Biological Assessment

U.S. Fish and Wildlife Service

Vogtle Electric Generating Plant
Combined Licenses Application

U.S. Nuclear Regulatory Commission Combined Licenses Application
Docket Nos. 52-025; 52-026

Burke County, Georgia

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Abbreviations/Acronyms

ac	acre(s)
AP1000	Advanced Passive 1000
APP	Avian Protection Program
BA	biological assessment
CCAA	Candidate Conservation Agreement with Assurances
CFR	Code of Federal Regulations
cm	centimeter(s)
COL	combined license
CWS	circulating water system
dBA	decibel(s) (acoustic)
DOE	U.S. Department of Energy
EA	environmental assessment
Eco-Sciences	Eco-Sciences of Georgia
EMFs	electromagnetic fields
EPP	environmental protection plan
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
ESP	early site permit
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot/feet
FWS	U.S. Fish and Wildlife Service
GDNR	Georgia Department of Natural Resources
GEIS	generic environmental impact statement
GPC	Georgia Power Company
GTC	Georgia Transmission Corporation
ha	hectare(s)
in.	inch(es)
kg/ha/mo	kilograms per hectare per month
km	kilometer(s)
kV	kilovolt(s)
lbs/ac/mo	pounds per acre per month
LWA	Limited Work Authorization
m	meter(s)

mi	mile(s)
MW(t)	megawatts thermal
NEPA	National Environmental Policy Act of 1969, as amended
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
Plant Wilson	Allen B. Wilson Combustion Turbine Plant
RDC	Representative Delineated Corridor
ROW	right(s)-of-way
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric and Gas
SEIS	supplemental environmental impact statement
SERPPAS	Southeast Regional Partnership for Planning and Sustainability
SPL	sound pressure level
Southern	Southern Nuclear Operating Company, Inc.
TDS	total dissolved solids
TRC	Third Rock Consultants, LLC
USACE	U.S. Army Corps of Engineers
VEGP	Vogtle Electric Generating Plant
Westinghouse	Westinghouse Electric Company, LLC

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application from Southern Nuclear Operating Company, Inc. (Southern), acting on behalf of itself and several co-applicants (i.e., Georgia Power Company [GPC], Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and the City of Dalton, Georgia) for combined licenses (COLs) to construct and operate two Westinghouse Electric Company, LLC (Westinghouse) Advanced Passive 1000 (AP1000) pressurized water reactors (Units 3 and 4) on the site of the Vogtle Electric Generating Plant (VEGP) in Burke County, Georgia. The VEGP Site and existing facilities are owned and operated by GPC, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and the City of Dalton, Georgia. Southern is the licensee and operator of the existing VEGP Units 1 and 2, and has been authorized by the VEGP co-owners to apply for COLs to construct and operate two additional units (Units 3 and 4) at the VEGP Site.

On August 26, 2009, the NRC approved issuance of an early site permit (ESP) and a limited work authorization (LWA) for two additional nuclear units at the VEGP Site (NRC 2009) to Southern and the same four co-applicants. This approval was supported by information contained in NUREG-1872, *Final Environmental Impact Statement for an Early Site Permit (ESP) at the Vogtle Electric Generating Plant Site, Volumes* 1 and 2 and errata (NRC 2008a). The ESP resolved many safety and environmental issues and allowed Southern to "bank" the VEGP ESP Site for up to 20 years. The LWA authorized Southern to conduct certain limited construction activities at the site in accordance with Title 10 of the Code of Federal Regulations (CFR), Sections 50.10 and 52.24(c). As permitted by NRC regulations, the COL application references the VEGP ESP.

Southern's COL application addressed the impacts of constructing and operating two new nuclear units at the existing VEGP Site in Burke County, Georgia. The VEGP Site is approximately 42 km (26 mi) south of Augusta, Georgia. The proposed COL site is completely within the confines of the existing VEGP Site, with the new units to be constructed and operated adjacent to the existing Units 1 and 2 (Figure 1). In October 2009, as part of the COL application, Southern requested a second LWA that would authorize installation of reinforcing steel, sumps, drain lines, and other embedded items along with placement of concrete for the nuclear island foundation base slab.

Independent of the COL application and LWA request, Southern and GPC intend to construct and operate a new 500-kV transmission line to serve the proposed Units 3 and 4. The two new units would use some combination of the new and existing transmission lines. The exact route of the new transmission line has not been determined, but the new transmission line right-of-

way (ROW) would be routed northwest from the VEGP Site, passing west of Fort Gordon, a U.S.

Army facility west of Augusta, Georgia, and then north to the Thomson substation. The Thomson substation is located about 32 km (20 mi) west of Augusta, Georgia. The transmission line ROW would be approximately 46 m (150 ft) wide and approximately 97 km (60 mi) long (NRC 2008a). The new transmission line would require approximately 390 towers (NRC 2008a). Each tower would require foundation excavations. Transmission line siting in Georgia is regulated under Title 22 of the Georgia Code. Construction and operation of the potential transmission line is not authorized by the NRC and approval of that activity is thus not part of the NRC's determination on the COL application. However, that activity is considered in the environmental review in assessing potential impacts of the major Federal action of issuing the requested COLs. Using the Electric Power Research Institute-Georgia Transmission Corporation (EPRI-GTC) Transmission Line Siting Methodology (EPRI-GTC 2006), Southern and GPC (GPC 2007) identified a set of potential transmission routes within what they termed the Representative Delineated Corridor (RDC), as depicted in Figure 2. The RDC was used as the basis for environmental impact analysis. Although the precise route for the planned new transmission line has not yet been determined, it will be within the RDC.

As permitted by NRC regulations in 10 CFR Part 52, which contains NRC's reactor licensing regulations, the COL application references the VEGP ESP. In accordance with the applicable provisions of 10 CFR Part 51, which are the NRC regulations implementing the National Environmental Policy Act of 1969 (NEPA), NRC is required to prepare a supplemental environmental impact statement (SEIS) as part of its review of a COL application referencing an ESP. As required by 10 CFR 51.26, the NRC published the draft SEIS for public comment in the *Federal Register* (FR) on September 3, 2010.

