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 Morgan and Limestone Counties area in Alabama 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.

3.2. Alternative 2 – Construct a Transmission Line from Calpine's Morgan Energy Center to General Motors Substation

3.2.1. Groundwater

The project area is underlain by aquifers in the Interior Low Plateau Physiographic Province and consists of permeable stratigraphic units within flat-lying, sedimentary rocks of Paleozoic age. The Interior Low Plateau consists of extensive tablelands; underlying rocks are either flat or dip at angles of only a few degrees. In the Interior Low Plateau Province, erosion has removed part or the entire resistant sandstone cap, exposing underlying limestone at the surface.

The major aquifers are in limestone units of Mississippian age that are exposed in wide valley floors in the Interior Low Plateau Province. In the limestone, the circulation of slightly acidic groundwater has enlarged fractures by dissolution of the carbonate rock. Where vertical fractures extend to the land surface, the enlarged solution conduits may become completely or partially filled with sediment transported into them by surface streams. Where they are unfilled, solution openings convey large volumes of water.

Rocks comprising the Interior Low Plateau aquifers in Alabama are mostly limestone, sandstone, and shale, but also include beds of siltstone, conglomerate, dolomite, and chert. They range in age from Devonian to Pennsylvanian.

The quality of water in the Interior Low Plateau aquifers is variable, but most of the water is suitable for most uses, although concentrations of sulfate and iron are objectionable in places. Large concentrations of hydrogen sulfides, derived from sulfate, can impact a "rotten-egg" odor to the water. Large concentrations of iron cause staining of plumbing fixtures. The quality of the water generally deteriorates with depth as it becomes more mineralized. In places, dissolved-solids concentrations at depths of 300 feet or more in limestone aquifers are as large as 1000 milligrams per liter.

3.2.2. Surface Water

The proposed project drains to Wheeler Reservoir on the Tennessee River via Round Island Creek, Briley Creek, Mud Creek, Spring Creek, and direct runoff. 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. The reservoir has a normal summer elevation of 556 feet (mean sea level) and a minimum water elevation of 550 feet. The lake usually reaches summer elevation by April 15. Fall drawdown in anticipation of winter rains begins August 1. 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.

The Tennessee River in the project vicinity is classified by the state (Alabama Department of Environmental Management) for fish and wildlife and for swimming and other whole body water-contact sports. Downstream of TRM 289.3 (about 8 miles below the project), the river is also classified for water supply. The remaining streams in the project area are classified for fish and wildlife. Round Island Creek is on the state 303 (d) list as partially supporting its designated uses due to siltation from agriculture. Wheeler Reservoir from the Elk River to Wheeler Dam is on the year 2000 303 (d) list (Tennessee Department of Environment and Conservation [TDEC], 2000) due to thermal modification, but is not included on the proposed year 2002 list (TDEC, 2002).

3.2.3. Vegetation

The proposed transmission line interconnection project lands occur in the southern portion of the Highland Rim section of the Interior Low Plateau Physiographic Province as described by Fenneman (1938). The proposed transmission line would cross the Tennessee River and span portions just north of the Tennessee River.

Botanically, the proposed project site occurs within the Mississippian Plateau section of the Western Mesophytic Forest Region as recognized by Braun (1950). In the region of northern Alabama where the project lands occur, native forest communities generally consist of mixed oak forests varying in composition in relation to topography and soils. Historically, upland forests in the project area were characterized by mixtures of southern red oak, black oak, post oak, and white oak, with dogwood commonly present in the understory. The clearing of forested lands for agriculture and industrial use has converted many of these forest communities to early successional habitats thereby enabling representative native plant communities to become replaced by introduced plant species. Existing plant communities observed on the proposed project sites include four broadly delineated vegetation types (Table 3-1).

Table 3-1. Major Vegetation Types in the Project Area

Vegetation Type	Percent of Area
Agricultural fields	75
Bottomland and wetlands	10
Successional communities	10
Regularly mowed areas	5

In the proposed project area, agricultural fields are abundant with the vast majority of these fields planted in cotton and some in corn.

Bottomland forests and marshes account for approximately less than 10 percent of the project area and are mostly found along stream corridors. Dominant trees in the forested bottoms include water oak, willow oak, Drummond red maple, trident 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.

