR Part 192p describes minimum safety requirements for pipeline facilities and the transportation of gas.

Floodplains and the Ensley Levee System

Comments:

- As stated in the TVA draft EA, the proposed CT/CC plant site is protected from the Mississippi River floodwaters by the Ensley levee system. This levee is approximately 10 miles long. The upper end of the levee ties into high ground approximately 2 miles east of the proposed CT/CC plant site and the lower end of the levee ties into high ground approximately 4 miles southeast of the proposed site. The levee system was designed and then constructed by the US Army Corps of Engineers in the late 1950's and early 1960's. Currently the levee crown elevation is between 237 ft and 238 ft. TVA also states in the draft EA that the 500-year flood elevation is 230.5 ft and the 100-year flood elevation is 225 ft at the Mississippi River Mile 725 (near the upper or northern end of the Ensley Levee).

  During a flood event, levees can fail basically in three modes: (1) levee overtopping (2) levee through seepage (3) levee under seepage. Overtopping of the Ensley levee system is very unlikely since the levee crown is approximately 6.5 to 7.5 ft higher than the 500-year flood elevation. A levee "through seepage" failure is also unlikely because this levee was constructed primarily out of clay soils and the levee side slopes are relatively flat (between 1V:5.5H). But levee under seepage is a major issue and a cause of concern for most levees because of the underlying alluvial deposits. For this mode of failure, the under seepage causes excessive hydrostatic pressure (uplift pressure) which can cause global levee slope stability problems or the piping of foundation materials. When excessive piping occurs, the levee fails due to settlement and the consequential overtopping of the reduced levee section. When the Ensley levee was designed, standard Corps criteria for levee under seepage design was being developed but was not published until 1961. Therefore the Ensley levee was constructed with no seepage control measures.

  During 1973, a flood event on the Mississippi River caused under seepage forces to produce many sand boils (a preliminary sign of foundation piping) along the landside toe of the levee at the southern end of the Ensley levee system. To prevent the levee from failing due to these under seepage forces, the area of heavy sand boil activity was back flooded with water from the Ensley Pumping Station/Floodgate (which is located at the southeastern corner of the levee system). After this flood event, the Corps designed seepage control features for the Ensley levee utilizing the then existing Corps levee seepage design criteria. the seepage control features consisted of landside "seepage berms" which varied in width from 150 ft to 300 ft and were constructed in the early 1990's. Since the construction of these berms, the Corps levee seepage design guidance has changed numerous times. It has gotten more conservative or stringent especially since Hurricane Katrina. In May 2011, a major flood occurred on the Mississippi River (much higher than the 1973 flood). The May 2011 flood level was slightly above the 100-year flood elevation. During this flood event, large sand boils occurred along the southern end of the Ensley levee adjacent to the landside toe of the seepage berms. Many of the sand boils were ringed by sand bags and the total seepage area was back flooded again. Also sink holes were formed in the landside berm at several locations which was evidence of settlement due to piping. Based on the observed effects of the 2011 flood event on the Ensley levee, it is doubtful that this levee system would withstand the under seepage forces that would develop during a 500-year flood.

The probability of a 500-year event occurring or being exceeded in a 100-year period is 18 percent and in a 50-year period is 10 percent. It is stated in the TVA draft EA that the proposed plant is to be designed to an earthquake load that only has a 2 percent probability of exceedance in a 50-year period (a 2,475-year return period). Therefore to be consistent with the earthquake design criteria, the hydraulic design flood event should be increased to a value greater than the 500-year flood event.

The following are two proposals for TVA to consider for mitigating the potential flood risk to the proposed CT/CC plant.

1. Provide funds to the Corps to design and install a levee seepage control system that is designed to a flood elevation of 234 ft. At this elevation, the levee would still have over 3 ft. of freeboard (top of levee varies from elevation 237 to 238) and the 234 elevation would be 3.5 ft above the 500-year flood elevation. This amount of hydraulic protection would be more consistent with the TVA earthquake design risk (which is at a 2,475-year return period).

2. Move the proposed CT/CC site to “Laydown Area 2” (See Figure 2-3). This location is a permitted ash fill area where a structural ash fill is being constructed by a TVA contractor utilizing ash from the Allen plant. To date the ash structural fill has a usable surface area of 53 acres. The permitted ash fill footprint extends approximately an additional 1300 ft toward the south of the current southern fill limits. To produce the total required 73 acres for the proposed CT/CC plant, the fill would only have to be extended another 800 feet to the south (to gain the additional 20 acres of surface area). If TVA elected to adopt this proposal, then TVA’s contractor could easily extend the ash fill 800 ft by the end of 2015. Two main benefits of this proposal are that: (1) the site can be built above the 500-year flood elevation (2) the thick, concrete like ash structural fill will help mitigate potential liquefaction hazards of the underlying alluvial foundation.

Currently the ash fill “ties” into the levee crown elevation (approximately elev. 238) and the surface of the fill slopes away from the levee on a 1V:100H slope. But if this site is developed as a plant site, then the ground surface would probably be paved and then the slope could be flatten to 1V:300H. Since the maximum width of the fill site is approximately 1200 feet, then the 1V:300H slope would produce a surface that slopes from elevation 238 to an elevation of 234 [238-(1200/300=234]. This ground surface re-shaping would produce the same flood protection as stated in proposal #1 above but without the installation and maintenance costs for the relief wells.