During April, May, and June, 2010, Southern submitted requests for three ESP license amendments associated with the previously authorized LWA construction activities. These amendment requests sought authorization to use Category 1 and Category 2 backfill materials from additional onsite sources, including three new borrow areas, and to change the classification of engineered backfill over the side slopes of the excavations for Units 3 and 4 (Southern 2010a, b, c, d). NRC prepared environmental assessments (EA) and Findings of No Significant Impact (FONSI) for each license amendment request (NRC 2010a, b, c). These ESP license amendments were issued in May 2010 (NRC 2010d), June 2010 (NRC 2010e), and July 2010 (NRC 2010f). The ESP license amendments requesting authorization to use backfill materials from three new borrow areas resulted in changes to the construction footprint on the VEGP Site. The change in the site preparation footprint for additional borrow areas resulted in an additional 108 ha (267 ac) that was cleared and excavated for backfill material.

The SEIS, together with the ESP EIS (NRC 2008a), the ESP hearing proceedings, and the ESP license amendment EAs, provides the NRC staff's evaluation of the environmental effects of constructing and operating two new AP1000 reactors at the VEGP Site.

During the review of the ESP application, as part of the NRC's responsibilities under Section 7 of the Endangered Species Act (ESA), the NRC staff prepared a biological assessment (BA) documenting potential impacts on the Federally listed threatened or endangered species as a result of the site preparation (including construction of the onsite portion of the new 500-kV transmission line) and construction of Units 3 and 4 on the VEGP Site. The BA was submitted to U.S. Fish and Wildlife Service (FWS) on January 25, 2008 (NRC 2008b), and FWS concurred with the findings on September 19, 2008 (FWS 2008).

The NRC staff has concluded that, with respect to site preparation activities and construction of Units 3 and 4 on the VEGP Site (including construction of the onsite portion of the proposed transmission line), the COL action involves similar impacts to the same Federally listed species in the same geographic area as analyzed in the ESP; that no new species have been listed or proposed and no new critical habitat designated or proposed for the action area; and that, with respect to potential impacts to listed species from the activities previously analyzed, no relevant information has changed regarding the project since the earlier BA was submitted. Therefore, pursuant to 50 CFR 402.12(g), the ESA of 1973, as amended, the NRC staff proposes to incorporate the earlier BA by reference. Furthermore, NRC has prepared this BA to document potential impacts on Federally listed threatened or endangered terrestrial species resulting from operation of Units 3 and 4, including potential impacts anticipated from construction and operation of the proposed transmission line ROW. Operation of the transmission lines includes maintenance activities, such as herbicide applications, tree removal, and mowing.

In a letter dated January 7, 2010, NRC requested that the FWS Field Office in Brunswick, Georgia, provide information regarding Federally listed species and critical habitat that may have changed since the 2008 consultation (NRC 2010g). On February 12, 2010, FWS provided a response letter indicating listed species under FWS had been adequately addressed for limited site-preparation activities on the VEGP Site (FWS 2010a). On October 20, 2010, FWS provided an updated list of Federally listed threatened or endangered species that can be expected to occur in the project area (FWS 2010b). In addition to the federally listed species, FWS provided information on the bald eagle (*Haliaeetus leucocephalus*) and the gopher tortoise (*Gopherus polyphemus*) in the response letter.

The bald eagle was Federally delisted under the ESA in August 2007. In May 2007, National Bald Eagle Management Guidelines were published to assist in understanding protections afforded to and prohibitions related to the bald eagle under the Bald Eagle Act (FWS 2010b). There are bald eagle nests in Jefferson and McDuffie Counties in Georgia, and one known location of an active nest in McDuffie County in the vicinity of the proposed new transmission line (FWS 2010b). GPC stated that it would ensure the new transmission line ROW would not

come within 180 m (600 ft) of this known bald eagle nesting site (GPC 2007). Eagle nests on transmission/distribution structures or other electrical equipment have not been documented in Georgia (GPC 2006): nevertheless, one of GPC's procedures in its Avian Protection Program (APP) includes contacting the FWS to advise the agency of the situation and to obtain additional instructions or permits, if an eagle's nest is encountered on a transmission/distribution structure (GPC 2006). Potential impacts to the bald eagle related to construction and operation of proposed Units 3 and 4, including impacts from construction and operation of the proposed transmission line, are discussed in the ESP EIS (NRC 2008a).

The gopher tortoise is a Georgia state threatened species and is currently under review by the FWS to be listed as threatened (FWS 2010b). There are no known populations of the gopher tortoise on the VEGP Site or within the proposed transmission corridor (GDNR 2009; FWS 2010b). Southern submitted a draft Candidate Conservation Agreement with Assurances (CCAA) for the gopher tortoise at the VEGP Site. This CCAA is currently under review by FWS (SERPPAS 2010). The draft CCAA does not include the offsite portions of the proposed transmission line. In the October 20, 2010 letter to NRC, FWS recommended that tortoise surveys be included in surveys that are conducted where sandhills habitat exists. FWS stated that there are several areas within the proposed transmission line corridor that have sandhills habitat that may contain gopher tortoises (FWS 2010b). Potential impacts to the gopher tortoise related to construction and operation of the proposed Units 3 and 4, including impacts from construction and operation of the proposed transmission line, will be included in the final COL SEIS.

Pursuant to Section 7(c) of the ESA of 1973, as amended, NRC has prepared this BA, which examines the potential impacts of facility operation related to the proposed Units 3 and 4 at the VEGP Site on threatened or endangered species, including potential impacts from transmission line construction and operation activities. This BA evaluates the effects of the proposed action on four Federally listed threatened or endangered species identified by FWS in its October 20, 2010, letter that may occur on or in the vicinity of the VEGP Site and/or in habitats crossed by the proposed transmission line (Table 1). The consultation is between NRC and FWS.

Table 1. Federally Listed Species Potentially Occurring on and in the Vicinity of the VEGP Site and the Proposed Transmission Line Right-of-Way

Scientific Name	Common Name	Federal Status[a]
Vascular Plant		
Oxypolis canbyi	Canby's dropwort	E
Birds		
Mycteria americana	wood stork	E
Picoides borealis	red-cockaded woodpecker	E
Reptile		
Drymarchon couperi	Eastern Indigo Snake	T

a. Federal status rankings determined by the FWS under the Endangered Species Act: E = Endangered, T = Threatened.
Source: FWS 2010b

2.0 VEGP Site Description

The VEGP Site is located on the Savannah River shoreline approximately 24 km (15 mi) east-northeast of Waynesboro, Georgia, and 42 km (26 mi) southeast of Augusta, Georgia. The existing site consists of two Westinghouse pressurized water reactors, a turbine building, a switchyard, intake and discharge structures, and support buildings. Two generating units (Units 1 and 2) are currently operating at the site (Figure 1). The Allen B. Wilson Combustion Turbine Plant (Plant Wilson), a six-unit, oil-fueled combustion turbine facility built in 1974 and owned by GPC, and ancillary structures and systems related to Units 1 and 2 also are located onsite. The existing Units 1 and 2 and Plant Wilson would not be affected by this action.

