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SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

CALPINE'S MORGAN ENERGY CENTER – PROVIDE INTERCONNECTION

Morgan County and Limestone County, Alabama

TENNESSEE VALLEY AUTHORITY

SEPTEMBER 2005

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

°F	Degree Fahrenheit
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
APE	Area of Potential Effect
BMP	Best Management Practice
CFR	Code of Federal Regulations
EA	Environmental Assessment
e.g.	Latin term exempli gratia meaning "for example"
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Fields
EO	Executive Order
et al.	Latin term, et alii (masculine), et aliae (feminine), or et alia (neutral) meaning "and others"
etc.	Latin term et cetera meaning "and other things" "and so forth"
HPA	Habitat Protection Area
HU	Hydrologic Unit
I-65	U.S. Interstate Highway 65
i.e.	Latin term, id est, meaning "that is"
kV	Kilovolt
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
SMZ	Streamside Management Zone
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
TVARAM	A version of the *Ohio Rapid Assessment Method* specific to the TVA region
U.S.	United States
US 31	U.S. Highway 31
US 72	U.S. Highway 72
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action

Tennessee Valley Authority's (TVA) proposed action is to comply with the Federal Power Act by fulfilling Calpine's interconnection request between its new Morgan Energy Center generating plant and TVA's transmission system by July 2006.

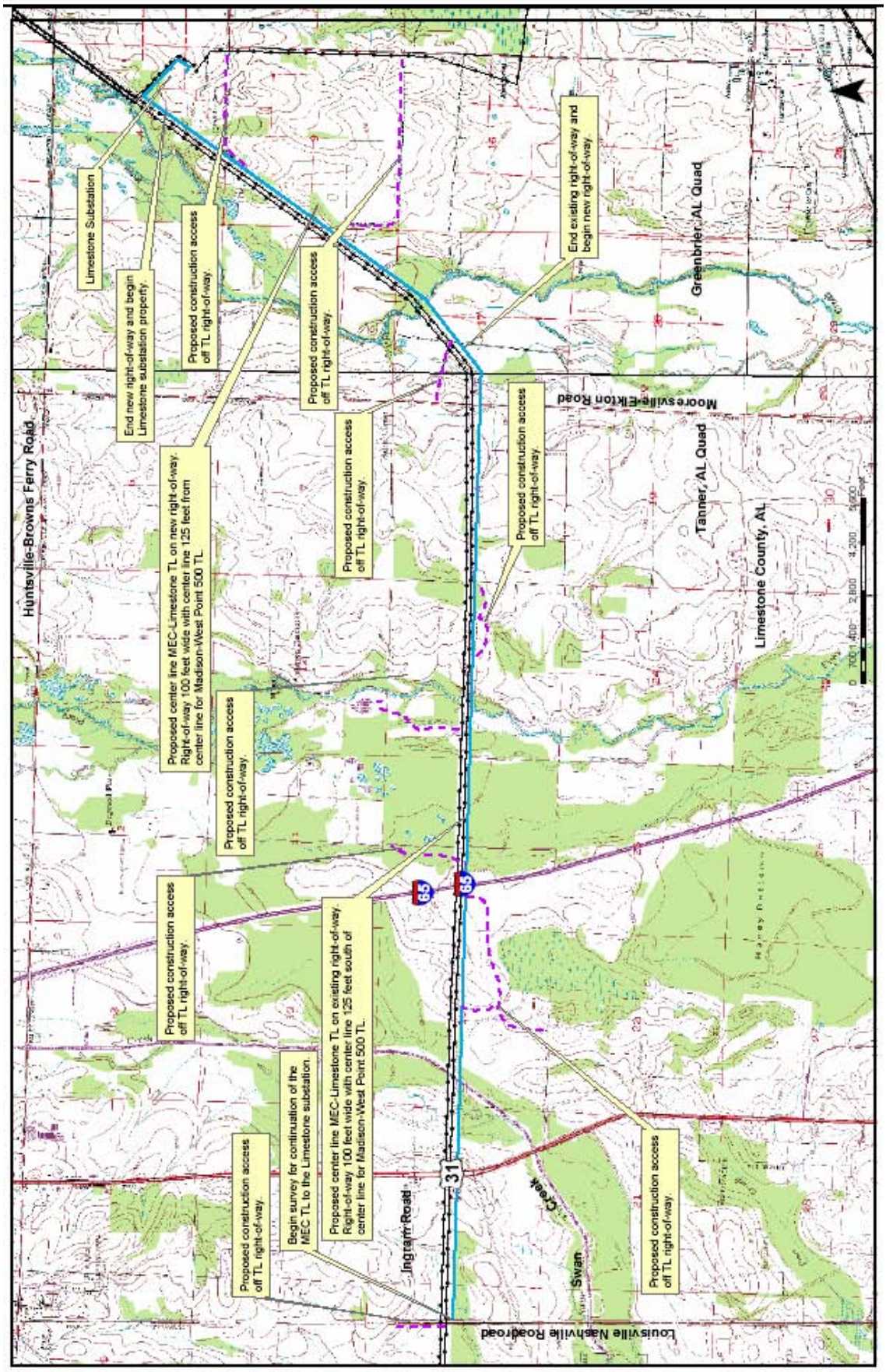
To provide the interconnection, TVA would use 12.5 miles of transmission line recently constructed as proposed in the Calpine's Morgan Energy Center – Provide Interconnection Environmental Assessment (EA) (TVA, 2003a) and construct an additional 8.3 miles of transmission line beginning west of the railroad tracks that parallel the Madison-West Point 500-kilovolt (kV) Transmission Line and continue to TVA's Limestone Substation property (Figure 1-1). Approximately 5.5 miles of the new transmission line route would be constructed on existing TVA transmission line right-of-way. Approximately 2.8 miles of additional new right-of-way occupying approximately 25 acres would be required to connect the TVA right-of-way section to the Limestone Substation. This Supplemental EA would provide review of the new 8.3 miles of transmission and cumulative review of the entire interconnection project.

1.2. Need

In accordance with the provisions of the Federal Power Act, Section 210, TVA and other owners of facilities used for the transmission of electric energy in interstate commerce are required, upon application, to interconnect power production facilities proposed by cogenerators, small power producers, and independent power providers under arrangements that provide safe and reliable operation of their facilities on the transmission system and that do not unfairly shift the cost of interconnection and operation to the transmission system owner and its customers. Calpine, an independent power provider, has applied to interconnect its new Morgan Energy Center to the TVA transmission system. This application requires TVA to connect the generation to TVA's transmission system.

1.3. Project Background

To meet Calpine's request to interconnect its new Morgan Energy Center generating plant to TVA's transmission system, TVA proposed in 2002 to build an approximate 15.8-mile new transmission line from Calpine's Morgan Energy Center generating plant to an existing substation named General Motors and perform upgrades at this substation. An EA was completed on the proposed project and a Finding of No Significant Impact was issued for this proposed action in October 2003 (TVA, 2003a). However, business issues that developed between TVA and General Motors after the completion of the EA resulted with the General Motors Substation option not being a viable alternative for this project.



AL = Alabama
MEC = Morgan Energy Center
TL = Transmission Line

Figure 1-1. Proposed 8.3-Mile 161-kV Transmission Line to the Limestone Substation - Preferred Route

After further review, TVA's Limestone Substation was identified as an alternative potential option to interconnect Calpine's Morgan Energy Center generating plant. TVA would use 12.5 of the 15.8 miles of transmission line constructed as described in the original project EA (TVA, 2003a). This completed section of transmission line begins at the Calpine's Morgan Energy Center generating plant and travels east to the west side of the railroad tracks located along U.S. Highway 31 (US 31). At this point, the original section of transmission line would have turned south for approximately 3.3 miles ending at the General Motors Substation. TVA had not completed the construction along this section and any transmission line structures that have already been placed would be removed from the right-of-way.

1.4. Decisions That Must be Made

The primary decision before TVA is determining the best alternative transmission line route for interconnecting Calpine's Morgan Energy Center generating plant to the TVA transmission system. The new alternative route is described in detail in Section 2.2.

If service to the area is to be improved, other, secondary decisions are involved. These include the following considerations:

- The timing of the interconnection
- The best route for a transmission line
- Determining any necessary mitigation and/or monitoring measures to implement to meet TVA standards and minimize potential damages to resources

1.5. Public Involvement

The following federal and state agencies have been contacted to date by TVA concerning this project.

- United States Army Corp of Engineers
- United States Fish and Wildlife Service
- United States Senators and Representatives from the study area
- Alabama Department of Agriculture and Industry
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Economic and Community Development
- Alabama Department of Environmental Management
- Alabama Department of Transportation
- Alabama Historical Commission

This proposal was reviewed in accordance with Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), Farmland Protection Policy Act, National Historic Preservation Act, Endangered Species Act, Section 404 of the Clean Water Act, and EO 12372 (Intergovernmental Review). Correspondence received related to this coordination is contained in Appendix I.

The additional right-of-way area that would be required for Calpine's interconnection to occur at the Limestone Substation involved three property owners. These property owners were notified by letter and telephone.