The majority of the successional communities in the project area are represented by young disturbed woodlands. Representative species include cherry bark oak, willow oak, post oak, elm, southern hackberry, supplejack, greenbrier, and black cherry. Exotic species are common in successional communities and include privet, multiflora rose, Japanese honeysuckle, sericea lespedeza, and Japanese grass. The early successional communities included old fields, pastures, thickets, and woods' edges. Fescue, sericea lespedeza, and Brazilian vervain were the dominant herbaceous species.

Regularly mowed grassy areas including hayfields, lawn-like areas, and roadsides, are primarily limited to areas near the substations.

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

3.2.4. Wildlife

Much of the habitat within the project area has been modified by previous agricultural practices. The habitats described in Section 3.2.3 are typical for this region and are used primarily by common species of wildlife.

The majority of the proposed project area comprises agricultural fields that offer limited wildlife habitat. Birds found in these areas include eastern meadowlark, field sparrow, and European starling. Mammals that occur in this habitat include white-footed mouse, white-tailed deer, and hispid cotton rat. Reptiles that may use these areas include milk snake, gray rat snake, and eastern box turtle.

The bottomland hardwood and wetland portions of the project area provide habitat to a greater diversity of wildlife species. Birds that nest in hardwood-dominated forests include red-eyed vireo, blue-gray gnatcatcher, downy woodpecker, and Carolina chickadees. Amphibians and reptiles common to this habitat include slimy salamander, American toad, bullfrog, broad-headed skink, and eastern box turtle. Mammals typically found in these areas include red bat, white-footed mouse, woodland vole, and eastern chipmunk.

Early successional habitats and narrow strips of trees provide habitat to most of the species listed above. Additional species found in these areas would include northern mockingbird, tufted titmouse, gray tree frog, eastern pipistrelle, and eastern cottontail rabbit.

3.2.5. Aquatic Ecology

The corridor of the proposed transmission line is drained by the nearby Tennessee River (Wheeler Reservoir) and its tributaries. Streams of this region are characterized by coarse

chert gravel and sand substrates interspersed with bedrock areas, moderate gradients, clear waters, and moderate to low productivity, and thus little aquatic vegetation except near spring sources. During times of drought, water from springs often augments stream flows. The region is very rich in spring and cave habitat, particularly in the southern portions. The Highland Rim, because of its geologic complexity and numerous semi-independent drainage systems, harbors the most diverse fish fauna of any region of comparable size in North America (Etnier and Starnes, 1993).

Typically, perennial streams can support a permanent assemblage of aquatic biota including invertebrates, reptiles, amphibians, and fish. Creeks in proximity to Wheeler Reservoir could also provide spawning and nursery habitat for some reservoir and large-river species on a seasonal basis. Ponds provide habitat for aquatic species (most likely sunfish, mosquito fish, and catfish) associated with those habitats. Intermittent streams flow during only a portion of the year and usually not during the drier, summer months. These streams depict a strong bed and bank structure, receive both surface and subsurface flow, and support a limited amount of aquatic biota. Ephemeral streams typically only flow for approximately 24 to 48 hours after a rain event, receive negligible subsurface flow, and maintain weak to moderate bed and bank structure. These factors make it difficult for aquatic biota to survive in these channels.

Forty-six watercourses were identified during a survey of the proposed transmission line route conducted in July 2003. Of these watercourses, 12 were identified as perennial streams and areas of ponded water associated with perennial streams. In addition, one intermittent channel was observed, and the remaining 33 stream channels were classified as ephemeral streams or wet-weather conveyances.

Segments of the proposed transmission line would cross Wheeler Reservoir, waters of Island Creek and Swan Creek that are somewhat affected by impoundment, and waters of Pryor Branch that are impounded by beaver activity. Mettee, et al. (1996), documents 87 fish species in Morgan County and 123 species in Limestone County, so diverse fish communities are expected to be present at various localities in the area. TVA sampling of Swan Creek at mile 2.2 in June 1999, collected 17 fish species, and the overall fish assemblage rated "poor"; the benthic community rated "fair." TVA sampling in Wheeler Reservoir in fall 2001 collected 43 species; the fish assemblage rated "fair" or "good" at all sites compared to similar sampling sites in other mainstem Tennessee River reservoirs (Dycus and Baker, 2002).