In summary, TVA is required to construct this new plant in an area that will not be impacted by the 500-year flood. There is an unacceptable probability that the Ensley levee without seepage control modifications could fail during the 500-year or lesser flood event. To mitigate for this risk, TVA could have the Corps design and install a more robust levee under seepage control system or could move the proposed plant site to Laydown Area #2 - a structural ash fill site.
(*Commenter: John E. Monroe, PE*)

The DEA reports the proposed Allen CT/CT site, existing switchyard, laydown areas, and a portion of the 24 or 30 inch underground gas pipeline would be located behind the Ensley Levee. TDEC Office of Energy Programs recommends that TVA include in the Final discussion of controls or infrastructure that will be in place to prevent or mitigate damage from flood waters in the event of a levee breach.
(*Commenter: Tennessee Department of Environment and Conservation, Office of Energy Programs*)

Response:

TVA has been informed that the U.S. Army Corps of Engineers (Corps) has now received funding for a project to address the levee weaknesses identified by this commenter. Project details are identified in a Draft EA and Draft Finding of No Significant Impact for this action. See http://www.mvm.usace.army.mil/About/Offices/Regulatory/PublicNotices.aspx. The Corps also has informed TVA that it is implementing interim measures to improve the stability of the levee while the longer-term project is underway. These actions should ameliorate the risk identified by this commenter.

TVA thinks the Ensley Levee, appropriately restored by the ongoing project, provides sufficient infrastructure to protect the proposed site of the gas plant from a 100- or 500-year flood (the height of the levee is above both flood levels). As noted in Section 3.11 of the EA, if the levee did fail, the site could be flooded. Whether this happens and the extent of the inundation would depend on where the levee failed, how much of the levee failed, and the magnitude of the flood. We know from the 2011 flood that the southwestern part of the levee is most at risk of failing (this is where the Corp's project is located). The ground elevation at that location is 205 feet. The elevation of the plant site is 215 feet, a 10-foot increase in height. This provides some additional protection from inundation.

FONSI

Comments:

- Given the lack of thorough review of reasonable alternatives and comparison with the preferred alternative; unspecific plan for the preferred alternative CT\CC facility and compartmentalization of evaluation of the preferred alternative as well as the fact that the EA is in draft form for public comment without a final decision on the appropriate decision, a finding of no significant impact is not supported and is premature.
(*Commenter: Smith Management Group*)

- The manner in which TVA prepared and released the EA and its draft Finding of No Significant Impact (FONSI) indicates that TVA prejudged its alternatives and made its decision before analyzing all relevant information and any comments to the Draft EA. TVA released its Draft FONSI at the same time as the EA, indicating it did not plan to seriously consider any comments inconsistent with its chosen alternative. Even more significant is the fact that TVA leased the property for the gas plant more than a year ago for the express purpose of facilitating its plan to build the gas plant.
(*Commenter: Wyatt, Tarrant & Combs*)

Response:

The EPA Agreements require that TVA make a decision about continued investment in and operation of the Allen coal plant. TVA disagrees that it has prejudged the proposed action or associated environmental analyses. TVA does have a preferred action and it has identified this in the EA. This is consistent with CEQ regulations. 40 C.F.R. § 1502.14(e). CEQ asks that this be done so that “the public can understand the . . . agency’s orientation.” 55 Fed. Reg. 18027 (March 23, 1981). Based on analyses of the proposed action, TVA determined that retiring the Allen units and replacing them with a natural gas plant is the best long-term economic and environmental action. Summaries of those analyses and TVA’s rationale for preferring the proposed action over other alternatives were set out in the Draft EA and subjected to public review and comment. After consideration of the comments it received, TVA staff continues to think that replacing the three coal units with a natural gas plant is the best course of action. The TVA Board now will be asked to make a decision about this.

When TVA released the draft FONSI, it made clear that it would change that document and, possibly, the determination of no significant impacts if its analyses, informed by the comments it receives on the draft EA and FONSI, required changes. TVA now has completed its analyses and considered the comments it received and has concluded that the proposed action would not significantly impact the quality of the human environment.

Support TVA’s Proposed Action

Comments:

- I believe TVA is choosing the best option in closing the Allen plant in Memphis. Replacing it with a combined-cycle plant that is natural gas and fuel-oil fired. The scrubber is throwing good money after bad. Plus, it does not address the CO_2 problem. (*Commenter: Bart Hanners*)

- Do not be forced into making the wrong decision re future of the Allen plant. We expect management from the TVA, not unrealistic pressure from the Sierra Club or its’ allies. (*Commenter: Russ Hanson*)

- Gas is fine for the Allen Plant. Wind and solar are good as additional help occasionally, but not primary fuel. Please don’t be pushed by environmentalists. Thank you. (*Commenter: Jean Hanson*)

- I am very supportive of the plan to construct a new gas fired generation plant. I agree that this is the most efficient way to ensure inexpensive clean power for the foreseeable future. I especially like the 6 to 15MW internal combustion engines burning bio-gas from the adjacent wastewater treatment plant. (*Commenter: Kip Lemons*)