1.6. Necessary Permits or Licenses

Permit revisions from the State of Alabama and United States Army Corps of Engineers (USACE) would be required for the transmission line construction on the additional 8.3 miles of right-of-way. The storm water permit has been prepared and submitted to the State of Alabama. The erosion and sedimentation control plans included in the storm water permit would be coordinated with other appropriate state and local authorities. The Section 404 Nationwide Permit 12-Utility Line Crossing request was submitted to the USACE, and a permit has been issued for the project (Appendix I). A permit would also be required for burning trees and other combustible materials removed during transmission line construction.

CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Introduction

Chapter 2: Alternatives Including the Proposed Action is the *heart* of this EA. This chapter has the following five major sections:

- Description of Alternatives
- Alternative Eliminated From Detailed Study - Rebuild and Upgrade Existing TVA Transmission Lines
- Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line
- Project and Siting Alternatives
- Identification of the Preferred Alternative

This chapter describes all of the alternatives explored and provides a detailed description of the necessary steps in constructing a transmission line and substation. Chapter 2 also identifies TVA's preferred alternative.

2.2. Description of Alternatives

2.2.1. Alternative 1 – Do Not Provide an Interconnection to Calpine's Morgan Energy Center (No Action)

Under the No Action Alternative, TVA would not connect its transmission system to Calpine's Morgan Energy Center. However, TVA is required to connect to the Calpine facility by the Federal Power Act. If TVA and Calpine are unable to agree on interconnecting the Calpine facility, Section 210 of the Federal Power Act provides that the Federal Energy Regulatory Commission may issue an order that would require TVA to interconnect TVA's transmission system with those of the generator. Therefore, TVA does not have the discretion to take no action in this situation, and the No Action Alternative was deemed unreasonable. It is not discussed further within this document.

2.2.2. Alternative 2 – Construct a Transmission Line From Calpine's Morgan Energy Center to TVA's Limestone Substation (Action)

Under the Action Alternative, TVA would construct an additional 8.3 miles of transmission line beginning near US 31 on the west side of the railroad tracks that parallel the Madison-West Point 500-kV Transmission Line and ending at TVA's Limestone Substation (Figure 1-1). Approximately 5.5 miles of the new transmission line route would be constructed within an existing TVA transmission line right-of-way. Additionally, approximately 2.8 miles of new right-of-way would be required to connect the TVA right-of-way section to the Limestone Substation.

At the Limestone Substation, TVA would add a breaker and associated switches, surge arrestors, coupled capacitor voltage transformer, and bus. TVA would also add telecommunications equipment such as modem splitters, mirrored bits, station manager, and relays. The supervisory equipment and accessories would be removed and reused by TVA. At Calpine's Morgan Energy Center generating plant, TVA would install mirrored bits. Map board upgrades would occur at TVA's Power Business Center and Power System Control Center.

2.3. Alternative Eliminated from Detailed Study - Rebuild and Upgrade Existing TVA Transmission Lines

Under this alternative, TVA would destruct and rebuild three 161-kV transmission lines totaling approximately 28.4 miles and uprate six 161-kV transmission lines and one 500-kV transmission line totaling 138.2 miles. Transmission line uprates consist of resagging the conductor by increasing conductor tension, adding structures within the transmission line, and/or replacing existing structures. Although this alternative would utilize existing right-of-way, because more land disturbance would be required for destructing and rebuilding 23.8 miles of three different transmission lines and uprating 10 different transmission lines, the environmental impacts would potentially be greater than for Alternative 2. Impacts to the TVA transmission system would also be greater than for Alternative 2, because this alternative would require more scheduled outages at the many different locations. Additionally, the cost of this plan would be almost twice as high as for Alternative 2. As a result of these identified issues, this alternative was rejected as unreasonable and is not discussed further within this document.

2.4. Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line

2.4.1. Transmission Line Construction

2.4.1.1. Right-of-Way Acquisition and Clearing

Existing and new right-of-way would be needed for the new section of proposed transmission line. The transmission line on existing right-of-way would parallel the Madison-West Point 500-kV Transmission Line for approximately 5.5 miles and would require vegetation clearing. The centerline on this section would be located 125 feet from the centerline of the Madison-West Point 500-kV Transmission Line. At the 5.5-mile point, the proposed transmission line would angle northeast off the existing right-of-way toward the Limestone Substation property. Approximately 2.8 miles of new right-of-way 75 feet wide and occupying about 25 acres would be required.

TVA would purchase easements from landowners for the new right-of-way on private land. These easements and land would give TVA the right to construct, operate, and maintain the transmission line, as well as remove danger trees off the right-of-way. Danger trees are those trees that are located away from the cleared right-of-way, but are tall enough to pass within 5 feet of a conductor or strike a structure should it fall toward the transmission line. Fee title, i.e., ownership, for the land within the right-of-way remains with the landowner, and a number of activities may be continued on the property by the landowner. However, the easement agreement prohibits certain activities such as the construction of buildings and any other activities within the right-of-way 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, most trees and shrubs would initially be removed from the entire width of the right-of-way. Equipment used during this right-of-way 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 right-of-way 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 soon to 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 Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, and Transmission Construction Guidelines Near Streams (Appendices II, III, and IV) would be followed in clearing and construction activities.

Subsequent to clearing and construction, the right-of-way would be restored as much as is possible to its state prior to construction. Pasture areas would be reseeded with suitable grasses. Wooded areas would be restored using native grass and other low-growing species. Erosion controls would remain in place until the plant communities were fully established. Streamside areas would be revegetated as described in Appendices II through IV.

2.4.1.2. Access Roads

Permanent access roads would be needed to allow vehicle access to each structure and other points along the right-of-way. Eight new access roads were identified along the proposed transmission line and were included in the environmental field review. TVA would obtain the necessary rights for these access roads from landowners. Existing roads including privately built, farm and field roads, some of which may need upgrading, would be used where possible. New access roads used for transmission lines are located on the right-of-way wherever possible and designed to avoid severe slope conditions and to minimize stream crossings. Access roads are typically about 20 feet wide and are surfaced with dirt 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, they would be left or removed, depending on the wishes of the landowner or on any permit conditions that might apply. If desired by the property owner, new temporary access roads would be restored to previous conditions. Additional applicable right-of-way clearing and environmental quality protection specifications are listed in Appendices II and III.

2.4.1.3. Construction Assembly Areas

The construction assembly area that was previously evaluated and used for the construction of the original transmission line alternative would also be used during the construction of the transmission line section to TVA's Limestone Substation (TVA, 2003a).

2.4.1.4. Structures and Conductors

The proposed 161-kV transmission line would be constructed using H-frame steel pole structures (Figure 2-1). Structure heights along the 8.3 miles of proposed transmission line would vary according to the terrain and transportation crossings and would range from 65 to 110 feet tall, averaging 85 feet.

Figure 2-1. H-Frame Type 161-kV Transmission Structure

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

Poles at angles in the transmission line may require supporting guy wires. Some structures for larger angles could require two or three poles. Most poles would be imbedded directly in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be back-filled with the excavated material. In some cases, gravel or a cement and gravel mixture might be necessary. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole.

Two structures would be required to be placed in wetland areas identified during the environmental field review. To reduce the potential for environmental impacts, structure placement would utilize a helicopter and vibratory hammer that would be mounted to the base section of the structure. The helicopter would lower the base portion of the structure with the attached vibratory hammer and allow the structure to sink into place with the vibratory hammer embedding it into soil. Once the base portion of the structure is installed, the helicopter would fly the rest of the structure to the site and position it for the construction crew to assemble the structure.

Additional 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 and a helicopter would be used in specified locations (e.g., areas with soft ground) to reduce the potential for environmental impacts.

2.4.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the right-of-way, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. Installation of conductors would begin with a small rope being pulled from structure to structure. This rope would then be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators mounted on the structures. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Finally, the wires would be clamped to the insulators and the pulleys removed.

2.4.2. Operation and Maintenance

2.4.2.1. Inspection

Periodic inspections of TVA's transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections, which occur on approximately 5-year cycles after operation begins, are conducted to locate damaged conductors, insulators, or structures, and to report any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance or routine vegetation management.

2.4.2.2. Vegetation Management

Management of vegetation along the right-of-way would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. The transmission line would be designed to meet a 24-foot minimum clearance as required by the National Electric Safety Code standards for a 161-kV transmission line.

Management of vegetation along the right-of-way would consist of two different activities: namely, the felling of danger trees adjacent to the cleared right-of-way, as described in Section 2.4.1.1, and the control of vegetation within the cleared right-of-way.

Management of vegetation within the cleared right-of-way would use 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. Given the land use in the area of this project, right-of-way maintenance is expected to be minimal. 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 right-of-way and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers.

Any herbicides used would be applied in accordance with applicable state and federal laws and regulations and the commitments listed in this document. Only herbicides registered with the United States Environmental Protection Agency (USEPA) would be used. A list of

the herbicides currently used by TVA in right-of-way management is presented in Appendix V. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Other than vegetation management, little other maintenance work would normally be required. The transmission line structures and other components typically last several decades. In the event that a structure must be replaced, the structure would normally be lifted out of the ground by crane-like equipment and the replacement structure inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads where possible. Replacement of structures may require leveling the area surrounding the replaced structures, but there would be little, if any, additional area disturbance when compared to the initial installation of the structure.