The footprint for Units 3 and 4 is in a previously disturbed area adjacent to the existing VEGP Units 1 and 2 (Figure 1). The existing Units 1 and 2 and the proposed Units 3 and 4 would share certain support structures such as office buildings and water, wastewater, and waste-handling facilities; however, the new intake and discharge facilities for Units 3 and 4 would be separate from the intake and discharge facilities for Units 1 and 2. Each proposed Westinghouse AP1000 reactor would have a rated thermal power level of 3400 megawatts thermal MW(t) (NRC 2008a). For the circulating water cooling system for Units 3 and 4, Southern proposed natural-draft cooling towers, and for the service water system, mechanical-draft cooling towers.

The VEGP Site is approximately 1282.5 ha (3169 ac) in size and is located in the sandhills of the Upper Coastal Plain Region, approximately 48 km (30 mi) southeast of the Fall Line (Eco-Sciences 2007; NRC 2008a). The site has 12 soil types and several major habitat types, including ponds, pine plantations, native upland pines, and the bottomland hardwoods that are

found along stream drainages onsite and adjacent to the Savannah River (NRCS 2003; TRC 2006).

Directly across the Savannah River from the VEGP Site is the Savannah River Site, a U.S. Department of Energy (DOE) facility with restricted access (NRC 2008a). River swamp, bottomland hardwood, and upland pine-hardwood communities occur on the Savannah River Site within 10 km (6 mi) of the VEGP Site (NRC 2008a). The Savannah River Swamp comprises about 3800 ha (9400 ac) and borders the Savannah River on the southwestern edge of the Savannah River Site, adjacent to the VEGP Site (Wike et al. 2006).

2.1 Wildlife Habitat

The VEGP Site is characterized by low, gently rolling sandy hills. Scrub oaks, including turkey (*Quercus laevis*), post (*Q. stellata*), and willow oak (*Q. phellos*), and longleaf pine (*Pinus palustris*) occur in the upland wooded areas that were not previously cultivated. Red oak (*Q. rubra*), water oak (*Q. nigra*), and maple (*Acer* sp.) dominate the lowland hardwood areas. Bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) characterize the Savannah River floodplain.

The longleaf pine-scrub oak community is found on ridge tops as well as south and west slopes in undisturbed upland areas on the VEGP Site. Common canopy species in this habitat include longleaf pine, turkey oak, and bluejack oak (*Q. incana*). The north and east slopes in the undisturbed uplands support the more mesic oak-hickory community. The canopy in this community is mainly composed of white oak (*Q. alba*), white ash (*Fraxinus americana)*, mockernut hickory (*Carya alba*), and flowering dogwood (*Cornus florida)*. A few turkey oaks and a scattering of shortleaf pine (*P. echinata*) are also present (TRC 2006). A steep bluff separates the dry upland forest from the intermittently flooded bottomland along the Savannah River. Common canopy species include oak, mockernut hickory, tuliptree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), American elm (*Ulmus americana*), basswood (*Tilia americana*), and Florida maple (*A. barbatum*). The planted pine plantations on the VEGP Site are of various ages and differ in the stocking rates. The plantations vary from a nearly closed canopy with very little understory, to areas that resemble old fields with only scattered pine. Loblolly (*P. taeda*) and longleaf pines are the primary overstory species (TRC 2006). Pine plantations are managed through prescribed burning every 3 to 5 years, timber thinning after 20 years, and aesthetic cuts after thinning. Burning is limited to 25 to 30 percent of the upland and planted pine acreage each year (NRC 2008a).

The wetlands associated with the VEGP Site include those near the Savannah River, as well as those near ponds and streams located onsite. Principal water bodies onsite include Mallard Pond and two streams in the southern portion of the VEGP Site (Figure 1). Southern contracted with Eco-Sciences of Georgia (Eco-Sciences) to survey the VEGP Site in December 2006 to determine where jurisdictional waters of the United States occur. Approximately 69 ha (170 ac)

of potential jurisdictional wetlands were identified on the site during the Eco-Sciences survey (NRC 2008a). These include 48 wetlands, 6 perennial streams, 13 intermittent streams, and 3 ephemeral streams.

The proposed transmission line ROW is within the Piedmont and Coastal Plain Physiographic Regions of Georgia. The Piedmont is characterized by rolling hills and irregular plains. The soils are finely textured and can be highly erodible. The Coastal Plain is composed of mostly flat areas with some rolling hills with well-drained soils (GPC 2007). Using the Electric Power Research Institute-Georgia Transmission Corporation (EPRI-GTC) Transmission Line Siting Methodology (EPRI-GTC 2006), Southern and GPC identified a set of potential transmission routes within the RDC (Figure 2) (GPC 2007) that was used as the basis for environmental impact analysis. The RDC ranges from approximately 1.6 km (1 mi) to a little of 5 km (3 mi) in width and is approximately 80 km (50 mi) long. The actual routing of the 45m (150 ft) wide, up to about 97 km (60 mi) long transmission ROW would be within the RDC. The siting model takes into consideration important features, including residential and other developed areas, mining activities, wetlands and sensitive land uses, cultural resources, and endangered and other species of special interest. GPC conducted an aerial field verification of the RDC, and identified a narrowing of the modeled corridor to avoid wetlands and stream crossings and reduce the overall length and land area that potentially would be affected. The RDC depicts areas in which a transmission line should minimize adverse impact on people, places, and cultural resources; protect water resources, plants, and animals; maximize co-location of the new line; and balance these considerations to reduce the overall impact of the transmission line (GPC 2007).

In siting the new transmission line ROW, GPC would consult with the Georgia State Historic Preservation Officer, FWS, the Georgia Department of Natural Resources (GDNR), and the U.S. Army Corps of Engineers (Southern 2008). If wetlands are disturbed, construction would be conducted in accordance with necessary State and Federal permits to protect wetland areas (Southern 2008).

There are no U.S. Forest Service Wilderness Areas, Wild/Scenic Rivers, Wildlife Refuges, State Parks, or National Parks within the RDC (GPC 2007). The Savannah River and Brier Creek, a tributary of the Savannah River, are the primary waterways located in the RDC. The general wildlife habitats within the RDC include forested land, planted pine stands, open land, and open water. The exact habitat types within the new 500-kV transmission line ROW are not known at this time, but it is assumed they comprise similar habitats to those on the VEGP Site. GPC has estimated the total acreage for a 46-m (150-ft)-wide hypothetical representative ROW within the RDC to be 416 ha (1029 ac) (Southern 2007).