3.2.6. Endangered and Threatened Species

3.2.6.1. Plants

The TVA Natural Heritage database indicated that two federally listed plant species, one candidate for Federal listing, and 21 state-listed plant species are known from Limestone and Morgan Counties, Alabama, in which the proposed transmission line project occurs (Table 3-2). One of these species, sweet flag, is known to occur within 5 miles of the proposed project area. This plant species is 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 proposed project area revealed that neither this plant species nor other federally or state-listed plant species were present on lands which potentially would be affected by the project activities.

Table 3-2. Federally and State-Listed Plant Species Reported From Limestone and Morgan Counties, Alabama

Common Name	Scientific Name	Status[1]	
		Federal	State
Alabama glade-cress	*Leavenworthia alabamica*		NOST
American hart's-tongue fern	*Aspelnium scolopendrium var. americanum*	THR	NOST
American smoke-tree	*Cotinus obovatus*		NOST
Butler's quillwort	*Isoetes butleri*		NOST
Common horsetail	*Equisetum arvense*		NOST
Cumberland rosinweed	*Silphium brachiatum*		NOST
Duck River bladderpod	*Lesquerella densipila*		NOST
Fleshy-fruit gladecress	*Leavenworthia crassa*	C	NOST
Gattinger prairie-clover	*Dalea gattingeri*		NOST
Lake-cress	*Neobeckia aquatica*		NOST
Leafy prairie-clover	*Dalea foliosa*	END	NOST
Limestone adder's tongue	*Ophioglossum engelmannii*		NOST
Nodding trillium	*Trillium flexipes*		NOST
Prairie trillium	*Trillium recurvatum*		NOST
Ragged fringe orchid	*Platanthera lacera*		NOST
Sessile trillium	*Trillium sessile*		NOST
Snow-wreath	*Neviusia alabamensis*		NOST
Southern rein orchid	*Platanthera flava var. flava*		NOST
Sunnybell	*Schoenolirion croceum*		NOST
Sweet flag	*Acorus calamus*		NOST
Tall larkspur	*Delphinium exaltatum*		NOST
Tennessee milk-vetch	*Astragalus tennesseensis*		NOST
Toadshade *	*Trillium sessile*		NOST
Waterweed	*Elodea canadensis*		NOST

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

* This common name is often applied to more than one member of this genus.

3.2.6.2. Terrestrial Animals

The TVA Natural Heritage Project database indicated two terrestrial animal species that are both federally and state listed and three other state-listed terrestrial animal species reported from Limestone and Morgan Counties, Alabama (Table 3-3). Three heron colonies and 27 caves have also been reported from these counties; however, none were found during field surveys of the proposed transmission line.

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

Common Name	Scientific Name	Status[1]	
		Federal	State
Amphibians			
Eastern hellbender	*Cryptobranchus alleganiensis alleganiensis*		PROT
Tennessee Cave Salamander	*Gyrinophilus palleucus*		PROT
Reptiles			
Red Milk Snake	*Lampropeltis triangulum syspila*		NOST
Mammals			
Gray Bat	*Myotis grisescens*	END	PROT
Indiana Bat	*Myotis sodalis*	END	PROT

[1] Status codes: END = endangered; PROT = Protected under the Alabama Nongame Species Regulation or Alabama Invertebrate Species Regulation; NOST = species considered sensitive by the state of Alabama, but with no regulatory protection status.

Areas affected by the proposed transmission line do not meet the habitat requirements for most species listed in Table 3-3. Tennessee cave salamanders, Indiana bats, and gray bats have been reported from caves in Limestone and Morgan Counties; however, no caves are present in the immediate vicinity of the proposed route. Eastern hellbenders inhabit large, clear, fast-flowing streams with many large, flat rocks and logs. The proposed route does not cross any streams with habitat suitable for this species.

Based on known geographic ranges and habitat requirements, one of the species listed in Table 3-3 may occur along the proposed transmission line route. Red milk snakes are found in a variety of habitats, and prefer open rocky pastureland or meadows.

3.2.6.3. Aquatic Animals

The TVA Natural Heritage database indicated several federally and state-listed aquatic animal species known to occur within the Tennessee River (Wheeler Reservoir) and its tributaries in Morgan and Limestone Counties, Alabama (Table 3-4). Of these species, one federally listed snail (slender campeloma), two state-listed fish (spring pygmy sunfish and tuscumbia darter), and one state-listed mussel (pink papershell) are known from the main channel of the Tennessee River in the vicinity of the proposed crossing or in tributary streams that would be crossed by the proposed transmission line.