2.5. Project and Siting Alternatives

The process of siting this transmission line adhered to the following basic steps used by TVA to determine a transmission line route:

- Determine potential sources to interconnect Calpine's generation with TVA's transmission system.
- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Develop general route options.
- Gather public input.
- Incorporate public input into the final identification of the preferred transmission line route.

2.5.1. Definition of Study Area

The first task in defining the study area was to identify alternative sources that could interconnect Calpine's generation with TVA's transmission system. The study area was defined based on the location of Calpine's Morgan Energy Center generating plant, the 12.5-mile section of transmission line already constructed for the initial project, and the practical routes for interconnection to TVA's Limestone Substation. The study area to the south was limited by the Madison-West Point 500-kV Transmission Line due to design and clearance issues. Although the entire transmission line project from Calpine's Morgan Energy Center to the Limestone Substation occurs in Morgan and Limestone Counties, for this portion of the study, the regional study area included was within Limestone County (Figure 1-1).

Relatively flat, open agricultural fields along with sparse forests dominate the study area. The transmission line would also cross bottomland forests and wetland areas associated with Tennessee River tributaries, including Swan Creek, Piney Creek, Spring Branch, and Limestone Creek.

2.5.2. Collect Data

Geographic data, such as topography, land use, right-of-way information, transportation, environmental features, cultural resources, near-term future development, and land

conservation information were collected for the entire study area. Analysis of the data was aided by using the geographic information system. This system allowed the multitude of factors of the study area to be examined simultaneously to develop a route that would best meet project needs, including avoiding or reducing potential environmental impacts.

2.5.3. Route Evaluation and Selection

The geographic data indicated that for most of the route to TVA's Limestone Substation property it would be possible to use existing right-of-way parallel to an existing 500-kV transmission line. The new transmission line section proposed would begin near US 31 on the west side of the railroad tracks and head east parallel to the Madison-West Point 500-kV Transmission Line before angling northeast and ending at TVA's Limestone Substation property (Figure 1-1). Approximately 5.5 miles of the new transmission line route would be located on existing TVA right-of-way parallel to the Madison-West Point 500-kV Transmission Line. In addition, approximately 2.8 miles of new 75-foot right-of-way would be required between the Limestone Substation and the Madison-West Point 500-kV Transmission Line. The proposed transmission line route would greatly reduce impacts to property owners since the transmission line would parallel an existing transmission line and use existing right-of-way. Three new property owners would be affected; however, they did not have any issues with the new right-of-way. Except for eight new access roads, the route would be accessible using mostly existing roads requiring little maintenance. The proposed route would cross several wetlands; however, the geographic data indicated that any routes north or south of the proposed route would also cross several of the same wetlands.

2.6. Identification of the Preferred Alternative

Alternative 2: Construct Transmission Line from Calpine's Morgan Energy Center to TVA's Limestone Substation (Action) is TVA's preferred alternative for this proposed project. TVA would utilize 12.5 miles of transmission line constructed as a result of the original proposed transmission line and build approximately 8.3 miles of new 161-kV transmission line to the existing Limestone Substation. The proposed transmission line would require the acquisition of approximately 25 acres of new right-of-way.

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CHAPTER 3

3. AFFECTED ENVIRONMENT

3.1. Introduction

Chapter 3: Affected Environment succinctly describes the existing condition of the environmental resources and factors of the Limestone County, Alabama, project area that would affect or that would be affected by implementing Alternative 2.

This description of the existing environment in Chapter 3 establishes the baseline conditions against which the decision maker and the public can compare the potential effects of Alternative 2.

3.1.1. Terrestrial Ecology

3.1.1.1. Terrestrial Plants

As stated in the original EA, existing plant communities along the new 8.3-mile section of proposed transmission line right-of-way include four broadly delineated vegetation types. About half of the land along the new section of proposed transmission line is occupied by agricultural fields of cotton and corn.

Additionally, approximately 35 percent of the new section of proposed transmission line is composed of bottomland forests and wetlands. These areas occur mostly along floodplains, riparian zones, and headwater areas associated with Tennessee River tributaries, including Swan Creek, Spring Branch, Piney Creek, and Limestone Creek. Dominant trees in the forested bottoms include swamp chestnut–oak, water oak, willow oak, sycamore, box elder, red maple, ash, winged elm, water tupelo, and black tupelo. In the wet, open marsh areas, buttonbush, halberd-leaved rose mallow, and Virginia sweet spire are dominant, along with several species of sedges, rushes, and wetland grass species.

Successional communities, such as old fields, pastures, thickets, and disturbed woods, account for approximately 10 percent of the plant communities along the new transmission line section. Representative species include cherrybark oak, willow oak, post oak, elm, southern hackberry, supplejack, greenbrier, and black cherry. Exotic species are common in successional communities and include Chinese privet, multiflora rose, Japanese honeysuckle, and Japanese grass. The early successional communities included old fields and woods' edges. Fescue, sericea lespedeza, and Brazilian vervain were the dominant herbaceous species in these areas. The remaining acreage (approximately 5 percent) exists as regularly managed areas and includes hayfields, lawn-like areas, and roadways.

The plant communities observed along the new section of the proposed transmission line route are common and representative of the region. No uncommon plant communities were observed on the proposed project route.

A large percentage of the proposed project is on land in which the native vegetation has been extensively altered as a result of previous land-use history (e.g., clear-cuts, roadsides, and grass-dominated areas maintained by mowing). Invasive exotic species encountered

along the proposed route include Japanese honeysuckle, Johnson grass, sericea lespedeza, and kudzu. All of these species have the potential to spread rapidly and displace native vegetation.

3.1.1.2. Terrestrial Animals

With one exception, habitat along the proposed 8.3-mile section of transmission line for terrestrial animals would be the same as described in the original EA for the previous planned transmission line route. Terrestrial species in these habitats would be expected to be similar to those along the original proposed transmission line route. At the western end of the new section of proposed transmission line, the route would cross a small pond between the railroad and US 31. Mallards, ring-necked ducks, gadwall, and Canada geese were present on the pond during field investigations.

3.1.2. Threatened and Endangered Species

3.1.2.1. Terrestrial Plants

The TVA Natural Heritage database indicated that no federally listed and seven Alabama state-listed plant species are known from Limestone County, Alabama (Table 3-1). Three of these species, sweetflag, waterweed, and ragged fringe orchid are known to occur within 5 miles of the proposed project area. These plant species are found in association with a variety of wetland habitats, ranging from marshes and floodplains to seasonally wet depressions such as roadside ditches. A field inspection of the new 8.3-mile 161-kV transmission line section revealed that neither these species of plants nor any other federally or state-listed plant species were present.

Table 3-1. Protected Plant Species Known From Limestone County, Alabama

Common name	Scientific name	Status[1]	
		Federal	State
Sweetflag	*Acorus calamus*	-	NOST
Waterweed	*Elodea canadensis*	-	NOST
Duck River bladderpod	*Lesquerella densipila*	-	NOST
Lake-cress	*Neobeckia aquatica*	-	NOST
Snow wreath	*Neviusia alabamensis*	-	NOST
Ragged fringe orchid	*Platanthera lacera*	-	NOST
Sessile trillium	*Trillium sessile*	-	NOST

[1] Status code: NOST - Alabama Natural Heritage Program does not assign status codes to state-listed species; this designation indicates the species is tracked by the Alabama Natural Heritage Program due to its rarity in the state.

3.1.2.2. Terrestrial Animals

The TVA Natural Heritage database indicated that two federally and four state-listed terrestrial animal species have been reported from Limestone County, Alabama (Table 3-2). In addition to these species, one state-listed animal previously unrecorded from the county was located during field investigations. Three heron colonies and 23 caves have also been reported from this county.

Table 3-2. Federally and State-Listed Terrestrial Animal Species Reported From Limestone County, Alabama

Common name	Scientific name	Status[1]	
		Federal	State
Amphibian			
Eastern hellbender	*Cryptobranchus alleganiensis*		PROT
Tennessee cave salamander	*Gyrinophilus palleucus*	-	PROT
Reptiles			
Red milk snake	*Lampropeltis triangulum syspila*	-	NOST
Bird			
Appalachian Bewick's wren	*Thryomanes bewickii altus*	-	PROT
Mammals			
Gray bat	*Myotis grisescens*	END	PROT
Indiana bat	*Myotis sodalis*	END	PROT
Meadow jumping mouse	*Zapus hudsonius*	-	PROT

[1] Status codes: END = endangered; PROT = Protected under the Alabama Nongame Species Regulation or Alabama Invertebrate Species Regulation; NOST = Alabama Natural Heritage Program does not assign status codes to state-listed species; this designation indicates the species is tracked by the Alabama Natural Heritage Program due to its rarity in the state.

Areas affected by the proposed transmission line do not meet the habitat requirements for most species listed in Table 3-2. Tennessee cave salamanders, Indiana bats, and gray bats have been reported from caves in Limestone County; however, no caves are present in the immediate vicinity of the new 8.3-mile section of the transmission line study area.

The eastern hellbender is a large, aquatic salamander inhabiting large, and mid-sized, clear fast-flowing streams with many large, flat rocks and logs. Eastern hellbenders are found at elevations below 2,500 feet (Petranka, 1998). The proposed route between US 31 and the Limestone Substation would cross five streams that may contain habitat suitable for this species.