- We are in favor of TVA building new gas fired units to take the place of the coal units. We think this will help provide clean, affordable, and reliable electricity to the Memphis, TN area and TVA region. (*Commenter: Goodrich Rogers*)

- I think most of the citizens and consumers of greater metro Memphis and mid-south region have been highly critical of the lack and/or level of action to prevent dangerous pollution of the output of the Allen Fossil coal fired manufacturing plant. The TVA should

have been a leader in your industry regarding the effective modifications that should been engineered and installed since the Mid to Late 1980's.
Your lack of planning, decisions of the Executive Management and Board Members since then has been irresponsible and harmful to: our Region's economy, human and animal health, agriculture plants, trees, forests, rivers and streams. We have been penalized for levels of toxic air qualities which has also de-graded our competitiveness in getting and keeping: manufacturing, processing, transportation, technical and a wide variety of research businesses.

Please, please take action as soon as your management can get results. From what I have read and watched many C-SPAN, PBS, and a wide variety of other legitimate media - you should either convert this plant or build an entirely new facility to utilize our Nation's significant growth in natural gas which is and can be made more plentiful for this plant's use.
(*Commenter: Don Gamblin*)

- The citizens of Memphis and Shelby County look forward to the construction of the new gas fired power plant in our City. As TVA's largest customer, we will work with TVA to make this project a great success.
(*Commenter: Jerry Collins*)

- Thank you for keeping your rate payers in mind by choosing to replace this plant with a natural gas facility. I appreciate not being played for a fool by being asked to subsidize a 'green' solar, wind or rainbow fueled plant. We need dependable power from proven technologies. We do not need a known fleecing from technologies whose economies are not ready for day to day use.
(*Commenter: Baxter Wilson*)

- I think that the proposal to replace the coal fired plant with one powered by natural gas is a sensible and sound decision. I support this decision and hope that it can be completed in a timely manner. I think that natural gas is a cheap, plentiful natural resource that we should use to meet our electrical needs. Sure, there are 'clean energy' choices but they are not nearly as practical as using natural gas. Please do not be swayed away from using natural gas. It makes sense. Thank you for your attention in this matter.
(*Commenter: Corbin Davis*)

- Wind/Solar energy production is not viable in West Tennessee, an upgrade to the existing plant or rebuild with clean-burning natural gas would be an excellent upgrade.
(*Commenter: Tim Justice*)

- Burn fossil fuels.
(Commenter: John Richards)

- I support TVA in their mission to clean up the air in the Tennessee Valley. Gas turbines are fine with me.
(Commenter: Tom Dittmaier)

- I support low-cost energy for all, so I support the Allen Coal Plant. I understand that you plan to replace it. Though I am sorry to hear this, it is positive that you seek to put a gas plant in its place. Gas is efficient, cheap energy that will help hard working Tennesseans like me.

(*Commenter: Daniel Taylor*)

- Notwithstanding our substantive and procedural concerns, we commend TVA for its decision to replaced three coal-fired electric generating units at Allen. We fully agree with TVA that it is appropriate to move forward with a cost-effective and timely plan to meet the needs of Memphis and the entire Valley with continued, reliable electric service.
  (*Commenter: Southern Alliance for Clean Energy*)

- The Sierra Club supports TVA's plan to retire the Allen coal plant in Memphis. Coal is an outdated fuel source that no longer belongs in our energy mix. The Allen coal plant creates smog that threatens our health.
  (*Commenters: 871 participating members of the Sierra Club*)

- The Tennessee Chapter [of the Sierra Club] agrees with TVA's determination that coal fired electricity production at the Allen site should be ended.
  (*Commenters: TN Chapter of the Sierra Club*)

Response:

Comments noted.

Support for Discontinued Use of Coal

Comments:

- Please take into account the following very costly coal related disasters.

  TVA over 1 Billion in clean up costs for ash dump in Kingston, Tn.

  Duke Energy talking about 10 Billion to stop and clean up their coal ash ponds.
  (*Commenter: Edgar Gehlert*)

- TVA's coal-burning plants like Allen in Memphis harm our health and the climate. As a practicing OB/Gyn, I am deeply concerned about this. TVA can live up to its legacy of being a leader in clean, affordable power and taking care of its workers. And of the rest of us. Thanks!
  (*Commenter: Jan L Crean, MD*)

- I would like to see TVA retire all coal, gas and nuclear plants and replace them with clean renewable sources of energy.
  (*Commenter: Gary Christian*)

- Coal is an outdated fuel source that no longer belongs in our energy mix.
  (*Commenter: Richard Gilbert*)

- Coal is old school and no good for sustainable living.
  (*Commenter: Amy Rigg*)

- TVA should move forward expeditiously with the most time-sensitive component of its plan to retire the coal units, and construction of the natural gas combined cycle ("NGCC") units, at the minimum scale that TVA determines to be necessary.
  (*Commenter: Southern Alliance for Clean Energy*)

Response:

TVA's strategic direction is to achieve a more balanced portfolio of energy resources. We anticipate that our additional capacity and energy needs will be met with nuclear, hydro, gas, coal, energy efficiency and renewable resources. This strategy will ensure that TVA provides the lowest cost approach for the public we serve and that our resources are balanced to maintain the high reliability requirements of our transmission system.