Table 3-4. Federally and State-Listed Aquatic Animal Species Reported From the Tennessee River and its Tributaries, Morgan and Limestone Counties, Alabama

Common Name	Scientific Name	Status[1]	
		Federal	State
FISH			
Spring Pygmy Sunfish	*Elassoma alabamae*		PROT
Slackwater Darter	*Etheostoma boschungi*	THR	PROT
Tuscumbia Darter	*Etheostoma tuscumbia*		PROT
Boulder Darter	*Etheostoma wapiti*	END	PROT
Paddlefish	*Polyodon spathula*		NOST
Southern Cavefish	*Typhlichthys subterraneus*		PROT
CRAYFISH			
Troglobitic Crayfish	*Cambarus jonesi*		NOST
A Troglobitic Crayfish	*Cambarus veitchorum*		PROT
Troglobitic Crayfish	*Procambarus pecki*		NOST
SNAILS			
Anthony's Riversnail	*Athearnia anthonyi*	END	
Slender Campeloma	*Campeloma decampi*	END	PROT
MUSSELS			
Spectaclecase	*Cumberlandia monodonta*		PROT
Dromedary Pearlymussel	*Dromus dromas*	END	PROT
Butterfly	*Ellipsaria lineolata*		NOST
Cumberland Combshell	*Epioblasma brevidens*	END	PROT
Tan Riffleshell	*Epioblasma florentina walkeri*	END	
Acornshell	*Epioblasma haysiana*		Extirpated
Tuberculed Blossom Pearlymussel	*Epioblasma t. torulosa*	END	PROT
Tennessee Pigtoe	*Fusconaia barnesiana*		NOST
Fine-Rayed Pigtoe	*Fusconaia cuneolus*	END	PROT
Cracking Pearlymussel	*Hemistena lata*	END	PROT
Pink Mucket	*Lampsilis abrupta*	END	PROT
Pocketbook	*Lampsilis ovata*		NOST
Birdwing Pearlymussel	*Lemiox rimosus*	END	NOST
Slabside Pearlymussel	*Lexingtonia dolabelloides*	C	PROT
Warty Rocksnail	*Lithasia lima*		NOST
Cumberland Moccasinshell	*Medionidus conradicus*		NOST
Ring Pink	*Obovaria retusa*	END	PROT
Orange-Foot Pimpleback	*Plethobasus cooperianus*	END	PROT
Sheepnose	*Plethobasus cyphyus*		PROT
Tennessee Clubshell	*Pleurobema oviforme*		NOST
Rough Pigtoe	*Pleurobema plenum*	END	PROT
Pink Papershell	*Potamilus ohiensis*		NOST
Kidneyshell	*Ptychobranchus fasciolaris*		NOST
Fluted Kidneyshell	*Ptychobranchus subtentum*	C	NOST
Armored Snail	*Pyrgulopsis pachyta*	END	PROT
Cumberland Monkeyface	*Quadrula intermedia*	END	PROT
Monkeyface	*Quadrula metanevra*		NOST
Purple Lilliput	*Toxolasma lividus*		NOST
Painted Creekshell	*Villosa taeniata*		NOST
Cumberland Bean	*Villosa trabalis*	END	-
Mountain Creekshell	*Villosa vanuxemensis*		NOST

[1] Status codes: END = endangered; THR = threatened; C = Candidate for listing; PROT = Protected under the Alabama Nongame Species Regulation or Alabama Invertebrate Species Regulation; NOST = species considered sensitive by the state of Alabama, but with no regulatory protection status.

The state-listed pink papershell is reported from the Tennessee River in the vicinity of the existing transmission line corridor crossing Wheeler Reservoir. Construction of the new transmission line would parallel this existing transmission line corridor.

The federally listed slender campeloma snail is known to occur in free-flowing portions of Round Island Creek upstream of the existing transmission line corridor crossing. Surveys conducted for the U.S. Fish and Wildlife Service (USFWS) indicated that this species is not likely present in any other streams that would be crossed by this proposed transmission line (ARC, 1997). The proposed transmission line would parallel the existing route, and would cross a section of Round Island Creek that is heavily influenced by the water level in Wheeler Reservoir and is routinely inundated. Field examination of this site indicated no suitable habitat for slender campeloma is present.