A meadow jumping mouse was located during field investigations. They prefer lush meadows, bogs, grasslands, abandoned grassy fields, and forest glades (Linzey, 1998). Meadow jumping mice are also found in grain and hay fields, shrubby or weedy fields, fencerows, and along the edge of the woods (Schwartz and Schwartz, 1981).

Based on known geographic ranges and habitat requirements, the Appalachian Bewick's wren and the red milk snake may occur along the proposed transmission line route. Appalachian Bewick's wrens are found in brushy thickets in areas of otherwise sparse vegetation. Red milk snakes are found in a variety of habitats, and prefer open, rocky pastureland or meadows.

3.1.2.3. Aquatic Animals

The TVA Natural Heritage database indicated that three federally listed and an additional three state-listed aquatic animal species (Table 3-3) are known to occur in Beaverdam Creek, Piney Creek, Pryor Branch, Swan Creek, and Limestone Creek in Limestone County, Alabama. With the exception of Beaverdam Creek, these streams are the location

of some of the only known records for armored snail and slender campeloma. Critical habitat has not been designated for these species.

Table 3-3. Federally and State-listed Aquatic Animal Species Known From Streams Along the Proposed 8.3-Mile Transmission Line Route in Limestone County, Alabama

Common name	Scientific name	Status[1]	
		Federal	State
Fish			
Spring pygmy sunfish	*Elassoma alabamae*	-	NOST
Tuscumbia darter	*Etheostoma tuscumbia*	-	NOST
Snails			
Slender campeloma	*Campeloma decampi*	END	NOST
Anthony's river snail	*Athearnia anthonyi*	END	NOST
Armored snail	*Pyrgulopsis pachyta*	END	NOST
Mussels			
Purple lilliput	*Toxolasma lividus*	-	NOST

[1] Status codes: END = endangered; NOST = Alabama Natural Heritage Program does not assign status codes to state-listed species; this designation indicates the species is tracked by the Alabama Natural Heritage Program due to its rarity in the state.

3.1.3. Wetlands

Wetland determinations were performed in the proposed project area according to USACE standards (Environmental Laboratory, 1987), which require documentation of hydrophytic vegetation (Reed, 1997), hydric soil, and wetland hydrology. Broader definitions of wetlands such as the wetland definition used by the U.S. Fish and Wildlife Service (USFWS) (Cowardin et al., 1979) and the TVA Environmental Review Procedures definition (TVA, 1983) were also considered in this review.

Eleven wetland areas, totaling 10.82 acres, were delineated within the proposed 8.3-mile section of the proposed transmission line right-of-way and associated access roads (Table 3-4).

The primary land use/landcover in the project area is agricultural use with large tracts of forested land and scattered residential areas. Part of the proposed right-of-way includes a portion of cleared right-of-way in the adjacent Madison-West Point 500-kV and Madison-Maury TVA transmission line rights-of-way. All of the wetlands identified occur in floodplains, riparian zones, and headwater areas associated with Tennessee River tributaries, including Swan Creek, Spring Branch, Piney Creek, and Limestone Creek.

Table 3-4. Summary of Wetlands Identified on the Proposed 8.3-Mile Section of Transmission Line Right-of-Way Between Calpine's Morgan Energy Center and TVA's Limestone Substation

Wetland ID[a]	Wetland classification[b]	TVARAM category	PFO1 in right-of-way (acres)	PSS1 in right-of-way (acres)	PEM1 in right-of-way (acres)	PUBH in right-of-way (acres)	Estimated intercept length and total wetland acreage in right-of-way[c]
W01	PUBH/PSS1/ PFO1	2	1.05	1.05	0.00	2.09	1826 feet/ 4.19 acres
W02	PFO1	3	1.02	0.00	0.00	0.00	1782 feet/ 1.02 acres
W03	PFO1/PSS1/ PEM1	3	0.81	0.33	0.49	0.00	708 feet/ 1.63 acres
W04	PSS1	3	0.00	0.82	0.35	0.00	509 feet/ 1.17 acres
W05	PSS1	2[d]	0.00	0.30	0.13	0.00	185 feet/ 0.42 acre
W06	PSS1	2[d]	0.00	0.15	0.06	0.00	94 feet/ 0.22 acre
W07	PFO1/PSS1/ PEM1	3[e]	0.07	0.07	0.06	0.00	82 feet/ 0.19 acre
W08	PFO1/PSS1/ PEM1	3[e]	0.08	0.08	0.07	0.00	100 feet/ 0.23 acre
W08 Access Road[f]	PSS1/PEM1	3[e]	0.00	0.02	0.02	0.02	100 feet/ 0.06 acre
W09	PEM1	2	0.00	0.00	0.11	0.00	48 feet/ 0.11 acre
W10	PFO1/PSS1	3	1.18	0.39	0.00	0.00	687 feet/ 1.58 acres
Totals			**4.21**	**3.21**	**1.29**	**2.11**	**10.82 acres**

[a]Federal and/or state jurisdictional determinations subject to confirmation by USACE and/or ADEM regulatory staff.
[b]As defined by Cowardin, et al. (1979). PEM = emergent; PSS = scrub-shrub; PFO = forested; PUB = Pond. Includes the previously cleared right-of-way of the adjacent Madison-West Point 500-kV Transmission Line.
[c]Acreage of right-of-way wetlands calculated from estimated right-of-way intercept length multiplied by 100-foot width of proposed right-of-way, except for W02, which is multiplied by 25.
[d]W05 and W06 were combined for TVARAM rating because they are in close proximity and are part of a single wetland.
[e]W07, W08, and W08 Access Road were combined for TVARAM rating because of their proximity to each other and their hydrologic link where the two flooded stream channels come together just south of the proposed right-of-way.
[f]Wetland W08 Access Road: Acreage calculated from estimated road right-of-way intercept length multiplied by 25-foot width of proposed access road right-of-way.

Each of the 11 wetland areas meets the USACE parameters for jurisdictional wetlands, which may be regulated under the Clean Water Act. All wetlands would require a jurisdictional determination from the USACE and Alabama Department of Environmental Management (ADEM) before TVA could initiate any action that would occur in these wetlands.

Wetland functions performed in the project area include attenuation of flood flows, nutrient cycling, contaminant removal and transformation, sediment retention, wildlife habitat, and maintenance of biological and landscape diversity. The ecological and economic values provided by these functions include sustaining wildlife and aquatic resources, flood control, water quality improvement and maintenance, preservation of biodiversity, and ecosystem support (via nutrient cycling, biomass production, and nutrient export).

A version of the *Ohio Rapid Assessment Method* (Mack, 2001) specific to the TVA region (TVARAM) was developed for use in guiding wetland mitigation decisions consistent with TVA's independent responsibilities under the National Environmental Policy Act (NEPA) and EO 11990. Wetlands identified in the proposed right-of-way were evaluated using TVARAM since they would all be subject to new disturbance (Table 3-4). The Ohio Rapid Assessment Method is designed to distinguish between three categories of wetlands:

Category 1 wetlands are described as "limited quality waters." They are considered to be a resource that has been degraded, has limited potential for restoration, or is of such low functionality, that lower standards for avoidance, minimization, and mitigation can be applied. None of the potentially affected wetlands were classified as Category 1.

Category 2 includes wetlands of moderate quality and also wetlands that are degraded but could be restored. Avoidance and minimization are the first lines of mitigation. About 4.6 acres of the potentially affected wetlands were classified as Category 2.

Category 3 generally includes wetlands of very high quality and wetlands that are of concern regionally and/or statewide, such as wetlands which provide habitat for threatened or endangered species. All practicable attempts would be made to avoid any disturbance of Category 3 wetlands and their buffer zones. About 5.9 acres of the potentially affected wetlands were classified as Category 3.

3.1.4. Aquatic Ecology

Field surveys conducted February 2005 on the new 8.3-mile section of proposed transmission line right-of-way identified 17 watercourses along the transmission line route and one pond on an access road. Of the 17 watercourses identified, 6 were perennial streams, 4 were intermittent streams, and 7 were wet-weather conveyances (Appendix VI).

The new section of proposed transmission line right-of-way would cross three main watersheds: Swan Creek, Piney Creek, and Limestone Creek. Swan Creek, an unnamed creek (possibly Spring Branch), Piney Creek, and Limestone Creek are unique perennial streams because they contain endangered species (Section 3.1.2.3). TVA sampling of Swan Creek at Mile 2.2 (the US 31 bridge crossing) in June 2004, collected 22 fish species, the overall fish assemblage rated "poor," and the benthic community rated "fair." TVA sampling of Piney Creek at Mile 6.7 (downstream of the proposed transmission line) in June 2003, collected 22 fish species, the overall fish assemblage rated "poor," and the benthic community rated "fair." TVA sampling of Limestone Creek at Mile 17, the US 72 bridge upstream of the proposed transmission line, in July 2003, collected 31 fish species with the overall fish assemblage rated "poor/fair," and the benthic community rated "fair."