Support for Alternative to Continue Use of Coal Plant

Comments:

- I hate to see our nation abandon one of our greatest natural resources, coal. My first choice would be to install the necessary scrubbers in the existing plant and continue operation with coal as the fuel source. In the event that TVA elects to convert to natural gas generation, DES would support the decision. The need to maintain base and intermediate generation should circumvent the installation of and dependency upon a renewable generation at this site.
  (*Commenter: Stephen Lane*)

- The current political climate is dictating a reduction in carbon emissions in industries across the country. One supposed advantage of a natural gas generation plant over a traditional coal fired generation plant is the reduction in carbon emissions. However, less than two years ago the Allen Fossil plant was proposed to have CO [SO_2] scrubbers installed to meet the emission requirements. The addition of scrubbers to this plant would provide for environmental compliance while ensuring low cost electrical generation and a continued positive economic impact for greater than a natural gas generation plant.

  The most positive outcome for the Memphis and Shelby County area would be for TVA to follow through with the originally announced addition of CO scrubbers. This action would allow for the continued economic and employment benefit while helping maintain low cost electrical power all while meeting the necessary environmental regulations. The old saying of "go with your first choice" has never been more true than with this decision.
  (*Commenter: Mike McElya*)

- Please do not replace the Allen plant. After reading about this I feel this move would not be best for anyone.
  (*Commenter: Janice Tankersley*)

- I still believe there is room to develop technology to clean coal. It is an abundant resource that we can show the world that we are willing to make it environmentally and economically to burn.
  (*Commenter: Cameara Fowler*)

- TVA cannot afford to make the wrong decision, when the gas prices start rising the whole valley will have to pay for it. The public is expecting the board to get this right. Yes it's a hard decision to make but I have tried to do my part in trying to inform you. Yes we all want cleaner air and less pollution but we have the EPA and the others approval to keep the Allen and Paradise Plants in service and we can still clean the air. Yes there will still be issues to resolve but we all need jobs. No one can see the future but this decision is like fishing, once the fish bites, it's hooked to the line and you reel it in. But in this case it's the gas company and EPA that has the shiny lure and once we are hooked to their gas line we have no other option but to bow at their demands. Can TVA survive? (*Commenter: Noel Mizell*)

- Both the United States and the world need a hydrocarbon-based system of reliable and affordable electric power generation to reduce energy poverty and enable people to live longer and better lives.

  Affordable, reliable electricity is the lifeblood of modern society and the key to a cleaner environment and higher quality of life for all.

  The best option for TVA customers, future energy supply, and the environment is to install and operate FGD systems on Units 1, 2, and 3 of Allen Power Station. (*Commenter: Wyatt, Tarrant & Combs, LLP*)

Response:

Comments noted. Section 2.2.1 of the EA addresses Alternative C - Emission Controls, Scrubbers. Under this alternative, TVA would install scrubbers on the three coal units and continue to operate them. As discussed at length in the EA, TVA has environmental and logistical reasons not to pursue installation of scrubbers and continued coal operations at ALF. Retiring the coal units and constructing a natural gas plant to provided needed generation is environmentally more beneficial, reduces the risks and associated cost of emerging EPA regulations, and avoids having to permit and construct a new landfill, something that that is not likely achievable by the December 2018 deadline.

Comment:

- TVA should pursue timely upgrades to TVA's existing coal plants (e.g., the Allen Units) as well as the construction of new supercritical coal power stations. TVA should take the lead in the continuing deployment of clean coal technologies.
  (*Commenter: Wyatt, Tarrant & Combs, LLP and Frank Clemente*)

Response:

Comment noted. TVA does pursue timely upgrades to our existing plants when they are economically and environmentally justified. The Gallatin project is an example of this type of upgrade. New supercritical coal units require long lead times and would be difficult to permit in the present environment. For example, the EPA standard for CO_2 emissions for new coal-fired units is 1100 lb. CO2/gross MWh. New coal units, including state-of-the art supercritical units, could not meet this standard without cost prohibitive and unproven CO_2 capture systems. TVA is studying various coal technologies, including clean coal technologies, in the 2015 IRP project.

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Appendix F

Agency Correspondence

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Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

June 27, 2014

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), PROSED ALLEN FOSSIL PLANT EMISSION CONTROL PROJECT, SHELBY COUNTY, TENNESSEE

TVA proposes to construct and operate a new natural gas-fired, combined-cycle, combustion-turbine electrical generating facility ("CC/CT Facility") in Shelby County, Tennessee. The proposed CC/CT Facility would be built just south of the Allen Fossil Plant (ALF) on a 73-acre site that TVA currently leases. TVA has determined that its proposal to construct a CC/CT Facility is an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. Therefore, we are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

Three related actions would occur as a result of TVA's proposal to construct a CC/CT Facility:

(1) Construction and operation of a high-pressure gas pipeline to supply the CC/CT Facility with natural gas.

(2) Construction and operation of two new 161-kilovolt (kV) electrical transmission lines to connect the CC/CT transformers to an existing 161-kV substation at ALF.