3.0 Proposed Federal Actions

The proposed Federal action is issuance of COLs, under the provisions of 10 CFR Part 52, for two AP1000 reactors at the VEGP Site, and an LWA for requested construction activities. The ESP EIS (NRC 2008a) disclosed the staff's analysis of the environmental impacts that could result from the construction and operation of these two new units. The draft COL SEIS (NRC 2010i) evaluated whether any new and potentially significant information has been identified that would alter the staff's conclusions regarding issues resolved in the ESP proceeding. In the draft ESP EIS and the COL SEIS, the NRC staff evaluated the impacts of construction and operation of two AP1000 units, with a total combined thermal power rating of 6800 MW(t). The proposed units would use a closed-cycle cooling system and require a single natural draft cooling tower for each unit.

4.0 Potential Environmental Impacts

This section provides information on the terrestrial impacts related to operation of the proposed Units 3 and 4 at the VEGP Site, including potential impacts from construction and operation of the proposed transmission line ROW. Construction and operation activities associated with the issuance of the COLs and LWA, including cumulative impacts, that could affect the Federally protected terrestrial species based on habitat affinities and life-history characteristics and the nature and spatial and temporal considerations of the activity are listed below:

- Construction
  - Transmission line ROW clearing and grading
  - Installation of new or upgraded transmission lines and towers
- Operation
  - Vegetation control in the transmission line ROW
  - Transmission line repairs or upgrades
  - Avian collisions with structures
  - Cooling tower operation.

4.1 Construction Impacts

The exact extent and types of wildlife habitats within the proposed new transmission line ROW are not known. Currently, Southern and GPC are evaluating the actual ROW alternatives for the transmission line within the RDC. The proposed transmission line ROW would be routed northwest from the VEGP Site, passing through Jefferson, McDuffie and Warren Counties. The ROW would pass west of Fort Gordon, and then continue north to the Thomson substation,

which is approximately 32 km (20 mi) west of Augusta, Georgia. It is anticipated that the transmission line would be about 46 m (150 ft) wide and 97 km (60 mi) long and would cover approximately 416 ha (1029 ac) (Southern 2007). A hypothetical transmission line ROW that represents what the GPC believes is a feasible route within the RDC was identified as part of a 2007 study (GPC 2007). Based on the GPC analysis, habitats within the ROW could include approximately 60 ha (148 ac) of forested habitat, 37 ha (91.5 ac) of forested wetlands, 133 ha (329 ac) of planted pine, 2.6 ha (6.4 ac) of open water, and 64 ha (158 ac) of open land (GPC 2007). Other land-use categories identified as potentially being impacted, such as mine/quarry, utility, transportation, and row crops, provide little value as wildlife habitat. Construction activities would avoid wetlands to the extent practicable. In the event that wetlands are encountered, construction would be conducted in accordance with the necessary permits obtained to protect wetland areas (GPC 2007).

A wide variety of wildlife common to Georgia is expected to occur within the transmission line ROW. The greatest extent of wildlife diversity is expected to occur within areas that support an interspersion of native upland, wetland, and aquatic habitats, and less diversity is expected in disturbed or developed lands. Lower-quality wildlife habitat is represented by areas cleared for utilities, roads, agricultural and residential development; and disturbed habitats such as pastureland, and open land.

Potential impacts on Federally listed threatened and endangered species from construction on the proposed transmission line ROW would include loss of habitat (temporary and permanent), presence of humans, heavy-equipment operation, traffic, noise, and avian collisions. The use of heavy equipment would likely displace or destroy wildlife that inhabit the areas that will be developed. Larger and more mobile animals would likely flee the area, while less mobile animals such as reptiles, amphibians, and small mammals would be at greater risk of death. Although the surrounding forest and wetland habitat would be available for displaced animals, the movement of wildlife into surrounding areas would increase competition for available space and could result in increased predation and decreased fecundity for certain species. These conditions could lead to a temporary localized reduction in population size for particular species. When construction activities are completed, species that can adapt to disturbed or developed areas may readily re-colonize portions of the site where suitable habitat remains, is replanted, or restored.

Forests or forested wetlands within the corridors would be converted to and maintained in an herbaceous or scrub-shrub condition. Species dependent on forest habitats or those that are sensitive to forest fragmentation could decline or be displaced, such as the red-cockaded woodpecker (*Picoides borealis*). Wildlife also would be affected by equipment noise and traffic, and birds could be injured if they collide with new transmission towers and conductors or the equipment used to install these components. However, increased noise levels associated with installation of the transmission lines would be of short duration and likely intermittent. Thus, the

impact on wildlife from noise is expected to be temporary and minor. Similarly, the potential for traffic-related wildlife mortality also is expected to be low because relatively small crews would spend only a limited time in each area as construction progresses over large geographic areas.

GPC would site the transmission line in accordance with Georgia Code Title 22, Section 22-3-161. GPC's procedures for implementing this code include consultation with FWS as well as an evaluation of impacts to special habitats (including wetlands) and threatened and endangered species. In addition, GPC would comply with all applicable laws, regulations, and permit requirements, and would use good engineering and construction practices (Southern 2008). GPC has developed an APP that includes guidelines for siting new transmission lines. When siting new transmission lines, substations, or other GPC facilities, available information on migratory and resident bird populations will be taken into account to ensure that the lines or facilities will have as little adverse impact as practicable on these bird species (GPC 2006).

In areas where agencies are concerned about the safety of protected birds, consideration of appropriate siting and placement will reduce the likelihood of collisions. When possible, areas with known bird concentrations will be avoided, and such vegetation or topographic characteristics that would naturally lead to shielding the birds from collision will be used. If this is not possible, installing visibility devices also may reduce the risk of collision. Examples of these devices are marker balls or other line visibility devices placed in varying configurations, depending on the line or locations. The effectiveness of these devices has been validated by Federal and state agencies in conjunction with Edison Electric Institute (GPC 2006).

When designing power transmission lines in high–bird-use areas or on Federal Lands, GPC construction standards for transmission, distribution, and substation equipment and facilities will reflect the most appropriate and practicable "raptor-safe" stands for new construction consistent with available information. The objective is to provide 1.5 m (60 in.) between energized conductors and grounded hardware, or to insulate energized hardware if such spacing is not possible. The design standards are consistent with raptor-safe specifications recommended by Federal wildlife agencies (GPC 2006).