3.1.5. Managed Areas

The TVA Natural Heritage database indicated that the proposed transmission line to interconnect Calpine's Morgan Energy Center to the TVA transmission system at the Limestone Substation is not within any managed areas and/or ecologically significant sites. The proposed new 8.3-mile section of transmission line is within 3 miles of three managed areas/ecologically significant sites.

Mallard-Fox Creek State Wildlife Management Area (WMA) extends along the southern shoreline of Wheeler Reservoir, encompassing many coves and inlets. The majority of the 1,483-acre WMA is leased from TVA by the Alabama Department of Conservation and

Natural Resources (ADCNR), with a small portion owned by the State of Alabama. The WMA is managed for small game and waterfowl. The eastern edge of the WMA is within 1,000 feet of the existing right-of-way, which runs parallel to Red Hat Road.

Swan Creek WMA is 0.3 mile south of the proposed transmission line in the vicinity of Beulah Land. Waterfowl and small game hunts on this 8,870-acre WMA are administered by the ADCNR. The area includes wooded lands, grassy pastures, marshes, and mudflats.

Pryor Branch TVA Habitat Protection Area (HPA) is 1.4 miles south of the proposed transmission line. Adjacent springs, which feed the stream, harbor two fish species that are listed as protected in Alabama, the spring pygmy sunfish and the Tuscumbia darter. The HPA has been set up as a buffer to protect this resource. These two species are generally restricted to the headwaters of Pryor Branch, although some have been recorded downstream in the TVA HPA. Several local colleges and scientists use the area for environmental education and research focusing on limestone habitats.

No Nationwide Rivers Inventory streams are within 3 miles of the new 8.3-mile section of the proposed transmission line.

3.1.6. Recreation

Recreation in the project area is informal and dispersed. Primary activities include hunting and wildlife observation and occur primarily on privately owned land. Nearby wildlife management areas mentioned in the preceding section, Swan Creek and Mallard-Fox, provide public recreation opportunities including waterfowl and small game hunting, wildlife observation, and fishing.

Wheeler National Wildlife Refuge, operated by the USFWS, encompasses 35,000 acres in Limestone, Morgan, and Madison Counties. It features wildlife observation, hunting, fishing, environmental education opportunities, walking trails, and other public access facilities.

3.1.7. Floodplains

The new 8.3-mile section of the proposed transmission line right-of-way would cross the identified floodplains of Swan Creek, Piney Creek, and Limestone Creek, along with several minor floodplain areas in Limestone County, Alabama. Some of the existing construction access roads also cross floodplain areas. The existing Limestone Substation is not located within the 100-year floodplain.

3.1.8. Groundwater

The project area is underlain by the Highland Rim aquifer system, which is part of the Interior Low Plateaus Physiographic Province. High capacity wells, producing from 100 to more than 1,000 gallons per minute, occur in the limestones and dolomites of the Fort Payne-Tuscumbia aquifer system, which is located within the Highland Rim and includes two of Alabama's three largest springs. Tuscumbia Spring, also known as Big Spring, supplies water to the City of Tuscumbia. Large springs are common in the Highland Rim because of conduit flow in limestone and chert aquifers. Huntsville is the largest groundwater user in the Highland Rim, getting most of its water from two wells and Brahan Spring (Huntsville Big Spring) (ADEM and Geological Survey of Alabama, 2000). Limestone County depends on both groundwater and surface water for its water supply.

3.1.9. Surface Water

The project drains to Wheeler Reservoir on the Tennessee River via Swan Creek, Piney Creek, and Limestone Creek. Rainfall in the area averages 57 inches per year with March being the wettest month at 6.6 inches and October the driest month at 3.3 inches. The average monthly air temperature ranges from 39 degrees Fahrenheit (^{o}F) in January to 79^{o}F in July with an annual mean of about 60^{o}F.

Wheeler Reservoir extends from Guntersville Dam at Tennessee River Mile (TRM) 349 to Wheeler Dam at TRM 274.9. The drainage area upstream of Wheeler Dam is 29,590 square miles. Normal summer elevation for the reservoir is 556 feet (mean sea level) and 551 feet at normal winter elevation. The lake usually reaches summer elevation by April 15. Fall drawdown, in anticipation of the winter/spring flood season, is after Labor Day. At summer pool elevation, the reservoir has an area of 67,070 acres, a volume of 1,050,000 acre-feet, a mean depth of 15.7 feet, and a hydraulic residence time of 10.6 days.

Swan Creek is classified by ADEM for fish and wildlife and for agricultural and industrial water supply. Piney Creek and Limestone Creek are classified for fish and wildlife. The Tennessee River downstream of the project is classified for fish and wildlife, swimming and other whole body water-contact sports, and public water supply. Swan Creek is on the state 303 (d) list as not supporting its designated uses due to siltation from nonirrigated crop production, urban runoff/storm sewers, and pasture grazing. Limestone Creek is on the 303 (d) list as not supporting its designated uses due to siltation from nonirrigated crop production and pasture grazing.

3.1.10. Visual Resources

Visual resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity). Views of a landscape are described in terms of what is seen in foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between 0.5 mile and 4 miles from the observer, objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernible unless they are especially large and standing alone (TVA, 2003b). The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used. The general landscape character of the study area is described in this section with additional details in Section 4.1.10.

The new 8.3-mile section of the proposed 161-kV transmission line begins north of Ingram Road just west of the Louisville-Nashville rail line adjacent to the existing Madison-West Point 500-kV Transmission Line. The new transmission line would follow the existing 500-kV transmission line right-of-way toward the existing Limestone Substation to the east. Traffic is light along Ingram Road, and views of the existing transmission line are in the foreground for motorists across open pastureland. To the east, intermittent views of the transmission line would be seen in the middleground from Huntsville-Browns Ferry Road. These views would be across open, relatively flat agricultural land in the middleground. Residential areas are sparse along this section of the existing transmission line. Scenic attractiveness is common. Scenic integrity is low.

The transmission line route would continue east and cross Swan Creek and US 31 to the east. Swan Creek is an unaltered perennial stream and has moderate scenic integrity. Views at the transmission line crossing would be limited to occasional recreational users in the foreground. Traffic is moderate to heavy along US 31 and residential and commercial developments are interspersed along this section. Farther east, the new transmission line would cross Interstate 65 (I-65). Traffic is extremely heavy in this area. Scenic attractiveness is common. Scenic integrity is low.

At Mooresville-Elkton Road, the transmission line would traverse open countryside that is typical of the region and similar to conditions described along Ingram Road and US 31. The transmission line route would turn to the northeast, visible in the foreground and middleground from most main roads up to 4 miles away. The route would terminate at the existing Limestone Substation.

3.1.11. Cultural Resources

The total length of the proposed transmission line route would be 20.8 miles. Of this, 12.5 miles of the proposed corridor were previously surveyed in 2002 and 2003, and no historic properties were identified that would be adversely affected. The remaining 8.3-mile section of the new section of proposed transmission line route would follow the existing Madison-West Point 500-kV Transmission Line, and the centerline for the new route would be located 125 feet south and southeast of the centerline for that corridor. Except for the 2.8-mile new right-of-way acquisition near the Limestone Substation, the proposed right-of-way would be 100 feet wide for its entire length.

For the new 8.3-mile section of proposed transmission line, TVA Cultural Resources staff identified the archaeological area of potential effect (APE) to be those lands on which the new transmission line and infrastructure would be situated, consisting of the above described transmission line corridor. In addition, TVA Cultural Resources staff identified the architectural/historical APE to be those areas from which the transmission line would be visible within a 0.5-mile radius, encompassing any areas where the undertaking would alter existing topography or vegetation in view of a historic resource. Viewsheds to and from the project area were terminated where topography and vegetation obstructed lines of sight.

No previously recorded archaeological sites occur within the project transmission line corridor; however, the archaeological survey identified three previously unrecorded archaeological sites (1LI596, 1LI597, and 1LI598; Holland, et. al., 2005). Site 1LI596 is a prehistoric lithic scatter that cannot be attributed to a specific culture period or phase. All of the artifacts were recovered from the surface or the plow zone. Sites 1LI597 and 1LI598 are historic artifact scatters. All of the artifact material recovered from both sites was retrieved from the surface; no subsurface deposits were identified. All three sites are unlikely to yield important information about human history and are recommended ineligible for inclusion on the National Register of Historic Places (NRHP).

The historic structures survey identified six architectural resources (HS-1 through HS-6) within the project APE (Holland, et. al., 2005). All of these architectural resources are unlikely to yield important information about human history and are recommended ineligible for inclusion on the NRHP.

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CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

4.1. Introduction

Chapter 4: Environmental Consequences and Chapter 3: Affected Environment form the detailed scientific and analytic basis for the summary comparisons presented in Chapter 2, Section 2.5 Project and Siting Alternatives.

Section 2.5 contains by option the predicted attainment and nonattainment of the purpose and need defined in Chapter 1. This chapter presents the detailed predicted effects of implementing Alternative 2.

4.1.1. Terrestrial Ecology

4.1.1.1. Terrestrial Plants

Vegetation types in the project area are relatively similar along both the original planned transmission line route and the new proposed transmission line route (Table 4-1). Some additional disturbance of existing plant communities would occur in conjunction with the addition of the proposed 8.3 miles of transmission line. However, because no rare or uncommon terrestrial plant communities or otherwise unusual vegetation occurs on the lands to be disturbed, direct, indirect, and cumulative impacts to the terrestrial plant ecology of the region are expected to be insignificant as a result of the proposed activities.