(3) Construction of a gray water supply line for condenser cooling. The gray water would be supplied from the adjacent Maxson Waste Water Treatment Plant, and the supply line would be built by the City of Memphis, Division of Public Works.

Plans are currently available to assess the impact on historic properties from construction of, and operation of, the CC/CT Facility and the natural gas pipeline. However, TVA does not yet have plans for the related actions to construct the transmission lines and the gray water supply line to assess impacts to historic properties. The exact placement of the 161-kV transmission line would depend on the design of the CC/CT Facility, which is not yet completed. Although the proposed gray water line is expected to be located within previously disturbed areas within Laydown Area 1, the exact location has not been determined.

Accordingly, pursuant to 36 CFR Part 800.4(b)(2) TVA will use a phased identification and evaluation process for the identification of historic properties, evaluations of effect, and resolution of adverse effects associated with the different phases of this undertaking. At

Mr. E. Patrick McIntyre, Jr.
Page Two
June 27, 2014

present, TVA is consulting with respect to phases of the undertaking involving construction of the CC/CT Facility and the high pressure gas pipeline. TVA will consult further with your office when detailed plans relating to phases involving construction of transmission lines and gray water supply lines are available.

TVA has determined that the area of potential effects (APE) (for archaeological resources) for phases of the undertaking involving the construction and operation of the CC/CT Facility and the natural gas pipeline encompasses the following three areas: (1) the area where the CC/CT facility and associated infrastructure including a switchyard, stormwater ponds, and possibly fuel oil backup tanks and associated backup fuel systems would be built (approximately 73 acres); (2) two construction laydown areas (approximately 151 acres); and (3) approximately 13 miles of right-of-way (ROW) associated with the proposed 24-inch XXHP gas pipeline. This ROW would be fully within an existing utility corridor with overall widths varying from 250 feet to 420 feet. This corridor contains existing ROWs for the Memphis, Light, Gas and Water (MLGW) 16-inch and 22-inch gas pipelines, MLGW transmission lines, and a TVA transmission line. The new 24-inch pipeline would tap into an existing MLGW pipeline at the Airways Gate Station (near Airways Boulevard), and the route would parallel an existing 16-inch MLGW line that supplies the existing CT units at ALF. This route would proceed westward for approximately seven miles, and would then turn toward the northwest and north into the proposed CC/CT facility. The new pipeline would be constructed along the southern and western extent of the existing utility corridor. Installation of the new pipeline would be accomplished with a combination of cut-and-cover and/or directional boring methods. Backhoes or trenching equipment would be used to excavate a trench seven- to nine-feet deep and five- to seven-feet wide, and the trench would provide approximately three feet of cover for the pipeline.

TVA had not determined the precise pipeline location when the cultural resources survey was initiated. Therefore, the entire 250- to 420-foot wide utility corridor for the 13-mile proposed route was considered part of the APE for archaeological resources. Further, TVA has determined that the APE for above-ground resources (i.e. historic structures) consists of a one-mile radius surrounding the proposed CC/CT Facility. Although TVA has not yet completed designs for the facility, those designs will include two to four exhaust stacks. The exhaust stacks would be at least 165-feet tall, but would not exceed 195 feet in height. The analysis of impacts to historic structures was performed on the assumption of stacks that would be 195 feet in height.

TVA contracted with Tennessee Valley Archaeological Research (TVAR) to perform a Phase I cultural resources survey of the APE. Enclosed are two copies of the draft report titled, *Phase I Cultural Resources Survey of Tennessee Valley Authority's Proposed Allen Fossil Plant Emission Control Project, Shelby County, Tennessee*, along with three CDs containing digital copies of the report.

Background research completed prior to the field study indicated that two previously-recorded archaeological sites are located within the APE: 40SY554 and 40SY566. Site 40SY554, a small historic scatter, was investigated by TRC Garrow in 1994 during a cultural resources survey of the Frank C. Pidgeon Industrial Park, and the report authors recommended the site ineligible for listing in the National Register of Historic Places (NRHP) due to a lack of integrity. TVAR's

Mr. E. Patrick McIntyre, Jr.
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investigation revealed evidence that the entire site has been destroyed, and TVAR recommends no further investigations of the site. Site 40SY566, Ensley Plantation, has been investigated previously by TRC and Panamerican Consultants, Inc. (PCI). PCI recommended the site ineligible for NRHP listing based on a lack of integrity. TVAR investigated the location of Site 40SY566 within Laydown Area 2 and identified no cultural deposits. The portion of the site within the APE is covered by several feet of modern fill. Therefore, TVAR recommended no additional investigation of Site 40SY566, finding it to be ineligible for listing on the NRHP. TVAR's survey also identified four previously unrecorded archaeological sites (40SY750-40SY753) and 14 isolated finds. The report authors recommend that sites 40SY750 and 40SY751 and the 14 isolated finds are ineligible for the NRHP due to a lack of research potential. TVA agrees with the aforementioned recommendations and findings made by TVAR. As to Sites 40SY752 and 40SY753, TVAR also recommends that the sites may have potential to yield significant data related to questions about mid-19th to early-20th century rural life in Shelby County, Tennessee. However, the data generated by the Phase I survey is insufficient to make a determination of eligibility, and TVA considers these sites to be of undetermined eligibility for the NRHP. TVA will avoid adverse project effects to these two sites by either installing the pipeline at least 33 feet/10 meters south of the sites, or by using the directional bore method to install the pipeline below the sites. Either method would avoid surficial ground disturbance within the site boundaries.