Spring pygmy sunfish and tuscumbia darter are restricted to a spring-influenced area in the headwaters of Pryor Branch within the Pryor Branch TVA Habitat Protection Area (HPA). The proposed transmission line would cross Pryor Branch in an area influenced by Wheeler Reservoir water levels, and may be inundated at higher pool elevations. No suitable habitat for these species was found during field investigations.

3.2.7. Natural Areas

A number of TVA tracts in Alabama are leased to the Alabama Department of Conservation and Natural Resources (ADCNR) – Division of Wildlife and Freshwater Fisheries to be included in their state Wildlife Management Area (WMA) program. Mallard-Fox Creek and Swan Creek are WMAs in the project area managed by ADCNR for small game and waterfowl. On both WMAs, the agency retains contract farmers who keep a minimum grain crop that attracts waterfowl and administers hunts during appropriate seasons.

Mallard-Fox Creek State WMA extends along the southern shoreline of Wheeler Reservoir, encompassing many coves and inlets. The majority of the 1483-acre WMA is leased from TVA, with a small portion owned by the state of Alabama. The eastern edge of the WMA is within 1000 feet of the existing right-of-way, which runs parallel to Red Hat Road. A swamp between station numbers 120 and 130 feeds into a wetlands complex on the WMA, but is not itself a part of the state tract (S. Bryant, ADCNR, personal communication, July 2003).

Swan Creek State WMA covers 8870 acres on the northern shore of Wheeler Reservoir Reservation, including a wide expanse of water north of the main river channel. The area includes wooded lands, grassy pastures, marshes, and mudflats. Although named for Swan Creek, the new right-of-way would not be within the WMA when it crosses this stream. It would enter the WMA between station numbers 779 and 790, where it crosses a swampy section of Pryor Branch, and between station numbers 810 and 836, south of Thomas Hammons Road on Sandy Road. The GM Substation is not within Swan Creek WMA.

One mile upstream of where the new right-of-way would cross Pryor Branch is the Pryor Branch TVA HPA. 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.

The existing right-of-way crosses the main channel of the Tennessee River at Wheeler Reservoir. Wheeler National Wildlife Refuge is located 6.7 river miles upstream of this crossing and 1.6 miles south-southeast of the proposed line's terminus at the GM Substation. The 34,500-acre refuge stretches for 20 miles along the Tennessee River within Wheeler Reservoir Reservation, capturing backwaters, uplands, hardwood bottoms, wetlands, pine plantations, farmlands, and pastures. The diverse landscape provides habitat for several federally listed species, and wintering waterfowl use the area extensively. The refuge is open to the public for fishing, pleasure boating, and wildlife observation. Refuge lands are under the administration of the USFWS, although ownership is divided among TVA, the Department of the Army, and the Marshall Space Flight Center.

No streams in Morgan County, Alabama, are listed on the National Rivers Inventory. The nearest such stream in Limestone County is a portion of the Elk River, noted for its scenic, recreational, and fishery qualities. This portion of the Elk River is 12.2 miles north of the existing right-of-way.

3.2.8. Wetlands

Activities in wetlands are regulated under Sections 404 and 401 of the Federal Clean Water Act and EO 11990 (Protection of Wetlands). To conduct activities in wetlands, a nationwide general permit or an individual permit from the USACE is required. EO 11990 requires all Federal agencies to provide leadership and 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. Among these factors considered are the 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 National Wetland Inventory data indicated some of the existing right-of-way areas as either forested wetlands (W15, W16) or areas of emergent and scrub-shrub wetlands situated between two forested wetlands (W12, W14). These data suggest that for these areas, forested wetlands were cleared for the initial transmission line right-of-way construction.

Impacts to forested wetlands are of concern due to the historic high rate of loss, and continuing losses, of this type of wetland, and the long time period necessary to replace forested wetlands and their functions. Forested wetlands are one of the most difficult categories to restore or replace functionally. The timetable for creating or regenerating mature forested wetlands and their associated functions can take 80–100 years.

Forested wetlands have experienced the greatest decline of any single category of wetlands, both in the southeastern United States (Hefner, et al., 1994) and the United States as a whole (USFWS, 2001). Although the annual rate of loss has declined since the mid-1970s to mid-1980s, due in part to Federal Government agriculture programs such as Swampbuster and Conservation Reserve Program, forested wetland acreage continues to decline, with an estimated 4 million acres of forested wetland lost or converted between 1986 and 1997 (Dahl, 2000). Part of the decline in forested wetland acreage was due to the conversion of forested wetlands to other vegetation types such as ponds and emergent and scrub-shrub wetlands.