Table 4-1. Major Vegetation Types in the Project Area

Proposed transmission line route	Percent agricultural fields	Percent bottomland and wetlands	Percent successional communities	Percent mowed areas
New 8.3-mile section of right-of-way beginning just east of US 31 to the Limestone Substation	50	35	10	5
Original Proposal – Calpine's Morgan Energy Center to General Motors Substation	75	10	10	5
New Proposal – Calpine's Morgan Energy Center to TVA's Limestone Substation	68	17	10	5

4.1.1.2. Terrestrial Animals

The new 8.3-mile section of transmission line is proposed for installation within an existing right-of-way that lies within a landscape that is predominantly disturbed agricultural fields interspersed with small forested patches. The forested areas are considerably fragmented, which limits the quality of wildlife habitat, by impeding wildlife movement and colonization, by degrading forest interior habitat, and by increasing brown-headed cowbird parasitism of songbirds.

A minimal amount of forest would be cleared along the edge of cotton fields and the forested patches. However, since no new edge would be created, there would be no increase in the already present problem of forest fragmentation. Forest patch size would decrease, but largely by less than 100 feet from the existing edges. The reduction of forest patch size would impact wildlife species, especially forest interior species that may be dependent upon certain sized areas of forest for survival. However, the amount of forest edge loss anticipated would not significantly impact any forest interior species.

Approximately 4 acres of forested wetlands that provide habitat for a variety of wildlife would be converted to scrub/shrub or emergent wetlands. Some species would be impacted; however, because similar habitat exists in the area, overall impacts to the area wildlife anticipated by the habitat conversion would be expected to be insignificant.

Potential clearing for the project is not expected to contribute significantly to the spread of exotic or invasive terrestrial animals. Similarly, adverse impacts to migratory bird habitats are not anticipated as a result of project implementation. All known heron colonies and caves are at adequate distances from the proposed right-of-way. No impacts are expected to these resources.

4.1.2. Threatened and Endangered Species

4.1.2.1. Terrestrial Plants

Because no occurrences of federally or state-listed plant species are known on or immediately adjacent to the lands to be disturbed, no impacts to such plant species are expected as a result of the proposed project.

4.1.2.2. Terrestrial Animals

The proposed project area does not meet the specialized habitat requirements for most of the species listed in Table 3-2. Suitable roosting habitat for Indiana bats along the entire proposed transmission line route is rare and of low quality. Clearing for the new section of proposed transmission line right-of-way would be completed between September and December 2005, a time when Indiana bats hibernate in caves. Therefore, no impacts are expected to this species.

Sedimentation of the streams crossed by the proposed transmission line could occur during construction. This could potentially result in impacts to eastern hellbenders that may occur in the project area. However, the use of erosion control measures and other best management practices (BMPs) at stream crossings would eliminate the potential for impacts to this and other aquatic species.

Within the study area, no recent records for Appalachian Bewick's wrens have been reported, and the species is considered extirpated. However, if Appalachian Bewick's wrens should occur in the brushy thickets along the proposed transmission line right-of-way, they would continue to utilize the early successional habitat preferred by this species.

Meadow jumping mice occur along the existing and proposed transmission line right-of-way. This species would utilize the cleared right-of-way habitat and would, therefore, not be impacted by the proposed project.

4.1.2.3. Aquatic Animals

Three federally listed snails and three other state-listed aquatic animal species have been recorded from several perennial stream crossings along the proposed new 8.3-mile transmission line right-of-way section.

This proposed action could indirectly affect local populations of aquatic animals (including the three federally listed snails) in streams along this transmission line right-of-way if it resulted in an increased sediment load or other changes in physical habitat within the affected streams. Increased sediment loading, extensive disruption of the canopy cover, extensive use of herbicides, or changes in the water temperature could disrupt or eliminate nearby populations of these species. Potential indirect effects caused by sediment during construction would be short term; however, maintenance activities could potentially cause long-term and detrimental effects to these species. With the proper implementation of BMPs and Standard Stream Protection (Category A) as outlined in Muncy (1999) on all perennial and intermittent streams in the project area, no indirect effects to aquatic animal species are anticipated (Appendix VI).

In addition, Piney Creek, Swan Creek, Limestone Creek, and Pryor Branch would be designated for Unique Water Habitats Stream Protection (Category C) as outlined in Muncy (1999) to give the three federally and state-listed snail species special protection (Appendix VI). Because these streams harbor some of the only known records for armored snail and slender campeloma, Category C protection is warranted to ensure there would be no effects to these species.

TVA has recognized the potential for transmission line projects to cause adverse impacts and has adopted planning and construction procedures to minimize those possible effects. The proposed route of this line was selected, in part, to avoid impacts to streams. None of the streams to be crossed would have transmission towers located in the water. All construction work, especially near streams, would be conducted following the requirements and guidelines presented in TVA's environmental protection and BMP guidelines (Muncy, 1999). The combination of routing decisions and measures planned to minimize erosion and sedimentation during construction reduce the potential adverse impacts on listed aquatic species

The proposed 8.3-mile section of transmission line would be added onto a portion of transmission line previously reviewed. With the implementation of BMPs and Category A or C protection as outlined in Muncy (1999), these species would not be directly affected by the construction, operation, or maintenance of the proposed transmission line between Calpine's Morgan Energy Center and the Limestone Substation. In addition, construction and maintenance of this transmission line would not result in any cumulative impacts to listed aquatic species. Maintenance techniques would be employed that avoid or minimize adverse effects to streams. Any herbicides used as part of the maintenance program would be registered for that use by USEPA, and would be applied according to label directions and Muncy guidelines. Particular care would be given to the selection of herbicides to be used near streams as a further safeguard for the protection of aquatic species, including those protected under federal and state laws.

4.1.3. Wetlands

A total of 10.82 acres of wetlands lie within the proposed Calpine's Morgan Energy Center-TVA Limestone Substation transmission line corridor and one associated access road that

meet USACE parameters for wetlands that may be federal jurisdictional wetlands under the Clean Water Act.

Activities in wetlands are regulated under the Clean Water Act. Section 404 implementation requires authorization through either a Nationwide General Permit or an Individual Permit from the USACE in order to conduct specific activities in wetlands. Section 401 gives states the authority to certify whether activities permitted by the federal government are in accordance with state water quality standards. Additionally, EO 11990 requires all federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. It also requires agencies to consider factors relevant to a proposal's effect on the survival and quality of the wetlands, including maintenance of natural systems, conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources, as well as other uses of the wetlands in the public interest.

The federal "no-net-loss" policy for wetlands states an interim goal of no overall net loss of the nation's remaining wetlands, and the long-term goal of increasing the quality and quantity of the nation's wetlands resource base (White House Office on Environmental Policy, 1993).

Mitigation requirements for wetland impacts, which are regulated under USACE and state permits, are developed in negotiation with USACE and the state regulatory agencies. TVA's practice is to mitigate for the loss of Category 3 forested wetlands at a 1:1 ratio as recommended by the 1990 Memorandum of Agreement between the USEPA and USACE Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines. No mitigation is recommended for impacts to scrub-shrub or emergent wetlands, as these areas would be spanned by proposed transmission lines and would not be filled or converted to other wetland types.

The construction and clearing of the proposed 8.3-mile transmission line right-of-way section on Calpine's Morgan Energy Center-TVA Limestone Substation interconnection could potentially affect 10 wetlands consisting of 10.76 acres. The proposed project could also affect approximately 0.06 acre of one additional wetland along a potential access road on the west side of Piney Creek (W08 Access Road). The extent to which these wetlands would be affected by the proposed project depends on the extent to which additional clearing would be required to establish the new right-of-way and the final routes selected for access roads.

This includes 4.21 acres of forested wetlands, 3.21 acres of scrub-shrub wetlands, and 3.40 acres of emergent and of open water (PUB) wetlands (Table 3-4). Of these wetlands, approximately 6.55 acres of emergent and scrub-shrub wetlands are located within the existing transmission line right-of-way that currently is maintained. The impacts to scrub-shrub, emergent/open water wetlands were determined to be insignificant because, except for the temporary disturbance associated with construction, no long-term loss of wetland functions would occur provided that impacts would be minimized, appropriate BMPs would be implemented to control erosion and sedimentation, and all federal and state permit conditions would be met.

Clearing the proposed new right-of-way alignment would convert 4.21 acres of jurisdictional forested wetlands to PEM1 or PSS1 habitat. This total includes 1.05 acres of a Category 2

forested wetland (W01) and 3.16 acres of Category 3 forested wetlands (W02, W03, W07, W08, and W10). Relocating the proposed transmission line route from the south side to the north side of the existing Madison-West Point transmission line right-of-way would result in crossing the same forested wetlands in different locations. Therefore, relocation would have similar impacts because of the continuation of forested wetlands on both sides of the right-of-way.