Background research indicated that there are no previously recorded historic architectural resources within the one-mile architectural APE. Archaeological site 40SY1 (Chucalissa), which includes above-ground features (mounds), is located within the architectural APE. This site is listed in the NRHP and is a National Historic Landmark. TVAR evaluated possible visual effects to the site from construction of the CC/CT Facility and recommends that although the undertaking would have a minor visual effect, the effect would not be adverse. TVA agrees with this recommendation. Site 40SY1 is visually buffered by dense foliage from the commercial development that is occurring west of the site. Staff of T.O. Fuller State Park indicated that visible impacts from on-going commercial development have not been an issue at the site. Presently, the only commercial features visible from the site (looking to the west) are the ALF stacks, which are 400-feet tall. Although not visible from most areas within 40SY1, the stacks can be seen from the top of the platform mound and from the plaza, through small gaps in the bordering vegetation. A wooded buffer zone prevents the ALF stacks from being visible from other locations at the site. Because the maximum height of the proposed CT/CC facility is 205-feet lower in height than the ALF stacks , they are expected to be out of view from 40SY1 site under most circumstances. Although the proposed CC/CT Facility may at times (e.g., winter) be visible from this same location, it would not alter the existing visual setting as presently found from atop the platform mound.

TVAR also completed an architectural assessment of ALF and recommends that ALF is ineligible for listing in the NRHP due to a lack of architectural distinction and to loss of integrity resulting from extensive modern alterations. TVA agrees with this recommendation.

Pursuant to 36 CFR Sections 800.4(d)(1) and 800.5(b), we are seeking your concurrence with TVA's findings and determinations, summarized below with respect to phases of TVA's

Mr. E. Patrick McIntyre, Jr.
Page Four
June 27, 2014

undertaking involving construction and operation of the CC/CT Facility and the natural gas pipeline:

- archaeological site 40SY554 is ineligible for listing in the NRHP;
- the portion of archaeological site 40SY566 within the APE contains no intact archaeological deposits;
- archaeological sites 40SY750 and 40SY751, and the fourteen isolated finds, are ineligible for listing in the NRHP;
- archaeological sites 40SY752 and 40SY753 are of undetermined NRHP eligibility;
- 40SY1 (Chucalissa) continues to be eligible for the NRHP and as a National Historic Landmark;
- ALF is ineligible for listing in the NRHP;
- TVA will avoid effects to 40SY752 and 40SY753 by either installing the pipeline south of the sites (outside the site boundaries), or by using directional boring to install the pipeline below the site deposits; and
- the undertaking will not adversely affect 40SY1 (Chucalissa).

Please provide your comment on the above findings. Separately, TVA will consult with your office regarding the other phases of this undertaking involving the construction and operation of the transmission lines and the gray water supply line.

Pursuant to §800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding historic properties within the APE that may be of religious and cultural significance to the tribes. The tribes involved in this consultation are The Chickasaw Nation, Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, and United Keetoowah Band of Cherokee Indians in Oklahoma.

Should you have any questions or comments, please contact Richard Yarnell in Knoxville at wryarnel@tva.gov or (865) 632-3463.

Sincerely,

Clinton E. Jones, Manager
Biological and Cultural Compliance
Environmental Permits and Compliance
WT 11B-K

SCC:CSD
Enclosure
cc (Enclosure):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210

TENNESSEE HISTORICAL COMMISSION
2941 LEBANON ROAD
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

July 9, 2014

Mr. Clinton Jones
Tennessee Valley Authority
400 West Summit Hill Drive
WT11D
Knoxville, Tennessee 37902-1499

RE: TVA, ALLEN FOSSIL PNT/FACILITY/GAS LINE, UNINCORPORATED, SHELBY COUNTY

Dear Mr. Jones:

Pursuant to your request, this office has reviewed documentation concerning the above-referenced undertaking received Friday, June 27, 2014. This is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Considering available information, we concur that a process of Phased Compliance in an appropriate means by which your agency can meet its Section 106 obligations for the Allen Fossil Plant Emission Control Project. We further concur that the portion of the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places. Therefore, this office has no objection to the construction of, and operation of, the CC/CT Facility and the natural gas pipeline portions of the project. Please direct questions and comments to Jennifer M. Barnett (615) 741-1588, ext. 105. We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

August 18, 2014

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), PROPOSED ALLEN FOSSIL PLANT EMISSION CONTROL PROJECT, SHELBY COUNTY, TENNESSEE

Please find enclosed two hard copies and three electronic copies of the final report titled, *Phase I Cultural Resource Survey of Tennessee Valley Authority's Proposed Allen Fossil Plant Emission Control Project, Shelby County, Tennessee*. Your concurrence with TVA that a phased compliance is an appropriate means by which TVA can meet its section 106 obligations for the undertaking, and with our determination that the currently proposed project will not affect any historic properties, was documented in your letter dated July 9, 2014.