4.2 Operational Impacts

Potential impacts on terrestrial habitats and Federally listed species related to the operation of the proposed Units 3 and 4 may result from cooling-system operation and operation of the transmission system. The proposed cooling system for Units 3 and 4 is a closed-cycle system employing natural draft cooling towers. The heat would be transferred to the atmosphere in the form of water vapor and drift. Vapor plumes and drift may affect wildlife habitat. In addition, bird collisions and noise-related impacts are possible with natural draft cooling towers.

Electric transmission systems potentially can affect terrestrial habitat and Federally listed species through ROW maintenance, bird collisions with transmission lines, and electromagnetic

fields (EMFs). Southern estimates that one additional 500-kV transmission line would be necessary to distribute the additional power generated by Units 3 and 4 (Southern 2008). Maintenance activities on the new transmission line ROW would be the responsibility of GPC (Southern 2008). Each of these topics is discussed in the following paragraphs.

4.2.1 Impacts on Vegetation

Impacts on Federally listed species may result from cooling tower drift, icing, fogging, or increased humidity. Through the process of evaporation, the total dissolved solids (TDS) concentration in the circulating water system (CWS) increases. A small percentage of the water in the CWS is released into the atmosphere as fine droplets containing elevated levels of TDS that can be deposited on nearby vegetation. Operation of the CWS would be based on four-cycles of concentration, which means the TDS in the make-up water would be concentrated approximately four times before being released.

Depending on the make-up source water body, the TDS concentration in the drift can contain high levels of salts that, under certain conditions and for certain species, can be damaging. Vegetation stress can be caused from drift with high levels of deposited TDS, either directly by deposition onto foliage or indirectly from the accumulation in the soils. The maximum estimated cumulative deposition rate is less than 10.0 kg/ha/mo (9 lbs/ac/mo) at 490 m (1600 ft) north of the cooling towers (NRC 2008a). The location of the maximum deposition rate is in the vicinity of the proposed switchyard for Units 3 and 4, which is more than 1.6 km (1 mi) from the northern site boundary. General guidelines for predicting effects of drift deposition on plants suggest that many species have thresholds for visible leaf damage in the range of 10 to 20 kg/ha/mo (9 to 18 lbs/ac/mo) on leaves during the growing season (NRC 1996). The maximum deposition for the proposed Units 3 and 4 is below the level that could cause visible leaf damage in many common species.

Southern expects the longest vapor plume associated with the new towers would be 10 km (6 mi), but would only occur 3.9 percent of the time (NRC 2008a). The longest plume length would occur in the winter months and the shortest in the summer months. Ground-level fogging and icing do not occur currently at the cooling towers for the existing Units 1 and 2 and are not expected to occur at the new cooling towers associated with the proposed Units 3 and 4.

4.2.2 Bird Collisions with Cooling Towers

The natural draft cooling towers associated with the proposed Units 3 and 4 would be 180 m (600 ft) high (Southern 2008). The VEGP Site is located adjacent to the Savannah River, and although migratory birds pass through the vicinity of the VEGP Site, it is not located on a major American flyway. No formal bird collision surveys have been conducted at the VEGP Site. However, the Environmental Protection Plan (EPP) for VEGP Units 1 and 2 stipulates that any excessive bird-impact events be reported to NRC within 24 hours (Southern 1989). No

excessive bird-impact events have been reported onsite. The conclusion presented in the *Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants* is that bird collisions with natural draft cooling towers are of small significance at all operating nuclear plants, including those with multiple cooling towers (NRC 1996).

4.2.3 Noise

The effects of noise on most wildlife species are not well understood partly because noise disturbance cannot be generalized across species or genera, and there may be response differences among individuals or groups of individuals of the same species (Larkin 1996; AMEC Americas Limited 2005). An animal's response to noise can depend on a variety of factors including the noise level, frequency distribution, duration, background noise, time of year, animal activity, age, and sex (AMEC Americas Limited 2005). The potential effects of noise on wildlife include acute or chronic physiological damage to the auditory system; increased energy expenditure; physical injury incurred during panic responses; and interference with normal activities, such as feeding; and impaired communications among individuals and groups (AMEC Americas Limited 2005). The impacts of these effects might include habitat loss through avoidance, reduced reproductive success, and mortality. Long-term noise thresholds have not been established for wildlife; evidence for habituation is limited; long-term effects are generally unknown; and how observed behavioral and physiological response might be manifested ecologically and demographically are poorly understood (AMEC Americas Limited 2005).

The noise levels from natural-draft cooling tower operation and diesel generators are estimated to be approximately 55 decibels (dBA) SPL (sound pressure level) at 300 m (1000 ft) (NRC 2008a). Researchers have found that dBA measurements contain frequencies that are out of the hearing bandwidth of birds and some mammals and are not inclusive of the total hearing range for other animals. Consequently, the dBA weighting system does not accurately characterize sound exposure or hearing response for wildlife (Dooling 2002; AMEC Americas Limited 2005). Natural-draft cooling towers emit broadband noise that is spectrally very similar to environmental (wind) noise. In the case of relatively flat spectra, the spectrum level of cooling tower and diesel generator noise, given the estimated dBA SPL, would be approximately 15 dB SPL. Cooling tower noise does not change appreciably with time (i.e., it is at steady state), and the estimated noise level at 300 m (984 ft) is well below the 80 to 85-dBA SPL threshold at which birds and small mammals are startled or frightened (Golden et al. 1980). Using the startle criterion reported by Golden et al. (1980), the noise level expected to be generated by cooling tower and diesel generator operations would only approach startle levels in the immediate vicinity (within 5 m [16.4 ft]) for noise with approximately 60 dBA SPL at 300 m [984 ft]) of the tower or generator. In addition, birds and other animals show habituation to acoustic deterrents (complex sounds designed with spectral components to be within the hearing band of the target animal). Thus, noise generated by natural draft cooling towers would be unlikely to disturb

transient wildlife beyond the VEGP Site perimeter fence, which is over 300 m (984 ft) from the towers. Seasonal or long-term resident wildlife could be expected to habituate to cooling tower and generator noise.

Impacts to species as a result of their response to noise (i.e., ranging from startle to avoidance) within the distance of the VEGP perimeter fence, if any, would be negligible because of the large expanses of open habitat available into which mobile wildlife species could move if disturbed. In addition, the new towers would be near the existing VEGP Unit 1 and 2 facilities, where wildlife have likely acclimated to typical operating facility noise levels. Consequently, the potential for startle and avoidance responses by wildlife posed by the incremental noise resulting from the operation of the two new natural-draft cooling towers for the proposed Units 3 and 4 and other facilities at the VEGP Site would be minimal.