The largest contributors to forested wetland loss and conversion have been agriculture, silviculture (including conversion to pine plantations), and urban and rural development. Over the decades, TVA has contributed to the cumulative impacts of forested wetland loss, conversion, and fragmentation through impoundment of the reservoir system and reservoir operations, other TVA-related projects, and the construction of thousands of miles of transmission lines.

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

The emergent and scrub-shrub wetlands that are likely to replace the forested wetlands following tree clearing would continue to perform valuable functions including flood control, removal and transformation of contaminants, sediment retention, wildlife habitat, species diversity, and ecosystem support functions. However, where forested wetlands are cleared and maintained in low-growing vegetation (emergent and/or scrub-shrub) there is a loss or reduction of functions provided only by forested wetlands. These functions include:

- Enhanced levels of primary production, nutrient cycling, and carbon storage and export due to greater biomass of forested wetlands.

- Essential habitat and woody structure required by species that are dependent upon forested habitats for all or part of their life cycle (woodland amphibians, bats, and some species of wintering, migratory, and nesting birds) including microhabitats such as shaded vernal ponds, stumps, and snags.

- Shading and cooling effects on vernal ponds, floodwaters passing through the floodplain, and adjacent streams.

Fragmentation and conversion of forested wetland habitat can lead to:

- Reduced habitat access for local populations of wetland-dependent amphibians, migratory birds, and small mammals.

- Increased predation pressure.

- Reduced propagation of native plants.

- Expansion of exotic species into the wetland and upland species into the wetland edges with resulting potential adverse impacts on native plants and animals.

- The "opening up" of the wetlands to other human impacts such as off-road vehicles and illegal dumping.

The proposed project right-of-way south of the Tennessee River is in an area being developed for industrial use, and north of the Tennessee River is agricultural with row crop fields, pastures, and forested areas of various sizes along tributary streams. All of the

wetlands identified occur in floodplains, riparian zones, and headwater areas associated with Tennessee River tributaries, including Island Creek, Briley Creek, Mud Creek, Pryor Branch, and Swan Creek.

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. Wetlands were classified according to the Cowardin system for the classification of wetlands and deepwater habitats (Cowardin, et al., 1979).

During field surveys conducted in July 2003, approximately 16.5 acres in 16 separate areas were identified as wetlands along the proposed project area for Calpine's Morgan Energy Center 161-kV Transmission Line (Table 3-5). Two of these 16 wetland areas (W4 and W5) occur in the new proposed right-of-way. The approximate acreages for all identified wetlands include 6 acres of emergent (marsh and wet meadow) wetlands, 3 acres of interspersed emergent and scrub-shrub wetlands, 6.5 acres of forested wetlands, and less than 1 acre of scrub-shrub wetland (Table 3-5). Fifteen of the 16 wetland areas identified met the USACE parameters for wetlands that may be regulated under the Clean Water Act. One of these wetlands of approximately 1 acre (W3) is an old, unused borrow pit that has been converted to a holding pond. This wetland was submitted to USACE as a non-jurisdictional wetland. Wetland determination data forms are provided in Appendix VI.

Table 3-5. Wetlands in the Project Area

Wetland ID	Wetland Classification[1]	Approximate Boundary Locations	Location	Linear feet in Right-of-Way[2]	Approximate Area in Right-of-way (acres)
W1	PEM1	10+20 to 10+80	Unnamed stream	60	PEM1 = 0.05
W2	PEM1/PSS1	121+20 to 128+80	Unnamed stream	760	PEM1/PSS1 = 1.75
W3	PEM1/PSS1	158+20 to 162+80	Borrow pit	460	PEM1/PSS1 = 1.06
W4	PEM1/PFO1	778+85 to 789+10	Pryor Branch	1,025	PEM1 = 2.05 PFO1 = 0.30
W5	PFO1/PSS1/ PEM1	663+00 to 672+70	Unnamed stream	970	PEM1 = 0.87 PSS1 = 0.68 PFO1 = 0.68
W6	PFO1	647+44 to 651+14	Wet-weather conveyance	370	PFO1 = 0.60
W7	PEM1/PFO1	645+98 to 646+44	Wet-weather conveyance	46	PEM1 = 0.08 PFO1 = 0.03
W8	PEM1	625+22 to 634+00	Wet-meadow	878	PEM1 = 2.01
W9	PEM1	598+50 to 599+76	Wet-meadow	126	PEM1 = 0.29
W10	PFO1	437+20 to 437+80	Briley Creek	20	PFO1 = 0.01
W12	PEM1/PSS1	307+69 to 309+40	Wet-weather conveyance	171	PEM1/PSS1 = 0.40
W13	PFO1	425+12 to 427+03	Island Creek	191	PFO1 = 0.44
W14	PFO1/PEM1	537+87 to 552+07	Unnamed stream	1,420	PEM1 = 0.14 PFO1 = 2.50
W15	PFO1/PEM1	517+14 to 525+63	Mud Creek	849	PEM1 = 0.57 PFO1 = 1.11
W16	PFO1	511+42 to 515+25	Mud Creek	383	PFO1 = 0.88
Total Acreage					PFO1 = 6.55 PEM1 = 6.06 PEM1/PSS1 = 3.21 PSS1 = 0.68