Individual and cumulative wetland impacts would be minimized through implementation of appropriate BMPs during clearing and construction and by providing compensatory mitigation for affected Category 3 forested wetlands. The recommended compensatory mitigation ratio for the 3.16 acres of Category 3 forested wetlands is 1:1. This would result in a total of 3.16 acres of forested wetland mitigation, consisting of restoration or creation.

One potential access road (W08 Access Road) could be affected by the proposed action. Approximately 100 feet of existing roadbed would need to be rebuilt to accommodate construction vehicles and heavy equipment. This could require placing as much as 463 cubic feet of fill to repair the breach in existing roadbed and extend it to a 25-foot-wide right-of-way (length = 100 feet, width = 25 feet, and depth = 5 feet); this would result in discharges to approximately 0.06 acre of wetland. The construction of access roads for utility line construction and maintenance are authorized under Nationwide Permit 12, provided the discharges do not cause the loss of greater than 0.5 acre of wetland and provided construction complies with all permit conditions.

The 0.06 acre of wetland fill would occur in a Category 3 nonforested wetland. Due to the small size of the area of impact, no mitigation would be necessary to offset impacts.

Suggested mitigation options for the conversion of 3.16 acres of a Category 3 forested wetland include, but are not limited to:

- On-site or off-site mitigation planned and implemented by TVA on or in proximity to the project site.

- Off-site wetland mitigation in the project area's U.S. Geological Survey (USGS) Hydrologic Unit (HU), either planned and implemented by TVA or through an in-lieu-fee agreement with a state agency or private nonprofit conservation organization.

- The purchase of credits in an existing mitigation bank (which includes forested wetlands) within the project area USGS HU.

4.1.4. Aquatic Ecology

Watercourses in the project area considered to convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) and the pond located along a proposed access road, would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams. Appendix VI lists the approximate locations of wet-weather conveyances.

With the exception of the Swan Creek, an unnamed creek, Piney Creek, and Limestone Creek, intermittent and perennial streams and their riparian habitats that occur within the project area would qualify for Standard Stream Protection (Category A) as designated by TVA Transmission Construction Guidelines Near Streams (Muncy, 1999). The Standard

Stream Protection designation is based on the variety of species and habitats that exist in intermittent and perennial streams and the state and federal requirements to avoid harming them. Criteria for the Standard Stream Protection designation included evidence of aquatic life and/or the presence of a well-defined channel with rock or soil substrate. These criteria and the presence of federally listed aquatic species would qualify Swan Creek, an unnamed creek, Piney Creek, and Limestone Creek for Unique Water Habitats Stream Protection (Category C). Streams identified for Standard Stream Protection and Unique Water Habitats Stream Protection along the new 8.3-mile section of the proposed transmission line right-of-way are noted in Appendix VI. Because of local topography, SMZs would extend 50 feet on either side of the proposed crossing (measured from the edge of the stream), but may extend further based on SMZ guidelines as outlined in Muncy (1999). These exceptions in width are noted in Appendix VI. With these suggested levels of protection and the use of BMPs, the cumulative impacts as a result of the proposed project would be insignificant.

By following the appropriate stream protection requirements on streams identified in Appendix VI, the design, construction, and maintenance of the proposed project would not result in significant impacts to aquatic life. Support structures are normally located as far as possible from surface waters to minimize water-related impacts. All construction and maintenance work, especially near streams, would be conducted following the requirements and recommendations presented in TVA's guidelines for environmental protection during transmission line construction (Muncy, 1999).

Road access to transmission line construction sites would be planned and constructed to minimize erosion and sedimentation effects. Use of existing access points along the existing right-of-way would reduce access-related impacts. If no practicable alternative exists, trees along streams within the transmission line corridor and danger trees adjacent to the corridor would be cut; however, their stumps would not be removed and understory vegetation would be disturbed as little as possible. These initial clearing/felling activities (including danger trees) within the SMZ areas along streams would be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., feller-buncher), which would result in minimal soil disturbance and damage to low-lying vegetation. During transmission line maintenance activities, trees and other vegetation within the SMZ would be controlled with backpack-applied spot-use herbicides to remove tree seedlings and other regrowth. Maintenance activities along streams would be by mechanical cutting or by selective use of USEPA-registered herbicides. Permanent and temporary stream crossings would comply with appropriate federal and state permitting requirements as well as any applicable designations and BMPs. Where herbicides are used, these chemicals would be applied following USEPA label restrictions and TVA BMPs.

4.1.5. Managed Areas

Actions related to the proposed transmission line include construction, operation, and clearance/maintenance of existing and new right-of-ways. None of these actions would involve crossing managed areas or ecologically significant sites. Therefore, no impacts to these Natural Areas are expected as a result of this Action Alternative. Because no NRI streams are within three miles of the proposed transmission line, no impacts to NRI streams are anticipated as a result of this Action Alternative.

4.1.6. Recreation

Swan Creek WMA is approximately 3 miles and Wheeler Refuge is approximately 5 miles from the project area. Any impacts to public recreation resources, facilities and activities are anticipated to be temporary and insignificant. Cumulative effects of the proposed action are also anticipated to be insignificant.

4.1.7. Floodplains

The proposed transmission line right-of-way would cross several floodplain areas. For compliance with EO 11988, an overhead transmission line and related support structures are considered a repetitive action in the 100-year floodplain. The construction of the support structures for the transmission line would not be expected to result in any increase in flood hazard either due to increased flood elevations or to changes in flow-carrying capacity of the streams being crossed. To minimize adverse impacts on natural and beneficial floodplain values, the rights-of-way would be revegetated where natural vegetation is removed and the removal of unique vegetation would be avoided.

Some of the construction access roads cross floodplain areas. Any necessary improvements to the road crossings would be done in such a manner that upstream flood elevations would not be increased. To extend and repair one of the proposed access roads, up to 463 cubic feet of fill could be required. Road fill is considered to be a repetitive action in the floodplain under Executive Order 11988. BMPs would be used during construction activities.

4.1.8. Groundwater

Extensive limestone aquifers are present in the project area, and construction and operation of the proposed transmission line could result in adverse impacts to groundwater, if appropriate protective measures are not implemented. Potential impacts to groundwater could result from sediments from excavated materials entering or clogging sinkholes, and from the transport of contaminants such as herbicides and fertilizers into sinkholes. No sinkholes were discovered along the right-of-way. However, one sinkhole is located along one of the access roads near Fletcher Cemetery. The road appears to have already been constructed through the sinkhole and improvements could require a permit from ADEM. To avoid contamination of groundwater in the project area BMPs as described in Muncy (1999) would be used. Construction activities would seek to avoid springs and sinkholes as practicable. However, if springs and sinkholes are encountered and cannot be avoided during construction, BMPs would be used to control sediment infiltration. During revegetation and maintenance activities, fertilizers and herbicides would be used sparingly to avoid contamination of groundwater. As stated in the BMPs, fertilizers and herbicides would not be applied in areas that flow to groundwater infiltration zones (i.e. springs, wells, and sinkholes). With the use of these BMPs, potential impacts on groundwater from this action would be insignificant.

4.1.9. Surface Water

Soil disturbances associated with access roads or other construction activities can potentially result in adverse water quality-impacts. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures and adverse impacts to aquatic biota. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts.

However, TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize these potential impacts. Permanent stream crossings would be designed not to impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in Muncy (1999). Canopies in all SMZs would be left undisturbed unless there were no practicable alternative. Right-of-way maintenance would employ manual and low-impact methods wherever possible. In areas requiring chemical treatment, only USEPA-registered herbicides would be used in accordance with label directions designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

4.1.10. Visual Resources

Visual consequences are examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The foreground, middleground, and background viewing distances were previously described in Section 3.1.10.

Intermittent views of the transmission line can be seen in the middleground from Ingram Road. These views are across open, relatively flat agricultural land in the middleground. Residential areas are sparse along this section of the existing transmission line. Details of the existing line and associated structures for motorists and residents depend upon a variety of factors such as viewer location, viewer context, and atmospheric conditions. Depending upon one or more of these factors, the existing transmission line and structures may appear to be a part of a broader pattern as seen in the middleground, and details may become weak or indistinguishable.

The transmission line route would continue east and cross Swan Creek and US 31 to the east. For recreational users at Swan Creek and motorists along US 31, views of the new 161-kV transmission line would be similar to views of the existing 500-kV transmission line. Views of the existing 500-kV transmission line for motorists along I-65 would range from broadly horizontal in the middleground to mainly between structures and under transmission lines in the immediate foreground. These views would be brief due to travel speeds along I-65.

At Mooresville-Elkton Road, traffic is light and a few motorists would have views of new structures and lines from distances up to 1.5 miles away due to relatively flat topography. The transmission line route would turn to the northeast, visible in the foreground and middleground from most main roads up to 4 miles away, and would terminate at the existing Limestone Substation. The degree of discernible detail of new structures and lines would depend upon atmospheric conditions. Additionally, the new steel structures would be less noticeable over time as they naturally weather, developing a darker gray color that would provide less visual contrast in the landscape.