4.2.4 Transmission Line Right-of-Way Management (Cutting and Herbicide Application)

Southern stated that the same vegetation management practices currently employed by GPC for the existing Units 1 and 2 transmission line ROWs (such as hand-cutting on an as-needed basis) would be applied to the proposed new 500-kV transmission line ROW (Southern 2008).

GPC performs aerial inspections of transmission line ROWs five times each year to support routine maintenance activities. These surveys are normally conducted using a helicopter. The noise may startle and temporarily displace wildlife. However, these impacts are of short durations and occur in very localized areas. Woody growth is cleared from transmission line ROWs on a 5-year maintenance cycle. This cycle may vary based on public concerns, local ordinances, line maintenance, or environmental considerations. Vegetation management includes use of herbicides, hand tools, and light equipment. Hand cutting or herbicides are used in areas that cannot be mowed either because it is impractical or because of environmental concerns. Herbicide use is conducted in accordance with manufacturer specifications and by licensed applicators. Any spills of fuel and/or lubricants that occur as a result of equipment use in the transmission line ROWs are immediately cleaned up and reported. GPC cooperates with GDNR to manage sites considered environmentally sensitive within the transmission line ROWs (Southern 2008). GPC has developed recommendations for maintenance practices for the protection of pitcher plants, caves, nests, rookeries, and habitat such as rock outcrops that occur within GPC transmission line ROWs (Southern 2007).

GPC also has developed an APP that includes recommendations on procedures for GPC personnel to follow if a Federally Endangered Species nest is encountered within the transmission line ROW. The GPC Environmental Field Service office will provide GPC staff with FWS-compliant guidelines and/or recommendations for management of these nests (GPC 2006).

Avian mortalities resulting from collisions with conductors, guy wires, and overhead ground (static) wires have not been specifically documented on GPC system components, but are known to occur on other utilities' systems and communication systems. GPC has installed spiral vibration dampers to increase visibility on some of the transmission lines, especially along the coastal areas where the wood stork is known to nest and forage (GPC 2006). Section 4.1 of the EPP for the existing Units 1 and 2 stipulates that any excessive bird-impact events be reported to NRC within 24 hours (Southern 1989). Transmission line and ROW maintenance personnel have not reported bird deaths attributed to collisions or contact with Units 1 and 2 transmission lines (Southern 2008).

EPRI (1993) notes that factors appearing to influence the rate of avian impacts with structures are diverse and related to bird behavior, the structure attributes, and weather. Structure height, location, configuration, and lighting also appear to play a role in avian mortality. Weather such as low cloud ceilings, advancing fronts, and fog also contribute to this phenomenon. Larger birds such as waterfowl are more prone to collide with transmission lines, especially when they cross wetland areas used by large concentrations of birds (EPRI 1993).

EPRI (1993) documents electrocution of large birds, particularly eagles, as a source of mortality that could be significant to listed species. However, electrocutions do not normally occur on lines whose voltages are greater than 69 kV because the distance between lines is too great to be spanned by birds (EPRI 1993). The voltage of the proposed new transmission line is greater than 69 kV; therefore, bald eagles and other large bird populations should not be noticeably affected by transmission-line electrocutions. GPC has implemented an APP to monitor and address the impacts of transmission lines on birds. Any impact events would be coordinated with GPC's Environmental Field Services and, if necessary, coordination also would involve FWS (GPC 2006).

4.2.5 Impact of EMFs on Flora and Fauna

Electromagnetic fields (EMFs) are unlike other agents that have an adverse impact (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be demonstrated and long-term effects, if they exist, are subtle (NRC 1996). As discussed in the GEIS (NRC 1996), a careful review of biological and physical studies of EMFs did not reveal consistent evidence linking harmful effects with field exposures. Thus, the conclusion presented in the GEIS (NRC 1996) was that the impacts of EMFs on terrestrial flora and fauna were of small significance at operating nuclear power plants, including transmission systems with variable numbers of transmission lines. Since 1997, over a dozen studies have been published that looked at cancer in animals that were exposed to EMFs for all or most of their lives (Moulder 2003). These studies have found no evidence that EMFs cause any specific types of cancer in rats or mice (Moulder 2003).

5.0 Evaluation of Impacts on Threatened or Endangered Species

This section describes Federally listed threatened or endangered terrestrial species and designated and proposed critical habitat that may occur on or in the vicinity of the VEGP Site and/or in habitats that would be crossed by the proposed transmission line ROW (Table 1). This list is composed of the Federally listed species identified in the October 20, 2010, FWS letter to NRC (FWS 2010b).

Surveys for species of interest, including those Federally listed species classified as threatened or endangered, proposed for listing, or candidate species were performed in spring, summer, and fall 2005 at the VEGP Site by Third Rock Consultants, LLC (TRC). The surveys were conducted on 675 ha (1669 ac) of the 1283 ha (3169 ac) that comprise the VEGP Site (TRC 2006). The American alligator (*Alligator mississippiensis*) was the only Federally listed species observed on the VEGP Site during the 2005 surveys. One adult alligator was observed in Mallard Pond during the summer survey (TRC 2006). It is Federally listed as threatened because it is similar in appearance to the endangered American crocodile (*Crocodylus acutus*). It is not included in this assessment based on input from FWS in its October 20, 2010 letter to NRC (FWS 2010b). Furthermore, based on the contents of the October 2010 letter, three other species that were addressed in the ESP BA (the smooth coneflower, relict trillium, and flatwoods salamander) were not further considered in this assessment because they were not identified as occurring in the project area or the proposed transmission line ROW.

The RDC is based on the EPRI-GTC siting model, developed in Georgia, to identify a reasonable corridor for locating the proposed 500 kV transmission line. The siting model takes into consideration important features, including wetlands and sensitive land uses and endangered and other species of special interest. The RDC represents a narrowing of the modeled corridor to avoid wetlands and stream crossings and reduce the overall length and land area potentially affected (GPC 2007). GPC would site the transmission line in accordance with Georgia Code Title 22, Section 22-3-161, and has developed an APP that includes provisions for siting new transmission lines (GPC 2006). GPC's procedures for implementing this code include consultation with FWS as well as an evaluation of impacts to special habitats (including wetlands) and threatened and endangered species (Southern 2008). At this time, on-the-ground surveys for Federally listed species have not been conducted in the RDC.