[1] Classification codes: PSS = Palustrine scrub/shrub; PFO = Palustrine forested; PEM = Palustrine emergent.
[2] Acreage varies with the width of the wetland in the right-of-way (15 feet to 100 feet). See Appendix VI for additional information on these wetlands.

3.2.9. Floodplains

The proposed transmission line right-of-way crosses the identified floodplains of the Tennessee River in Morgan County, Alabama, and the identified floodplains of the Tennessee River, Round Island Creek, Mud Creek, Spring Creek, Swan Creek, and Pryor Branch along with several minor floodplain areas in Limestone County, Alabama. The Morgan Energy Center Switching Station, Mallard Fox Creek Substation, and GM Substation are located outside the limits of the 100-year floodplain.

3.2.10. Navigation

The commercial navigation channel on Wheeler Reservoir extends 74.1 miles up the Tennessee River from Wheeler Dam at TRM 274.9 to Guntersville Dam at TRM 349.0. Wheeler Reservoir is an integral component of the Tennessee River's commercially navigable waterway that stretches from Paducah, Kentucky, to Knoxville, Tennessee. There are 25 commercial barge terminals/docks and one major fleeting area located on Wheeler Reservoir, and approximately 28 percent of the tonnage shipped on the Tennessee River system in 2002 was shipped on Wheeler Reservoir. The commercial channel was prepared to provide a year-round, minimum 11-foot channel suitable for 9-foot draft towboats and barges. The U.S. Coast Guard maintains the navigation channel buoys and onshore daybeacons marking the commercial navigation channel.

Most of the new 161-kV transmission line that would be used to interconnect Calpine's new Morgan Energy Center generating plant to the TVA transmission center would be constructed using the existing right-of-way and some existing structures at TRM 297.5.

3.2.11. Recreation

Round Island Recreation Area, developed and operated by TVA, is located at TRM 297.3R and is bisected by existing transmission lines. It features facilities for camping, swimming, picnicking, and boat launching. Wheeler Reservoir in the vicinity of this recreation area is moderately utilized by recreational boaters and fishermen.

Mallard Creek Recreation Area, located at river mile 293.0L, is also operated by TVA and offers facilities for swimming, picnicking, camping, and lake access.

Two managed areas occur on or nearby the project area. These areas have been recognized and are protected, to varying degrees, because they contain unique natural resources, scenic values, or public use opportunities. These areas are owned by TVA and presently managed by the ADCNR under long-term agreement.

- *Swan Creek State WMA*
  This WMA includes 3045 acres of land and 5825 acres of water surrounded by numerous industrial facilities. Wooded lands and grassy pastures, occasionally interrupted by railroad tracts and transmission lines, provide one of the most important waterfowl management areas in the state of Alabama. Although the primary management focus is for waterfowl and small game hunting, this area is becoming increasingly important for migrating bird species. In addition, the area is increasingly utilized by bird watchers and other outdoor enthusiasts.

- *Mallard-Fox Creek State WMA*
  Encompassing 1483 acres, this WMA is primarily utilized for small game hunting.

3.2.12. Visual Resources

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed would affect the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middleground, and background distances. In the foreground, an area within one-half mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between 1-4 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. 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 the section that follows.