Operation, construction, and maintenance of the proposed transmission line from Calpine's Morgan Energy Center to TVA's Limestone Substation would be visually insignificant. For information regarding the proposed section of transmission line beginning north of Ingram

Road and terminating at Calpine's Morgan Energy Center, refer to the original EA (TVA, 2003a). There may be some minor visual discord during the construction period due to an increase in personnel and equipment and the use of laydown and material storage areas. These minor visual obtrusions would be temporary until the proposed right-of-way, access roads, and laydown areas have been restored through the use of TVA standard BMPs (Muncy, 1999). Therefore, there are no visual impacts anticipated as a result of the proposed project.

4.1.11. Cultural Resources

The cultural resources survey of the proposed 8.3-mile transmission line route identified three new archaeological sites and six new historic structures:

- Prehistoric scatter, 1LI596, is ineligible for listing on the NRHP due to the inability to determine the age of the occupation and unlikelihood to yield cultural deposits.

- Historic scatters, 1LI597 and 1LI598, are not eligible for listing on the NRHP because they are very unlikely to yield cultural deposits.

- Historic structures, HS-1 through HS-6, are ineligible for listing on the NRHP due to a loss of integrity caused by alterations and/or damage.

These historic properties were recommended ineligible for listing on the NRHP (Holland, et. al., 2005). The Alabama State Historic Preservation Officer has concurred with TVA's determination that the proposed undertaking does not have the potential to affect any historic properties that are potentially eligible, eligible, or currently listed on the NRHP (see Appendix I).

4.2. Post Construction Impacts

4.2.1. Electric and Magnetic Fields

TVA recognizes there is public concern about whether any adverse health effects are caused by electric and magnetic fields (EMF) that result from generation, transmission, distribution, and use of electricity. Many scientific research efforts and other studies examining the potential health and other effects of EMF have been and are being done. TVA is aware of, and ensures that it stays aware of, published research and study results and directly supports some of the research and study efforts.

Studies, interpretations, and research to date are far from conclusive about potential associations between EMF and possible health impacts. A few studies have been interpreted as suggesting a weak statistical relationship between EMF and some rare forms of cancer. During the summer of 2001, the International Association for Research on Cancer reviewed available epidemiological studies and concluded that childhood leukemia appears to be associated with magnetic fields, but that there was not a cause and effect relationship. It was concluded that the risk is small but may in some circumstances of higher exposure result in one type of childhood leukemia. The association also concluded that electric fields do not have a connection with cancer.

However, equal or greater numbers of similar studies show no association or cannot reproduce data interpreted as demonstrating an association. No laboratory research has

found cause and effect health impacts from EMF and certainly none that are adverse. Neither has any concept of how these fields could cause health effects achieved scientific consensus.

There is also no agreement in the scientific or EMF research community as to what if any electric or magnetic field parameters might be associated with potential health effects. There are no scientifically or medically defined safe or unsafe field strengths, although state regulatory bodies in Florida and New York have established edge of right-of-way magnetic field strength limits for 230-kV and larger power transmission lines.

TVA has analyzed and continues to analyze the fields associated with its typical line designs using the best available models and has measured actual fields for a large number of locations along its transmission line easements. Both model data and measurements show that the field strengths for TVA transmission lines are well within Florida and New York limits. Based on such models, expected field strengths for the proposed lines discussed in this document would also be within those existing state guidelines.

TVA's standard location practice has the effect of minimizing continuous public exposures to transmission line EMF. The transmission line route selection team uses a constraint model that places a 300-foot-radius buffer around occupied buildings, except schools, for which a 1,200-foot buffer is used. The purpose of these buffers is to reduce potential land-use conflicts with yard trees, outbuildings, and ancillary facilities and potential visual impacts as well as exposures to EMF. Although not absolute location constraints, these buffers weigh heavily in location decisions, influencing selection of route options and alignments. Because EMF diminishes quickly with distance from the conductors, the routing of transmission lines using constraint buffers effectively reduces potential continuous public exposure to EMF. Crossing under lines or otherwise being near them for short periods may increase overall EMF exposure but only minutely.

4.2.2. Other Impacts

No significant impacts are expected to result from the relatively short-term activities of construction, such as noise, solid waste, etc. Appendices II and III contain procedures for dealing with these issues.

4.3. Irreversible and Irretrievable Commitment of Resources

The materials used for construction of the proposed facilities would be committed for the life of the facilities. Some materials, such as ceramic insulators and concrete foundations, may be irrevocably committed, but the metals used in equipment, conductors, and supporting steel structures could be recycled. The useful life of steel-pole transmission structures is expected to be at least 60 years.

The rights-of-way used for the transmission lines would not be irreversibly committed and could be returned to other uses upon retirement of the line. In the interim, compatible uses of the right-of-way could continue.

Forest products and related wildlife that might have grown on the presently forested portions of the right-of-way would be lost for the life of the project. No locally or regionally significant lost forest or agricultural production would be expected.

4.4. Unavoidable Adverse Effects

After completion of the transmission line:

- Trees would not be permitted to grow within the right-of-way or to a determined height adjacent to the right-of-way that would endanger the transmission line.
- Clearing and construction would result in the disruption of some wildlife, but no permanent habitat changes would occur except in the wooded areas previously described.
- Any burning of cleared material would result in some short-term air pollution.
- Clearing, tree removal, and excavation for pole erection would result in a small amount of localized siltation.
- Transmission line visibility would be minimized through the location; however, there would be some degree of visual effect on the landscape in the project area.

4.5. Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

The construction and operation of the proposed transmission line would supply the needed interconnection between Calpine's Morgan Energy Center to the TVA transmission system to meet the present and foreseeable expected loads. This would be accomplished by a localized shift of a small amount of land to use for electric power transmission. If, during the useful life of the transmission line, it is no longer needed or technology renders it obsolete, it can be removed with relatively little difficulty. The land encumbered by the right-of-way could be returned to its previous use or used for other purposes.

The principal change in short-term use of the right-of-way would be the exclusion of trees and permanent structures. The amount of forest being lost is relatively small, approximately 26 acres within the right-of-way area, and areas removed from production are dispersed along the length of the transmission line. The right-of-way cannot support building construction for the life of the project, but the social and economic benefits of the project should outweigh this small loss.

4.6. Summary of TVA Commitments and Proposed Mitigation Measures

To support the preceding conclusions, TVA would commit to the following additional actions to avoid or mitigate possible environmental impacts:

Protection of Aquatic Resources

- All intermittent and perennial watercourse crossings would be designated as either Category A, Standard Stream Protection, or Category C, Protection of Unique Habitats, as outlined in Muncy (1999). Protection levels for each watercourse crossing are identified in Appendix VI.

- Watercourses that convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) and that could be affected by the proposed transmission line route would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams.

Wetland Mitigation

- Compensatory mitigation would be implemented for the approximately 3.16 acres of Category 3 forested wetlands that would be converted to shrub-scrub wetlands.

General Best Management Practices for Clearing, Construction, and Maintenance

- TVA practices detailed in Appendices II, III, IV, and V would be used during clearing, construction, and maintenance. EO 13112 directs all federal agencies to prevent and control the introduction and spread of invasive species resulting from their activities. TVA would use reseeding mixes that are certified free of invasive, exotic plant seeds when replanting disturbed areas.

CHAPTER 5

5. SUPPORTING INFORMATION

5.1. List of Preparers

W. Nannette Brodie
Position: Environmental Specialist, Professional Geologist
Involvement: Groundwater

Brandon Chance
Position: Contract Aquatic Biologist
Involvement: Aquatic Ecology

Stephanie A. Chance
Position: Aquatic Biologist
Involvement: Threatened and Endangered Species - Aquatic Animals

Kimberly D. Choate
Position: Environmental Engineer - Siting and Environmental Design
Involvement: Purpose of and Need for Action; Alternatives Including Proposed Action

Patricia B. Cox
Position: Botanist
Involvement: Terrestrial Ecology - Terrestrial Plants; Threatened and Endangered Species - Terrestrial Plants

Tom Cureton
Position: Civil Engineer - Siting and Environmental Design
Involvement: Project and Siting Alternatives

John M. Higgins
Position: Water Quality Specialist
Involvement: Surface Water

Marianne M. Jacobs
Position: Archaeologist Technician
Involvement: Cultural Resources

David E. Marler
Position: Electrical Engineer - Transmission System Planning
Involvement: The Decision; Alternatives

Anita E. Masters
Position: Senior NEPA Specialist
Involvement: NEPA Compliance and Document Preparation

Roger A. Milstead
Position: Floodplain Specialist
Involvement: Floodplains

W. Chett Peebles
Position: Landscape Architect
Involvement: Visual

Kim Pilarski
Position: Senior Wetlands Biologist
Involvement: Wetlands

Richard L. Plueger
Position: Land Use and Recreation Specialist
Involvement: Recreation

Jan K. Thomas
Position: Contract Natural Areas Specialist
Involvement: Managed Areas

Allan J. Trently
Position: Contract Zoologist
Involvement: Terrestrial Ecology - Terrestrial Animals; Threatened and Endangered Species – Animals

5.2. List of Agencies Consulted

Federal Agencies

United States Army Corp of Engineers
United States Fish and Wildlife Service

State Agencies

Alabama Department of Agriculture and Industry
Alabama Department of Conservation and Natural Resources
Alabama Department of Economic and Community Development
Alabama Department of Environmental Management
Alabama Department of Transportation
Alabama Historical Commission

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