Four Federally listed terrestrial plant and animal species may occur on or in the vicinity of the VEGP Site and/or in the vicinity of the RDC (FWS 2010b). These four species − the red cockaded woodpecker (*Picoides borealis*), the wood stork (*Mycteria americana*), Canby's dropwort (*Oxypolis canbyi*), and the Eastern indigo snake (*Drymarchon couperi*) – are discussed below. No designated or proposed critical habitat for terrestrial species occurs on or in the general area of the site or the RDC.

5.1 Red-Cockaded Woodpecker – Endangered

The red-cockaded woodpecker (*Picoides borealis*), was listed by the FWS as endangered in 1970 (35 FR 16047). The red-cockaded woodpecker's historic range extended from north Florida to New Jersey and Maryland, as far west as Texas and Oklahoma, and inland to Missouri, Kentucky, and Tennessee. This species has been extirpated in New Jersey, Maryland, Tennessee, Missouri, and Kentucky (FWS 2007a), and currently, it is estimated that about 6000 family groups of red-cockaded woodpeckers, or 15,000 birds, remain from Florida north to Virginia and west to southeast Oklahoma and eastern Texas. Critical habitat has not been established for red-cockaded woodpeckers (FWS 2007b). In 1998, there were 665 family groups of red-cockaded woodpeckers in Georgia (GDNR 1999).

The red-cockaded woodpecker is endemic to open, mature, and old growth pine ecosystems in the southeastern United States. Red-cockaded woodpeckers require open pine woodlands and savannahs with large old pines for nesting and roosting habitat for family groups (clusters). Large old pines are required as cavity trees because the cavities are excavated completely within inactive heartwood and the higher incidence of heartwood decay in older trees greatly facilitates excavation. Cavity trees must be in open stands with little or no hardwood midstory and few or no overstory hardwoods. Suitable foraging habitat consists of mature pines with an open canopy, low densities of small pines, little or no hardwood or pine midstory, few or no overstory hardwoods, and abundant native bunchgrass and forb groundcovers (FWS 2003).

Red-cockaded woodpeckers are a cooperatively breeding species, living in family groups that typically consist of a breeding pair with or without one or two male helpers. In red-cockaded woodpeckers (and other cooperative breeders), a large pool of helpers is available to replace breeders when they die. Helpers do not disperse very far and typically occupy vacancies on their natal territory or a neighboring one (FWS 2003). A typical territory for an active group ranges from approximately 51 to 80 ha (125 to 200 ac), but can be as large as 240 ha (600 ac). The size of the particular territory is related to both habitat quality and population density (FWS 2007a). Dispersal is primarily undertaken by young birds; mate loss and an apparent avoidance of inbreeding sometimes cause adults to disperse, and adults may also occasionally move to neighboring territories for unknown reasons (Walters et al. 1988). In a North Carolina study, females dispersed a maximum of 31.4 km (19.5 mi) and males a maximum of 21.1 km (13.1 mi) (Walters et al. 1988).

In June 2007, Southern enrolled approximately 380 ha (940 ac) of the VEGP Site in the GDNR Safe-Harbor Program for red-cockaded woodpeckers (Southern 2010c, e). Safe-Harbor Agreements are arrangements that encourage voluntary management for red-cockaded woodpeckers while protecting the participating landowners and their rights for development in the event these woodpeckers become established on the private property. Landowners entering into safe-harbor agreements must establish a baseline number of individuals that would be maintained in the event that they are observed. Currently, Southern has no baseline

responsibilities under the red-cockaded woodpecker safe-harbor agreement because there are no active clusters or nest trees onsite, and there are no red-cockaded woodpecker clusters on neighboring lands within foraging distance (Southern 2010c, e; NRC 2010h).

Surveys at the VEGP Site conducted in February 2006 found no occurrence of red-cockaded woodpeckers onsite (NRC 2008a). There are no recorded occurrences of the red-cockaded woodpecker in Burke County, Georgia (GDNR 2007, GDNR 2009), and no active colonies exist within 16 km (10 mi) of the VEGP Site in South Carolina (SCDNR 2007; SCDNR 2009; Wike et al. 2006). There are no known occurrences of the red-cockaded woodpecker in the proposed RDC (GDNR 2007; GDNR 2009). However, red-cockaded woodpeckers are listed as having the potential to occur in the project area (FWS 2010b). The red-cockaded woodpecker has been recorded on Fort Gordon (Mitchell 1999), which is located in Richmond County adjacent to the RDC. In 1998, there were two active groups on Fort Gordon representing less than 1 percent of the total number of groups in Georgia. At this time, surveys for red-cockaded woodpeckers have not been conducted in the RDC, and it is not known if suitable nesting or foraging habitats exist in the vicinity of the proposed 500-kV transmission line ROW.

Red-cockaded woodpeckers are found mainly in large stands of old longleaf pine, and this type of habitat would not be disturbed during operation of Units 3 and 4. Based on the distance to the closest known active colony, and the fact that red-cockaded woodpeckers have not been recorded on the VEGP Site or in the general vicinity of the site, it is unlikely that red-cockaded woodpeckers would be affected during operational activities onsite.

Clearing activities (e.g., tree removal, noise, increased habitat fragmentation, etc.) in the transmission line ROW have the potential to affect the red-cockaded woodpecker and its habitat. Because the final transmission line ROW would be narrow (46-m [150-ft] wide), the actual extent of clearing would be limited, thereby minimizing the potential for impact on redcockaded woodpeckers. However, increased habitat fragmentation and/or removal of cavity trees could negatively impact the red-cockaded woodpecker. GPC would site the transmission line ROW in accordance with Georgia Code Title 22, Section 22-3-161. GPC's procedures for implementing this code include consultation with FWS. GPC also has developed an APP that includes guidelines for siting new transmission lines. Available information on resident bird populations will be taken into account to ensure that the lines will have as little adverse impact as practicable on bird populations (GPC 2006).

Potential operational impacts associated with the transmission line ROW maintenance include mowing close enough to an active colony to disturb the nesting effort and removing trees during side clearing or building access roads. GPC has implemented procedures that recommend identification of all active colony areas within 3.2 km (2 mi) of a transmission line ROW and to identify active "hot-spots" within 229 m (750 ft) of a ROW. GPC recommends maintenance activities around "hot-spots" be conducted during non-breeding periods (Southern 2007). Avian mortalities resulting from collisions with conductors, guy wires, and overhead ground (static)

wires have not been specifically documented on the GPC system components. However, electrocution of birds is unlikely on lines with voltages greater than 69 kV because the distance between lines is too great to be spanned by birds (EPRI 1993). Therefore, it is unlikely that operational impacts would adversely affect the red-cockaded woodpecker.