The proposed 15.7-mile 161-kV transmission line would be located between the existing Morgan Energy Center Switching Station west of Finley Island Road and the existing GM Substation just north of Alternate U.S. Highway 72. Approximately 11.7 miles of the proposed transmission line would be built on existing Browns Ferry Nuclear-Limestone Transmission Line right-of-way and some existing structures. The remaining 4 miles of transmission line that terminates at the proposed GM Substation would be constructed on new right-of-way. The transmission line corridor would pass through mostly agricultural, open land settings interrupted frequently by sparse woodlands. There are approximately seven road crossings, one river crossing, and two creek crossings along the proposed transmission line route.

The proposed transmission line would leave the Morgan Energy Center Switching Station on the south side, crossing a railroad spur, and turn west toward the existing Trinity-Browns Ferry Transmission Line. Turning north, the new transmission line would be located just east of the Mallard Fox Creek State WMA before crossing the Tennessee River on the vacant side of existing towers. North of the Tennessee River, the transmission line would pass over the boat ramp and a portion of the parking area at Round Island (Cow Ford) Recreation Area. Continuing north, the transmission line would follow existing right-of-way east of Cow Ford Road within the Swan Creek WMA to the intersection of the Browns Ferry Nuclear-Limestone Transmission Line, turning to the southeast. The transmission line would traverse mostly agricultural cropland and cross Round Island Creek, Vanzille Lane, Lindsay Road, County Road (CR) 24 (Ripley Road), and Lucas Road to the east. There are few homes along this section of the route. Traffic along local roads is light.

At the Louisville and Nashville Railroad line to the east, the proposed 161-kV transmission line would turn south on new right-of-way and parallel the existing railroad track right-of-way. The transmission line would cross CR 16 (Ingram Road) and Swan Creek northeast of Orrville before turning to the east, crossing Harris Station Road to the south, and paralleling Sandy Road, and finally entering the existing GM Substation. The area is a mixture of open farmland and commercial/industrial buildings. Local traffic consists of area

residents and a mixture of commercial vehicles. Scenic attractiveness is common along the transmission line route. Scenic integrity is low.

3.2.13. Cultural Resources

Human occupation of northern Alabama has occurred from the Paleo-Indian to the Historic period. In northern Alabama, prehistoric archaeological chronology is generally broken into five broad time periods: Paleo-Indian, Archaic, Gulf Formational, Woodland, and Mississippian (Walthall, 1980; McNutt and Weaver, 1985). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. European interactions with Native Americans associated with the fur-trading industry in this area began in the seventeenth and eighteenth centuries. The first permanent occupation of northern Alabama by Europeans, European Americans, and African Americans occurred in the late eighteenth century. Various excursions and temporary settlements by the British, French, and Spanish occurred prior to this period. From the 1840s to the mid-twentieth century, northern Alabama was a major cotton growing area. Settlement and land use of the area remained primarily rural until the mid-twentieth century, at which time industry and urbanization increased.

Currently, there are 29 historic properties listed in the NRHP in Limestone and Morgan Counties. None of these properties is within the Area of Potential Effects (APE) for the proposed undertaking. The archaeological APE for the proposed project is the location of transmission line right-of-way. The architectural and historical APE is any area from which the transmission line would be visible.

Archaeological APE surveys were conducted in September 2002, March 2003, and May 2003. A preliminary records search indicated that eight previously recorded archaeological sites were within the APE. Four of these sites were relocated: 1MG666, 1MG735, 1LI65, and 1LI374. Sites 1MG113, 1MG116, 1MG667 and 1LI526 could not be relocated and have probably been destroyed based on the current conditions at their recorded locations. Seven new archaeological sites were also recorded within the APE: 1LI560, 1LI561, 1LI562, 1LI563, 1LI564, 1LI566, and 1LI568. Site 1LI568 is an aboveground feature that encompasses remnants of the original Athens-Decatur road and also an original route of the Louisville and Nashville Railroad. This site was recommended eligible for listing in the NRHP due to its association with early transportation routes in Alabama. The survey also recommended that construction of the proposed project would adversely affect 1LI568 (D'Angelo, et al., 2003).

The architectural and historical survey of the project's visual APE identified eight historic structures. Structures HS-5, HS-6, and HS-7 are recommended eligible for listing in the NRHP because of their architectural significance. The survey indicated that the proposed undertaking would have a visual effect on these properties, but the effect would not be adverse due to the existing transmission lines within the viewshed (D'Angelo, et al., 2003).