This fulfills TVA's obligations under section 106 for the portions of this undertaking involving the construction and operation of the Combined Cycle / Combustion Turbine (CC / CT) facility and the natural gas pipeline. If project plans are altered or there are inadvertent discoveries during construction, TVA will consult further with your office. Furthermore, as we indicated in our letter dated June 27, 2014, TVA will consult with your office regarding the other phases of this undertaking involving the construction and operation of the transmission lines and grey water supply line once TVA has developed plans for those actions.

Should you have any questions or comments, please contact Richard Yarnell in Knoxville at wryarnell@tva.gov or (865) 632-3463.

Sincerely,

Clinton E. Jones, Manager
Biological and Cultural Compliance
Environmental Permits and Compliance
WT 11B-K

SCC:CSD
Enclosure
cc (Enclosure):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210

PHASE I CULTURAL RESOURCE SURVEY OF TENNESSEE VALLEY AUTHORITY'S PROPOSED ALLEN FOSSIL PLANT EMISSION CONTROL PROJECT, SHELBY COUNTY, TENNESSEE

Tennessee Valley Archaeological Research

INTERNAL COPIES, NOT INCLUDED WITH OUTBOUND LETTER:

Brenda Brickhouse, BR 4A-C
Ashley Farless, BR 4A-C
Amy Henry, WT11D-K
Khurshid Mehta, WT 6A-K
Richard Yarnell, WT11D-K
EDMS, WT CA-K

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

ROBERT J. MARTINEAU, JR.
COMMISSIONER

BILL HASLAM
GOVERNOR

August 5, 2014

Via First Class and Electronic Mail to arfarless@tva.gov
Allen Fossil Plant Emission Control Project
ATTN: Ashley Farless
1101 Market Street, BR 4A-C
Chattanooga, Tennessee 37402

Ms. Farless:

The Tennessee Department of Environment and Conservation (TDEC) appreciates the opportunity to provide comments on the Tennessee Valley Authority's (TVA) Draft Environmental Assessment (DEA) for the proposed retirement of current coal units and construction of a natural gas power plant at Allen Fossil Plant (ALF). The proposed action will result in sulfur dioxide emissions reductions which will serve to address negotiations reached during the 2011 EPA Clean Air Agreements, while continuing to reliably serve the Memphis area.[1] This DEA tiers off of TVA's Final Environmental Impact Statement (EIS) for its 2011 Integrated Resource Plan (IRP).

While the new natural gas facility would replace all ALF coal-fired generation, the exact configuration of the new facility remains undecided. Two possible options at this time are a combustion turbine (CT) plant that would include three of four natural gas-fired CT generators having a total generating capacity of 600 to 800 megawatts (MW) or a combined cycle (CC) plant with a generating capacity of 800 to 1,400 MW. Depending on final gas plan electrical output, some or all of the existing CT units at ALF would continue to be used for peaking operations. Regardless of the option selected, both natural gas-fired CT and CC configurations would include:

- Construction of a new natural gas pipeline within an existing Memphis Light, Gas & Water (MLGW) right-of-way (ROW) and gas system upgrades to existing infrastructure to connect the plant to an existing gas pipeline. The new pipeline would be owned by MLGW.
- Pond(s) for holding storm water flows from the site.
- Construction of multiple 161-kilovolt (kV) transmission lines (TL) from the proposed natural gas-fired facility to the existing ALF switchyard.
- Installation of reciprocating engines to combust biogas from the adjacent bio-waste lagoons and produce power.
- Fuel oil backup tanks and associated backup fuel systems (if required).

Long-term actions related to the retirement of coal-fired units, such as demolition, are outside the scope of this EA and will be addressed by TVA in the future should the proposed action be implemented.

---

[1] In the 2011 EPA Clean Air Agreements, TVA agreed to reduce emissions by either installing a scrubber system or retiring Allen's coal units by December 2018.

Two primary actions are considered in detail within the DEA:

- Alternative A – Continue Operations of ALF Units 1-3 with No Additional Controls (No Action Alternative)
- Alternative B – Retire ALF, Construct a Natural Gas-Fired Facility (CT/CC) (TVA's Proposed Action)

TDEC recognizes that a number of additional alternatives were considered but eliminated from further discussion and appreciates TVA's inclusion of rationale regarding decisions to eliminate additional alternatives from discussion.

TDEC's Division of Solid Waste Management (SWM) has reviewed the DEA and recognizes that the preferred alternative will prevent future generation of coal ash. TVA's current ash impoundment system is nearly at capacity and currently has a permit to transport ash to a nearby structural fill project. Due to EPA's pending CCR Rule, the future of structural fill permits for coal ash is unknown. TDEC SWM has the following specific comments on the DEA:

- When discussing the No Action Alternative in Section 3.17.2.1, a statement is made that "solid wastes would continue to be managed as required by applicable Stat regulations following procedures outlined in TVA's current environmental procedures and BMPs." What is left unsaid is that TVA has provided to TDEC a schedule of closure for the existing ash impoundment. This schedule includes a commitment to convert to dry ash management. If the ALF plant remained in operation according to the No Action Alternative, this would necessitate the construction of a new landfill or the use of an offsite landfill for the disposal of CCR. This information should be discussed as a consequence of the No Action Alternative or the appropriate NEPA document should be referenced as a related environmental review.
- The Disposal Option column in Table 3-21 "Typical Nonhazardous Wastes Generated During Construction" should be revised by changing Class II to Class I where it is listed as a disposal option. Based on TDEC's knowledge, there are no commercial Class II landfills in this region, but the waste streams listed could be disposed of in a Class I landfill.
- On page 93 in Section 3.17.2.2.1 "Proposed CT/CC Facility," the "Operation" subheading includes waste descriptions for Selective Catalytic Reduction (SCR) catalyst, sludge from potable water chlorine removal, and cooling tower fill. TDEC recommends that this description should note that these are special wastes which must be approved by TDEC SWM before offsite disposal occurs.

TDEC's Division of Air Pollution Control (APC) has reviewed the DEA and recognizes that the proposed project will have positive impacts to air quality at both the local and regional levels. Shelby County, Tennessee is currently designated in attainment with all of the National Ambient Air Quality Standards (NAAQS), however has been designated by the U.S. Environmental Protection Agency (EPA) as a nonattainment area for ozone based on 2008-2010 data. The State of Tennessee has filed a petition to have the area re-designated based on 2009-2011 data demonstrating attainment with 2008 ozone NAAQS. APC notes that any direct air pollution concerns resulted from the proposed action will be directly addressed by the Memphis local air Title V program. Since demolition of the existing facility is not included within the scope, there are no asbestos concerns at this time.

TDEC's Division of Underground Storage Tanks (UST) has reviewed the DEA and has found that there are no tanks in or around the location of the proposed action. Therefore, TDEC UST has no specific comments to make.

TDEC's Office of Energy Programs (OEP) has reviewed the DEA and recognizes that the proposed action will result in reduced greenhouse gas emissions resulting from energy generation. OEP also notes concurrence with TVA's conclusions regarding alternatives (nonviable) noted in Sections 2.2.2, 2.2.4, and 2.2.7 in particular. OEP has the following specific comments regarding the DEA:

- Regional pipeline capacity is designed to deliver the necessary gas supplies for heating and industrial production. TDEC OEP recommends discussion of any transmission network capacity impacts of the proposed new pipeline, particularly as it relates to the needs of regional power generators and/or the proposed Allen CT/CC Plant in the Final EA.
- Reliable and timely detection of failure of any part of a natural gas pipeline is critical to ensure the safety and reliability of the natural gas infrastructure. TDEC recommends that TVA explore optical and non-optical method(s) of leak detection to ensure safety and reliability with MLGW, and note those in the Final EA.
- The DEA reports the proposed Allen CT/CC Plant and natural gas pipeline's primary earthquake hazard is the New Madrid Seismic Zone. TDEC OEP recommends that TVA consider in the Final EA short and long term fuel supply option(s) that would be utilized to restore power to the Memphis area should a seismic event cripple the pipeline infrastructure but not render the Allen CT/CC Plant inoperable.
- On page 58, the DEA discusses liquefaction/lateral spreading, landsliding, and ground settlement resulting from earthquake hazards noting that such "can be mitigated, if present, by various geotechnical and structural design measures, including ground improvements and foundation design." TDEC OEP recommends that in the Final EA, TVA identify specific steps or actions that will be taken to minimize such impacts to the CT/CC Plant, fuel lines, and transmission assets planned under plant operation.
- The DEA reports the proposed Allen CCGT site, existing switchyard, laydown areas, and a portion of the 24 or 30-inch underground gas pipeline would be located behind the Ensley Levee. TDEC OEP recommends that TVA include in the Final EA discussion of controls or infrastructure that will be in place to prevent or mitigate damage from flood waters in the event of a levee breach.

TDEC's Division of Water Resources (DWR) has reviewed the DEA and recommends including discussion of how TVA and/or MLGW will deal with any potential "blowouts" of bentonite drilling mud during horizontal drilling for the gas pipeline.

TDEC's Division of Natural Areas (DNA) has reviewed the DEA. The proposed natural gas-fired facility would be located just south of ALF on a 73.3-acre site that TVA currently leases. The proposed gas primary supply pipeline would be up to 30 inches and built within an existing MLGW gas pipeline corridor ROW from the MLGW's gate station near Airways Boulevard to the west and then north approximately 13 miles to the proposed CT/CC site. Upon review of all the project locations, TDEC DNA finds that the project is located in a previously disturbed area with limited suitable habitat for rare species. As such, TDEC DNA does not anticipate any impact to rare, threatened, or endangered species within the project vicinity and has no specific comments regarding the proposed action and alternatives.

Additionally, TDEC noted that the DEA does not explicitly address additional generation capacity that may or may not be added to TVA's generation portfolio as a result of the proposed action. If additional generation capacity is to be added, it is recommended that it be discussed, including rationale (which may tier back to IRP documents) and consideration of potential direct and cumulative impacts associated with the proposed action.

TDEC appreciates the opportunity to comment on the DEA. Please contact me should you have any questions regarding these comments.

Sincerely,

Michelle B. Walker

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