In summary, based on the distance to the closest known active colony, and the fact that red-cockaded woodpeckers have not been recorded on the VEGP Site, it is unlikely that red-cockaded woodpeckers are foraging on the VEGP Site, and there is no evidence of nesting onsite. It is unlikely that red-cockaded woodpeckers would be encountered during operational activities onsite with the exception of possible transient individuals. There are no known occurrences of red-cockaded woodpeckers within the RDC; however, on-the-ground surveys have not been conducted at this time. If nest trees are removed during clearing for the proposed transmission line, red-cockaded woodpeckers could be affected. However, as previously noted, there are no known nest locations within the RDC. GPC has procedures to protect red-cockaded woodpeckers encountered during maintenance activities, and electrocution of birds is unlikely. Therefore, operation of the transmission system is not likely to adversely affect the red-cockaded woodpecker.

Based on the available information, the NRC staff has determined that operation of the proposed Units 3 and 4 and construction and operation of the proposed transmission system may affect, but are not likely to adversely affect, the red-cockaded woodpecker.

5.2 Wood Stork – Endangered

Breeding populations of the wood stork (*Mycteria americana*), which are Federally listed as endangered, currently occur or have recently occurred only in Florida, Georgia, South Carolina, and North Carolina (FWS 2007c). From 1975 to 1984, Georgia averaged three colonies and had an average total of 210 nesting pairs. Beginning in 1992, surveys in Georgia were expanded, and 1091 breeding pairs were documented at nine colonies. In 2005, 1817 breeding pairs were documented at 19 colonies. In 2006, there were 1928 breeding pairs at 21 colonies. Wood storks have nested at 43 different locations in the Georgia coastal plain, and the number of colonies averaged 14 during the years from 1997 to 2007 (FWS 2007c). No critical habitat has been designated for this species (FWS 2007d).

The wood stork is a highly colonial species, usually nesting and feeding in flocks. Its habitat includes freshwater and brackish wetlands, and it normally nests in bald cypress or red mangrove (*Rhizophora mangle*) swamps. At freshwater sites, nests are often constructed in bald cypress and swamp tupelo (*Nyssa biflora*). Wood storks in Georgia and South Carolina lay eggs from March to late May, with fledging occurring in July and August (FWS 1997).

Wood storks have a unique feeding technique (tacto-location) and typically require higher prey concentrations than other birds. They tend to rely on depressions in marshes or swamps where

prey can become concentrated during low-water periods (FWS 1997). A study from a wood stork colony in east-central Georgia found the diet was mostly composed of fish, including sunfishes (*Lepomis* spp.), bowfin (*Amia calva*), redfin pickerel (*Esox americanus americanus*), and lake chubsuckers (*Erimyzon* spp.) (FWS 1997).

Although forage areas may be 60 to 70 km (37 to 43 mi) from the colony, 85 percent are within 19 km (12 mi) (Coulter and Bryan 1993). Wood storks in east-central Georgia forage in a wide variety of wetland habitats, including hardwood and cypress swamps, ponds, marshes, drainage ditches, and flooded logging roads. Typical wood stork foraging sites have reduced quantities of both submerged and emergent macrophytes. The water in the foraging areas is either still or very slowly moving, and the depth is normally between 5 and 41 cm (2 and 16 in.). It has been suggested storks may have difficultly feeding in water with a depth more than 50 cm (20 in.) (Coulter and Bryan 1993).

Differences among seasons, rainfall, and surface-water patterns often cause storks to change where and when certain habitats are used for nesting, feeding, or roosting. These hydrological changes may cause storks to shift the timing or intensity of feeding at a local wetland, or cause entire regional populations of birds to make large geographic shifts between one year and the next. Successful colonies are those that are in regions where birds have options to feed under a variety of rainfall and surface-water conditions. Maintaining a wide range of feeding site options requires that many different types of wetlands, both large and small, and relatively long and short annual hydro-periods be available for foraging (FWS 1997).

Wood storks have the potential to occur in the project area (FWS 2010b). However, no wood storks were identified in the VEGP threatened and endangered species surveys completed in 2005, and there are no known records of wood storks occurring on the VEGP Site or within the RDC (NRC 2008a; TRC 2006; GDNR 2007; GDNR 2009). The closest known wood stork colonies to the VEGP Site are located in Jenkins and Screvin Counties, Georgia, which are south of the project area. The Birdsville colony is located at Big Dukes Pond, a 570-ha (1400-ac) cypress swamp, which is 12.6 km (7.8 mi) northwest of Millen in Jenkins County, Georgia. The VEGP Site is approximately 45 km (28 mi) from the Birdsville colony. The Chew Mill Pond colony in Jenkins County is approximately 6 km (3.7 mi) southwest of the Birdsville colony. Chew Mill Pond has a history of being a wood stork foraging site and a wading bird rookery. Researchers consider it to be an overflow or satellite colony of the Birdsville colony (Wike et al. 2006). The Jacobsons Landing colony in Screven County is approximately 43 km (27 mi) southeast of the VEGP Site. In 1996, it contained an estimated 40 wood stork nests. The distance from the VEGP Site to these colonies is within the maximum radius that wood storks travel during daily feeding flights (i.e., 60 to 70 km [37 to 43 mi]) (Coulter and Bryan 1993). Foraging wood storks have been recorded throughout Burke County, Georgia (Coulter and Bryan 1993; Wike et al. 2006), and in the Savannah River Swamp on DOE's Savannah River Site in South Carolina, which is adjacent to the VEGP Site (Wike et al. 2006).

Wood storks were reported in the vicinity of the Savannah River Site before the site was established in 1952, and before the discovery of the Birdsville colony. Storks have been followed from the Birdsville colony to the Savannah River Site. However, data from the aerial wood stork surveys of the Savannah River Swamp and the studies at the Birdsville colony suggest that the Savannah River Swamp probably is not used extensively during the breeding or pre-fledging phases of the Birdsville colony. Most of the observations of storks on the Savannah River Site occur during the late-nestling or the post-fledging period, which occurs between June and September. Some of the birds observed foraging in the Savannah River Swamp may be storks from farther south, either non-breeders or birds that already have finished breeding for the year (Wike et al. 2006).

Foraging habitats for wood storks exist on the VEGP Site and in the RDC, and wood storks have been seen within 3.2 km (2 mi) of the site in the Savannah River Swamp and on Fort Gordon, which is adjacent to a portion of the RDC. In the October 20, 2010, letter from FWS to NRC, FWS noted that there are no documented occurrences of wood stork rookeries in the project area; however, FWS stated that foraging wood storks may occur in the project streams and wetlands, and their locations should be noted (FWS 2010b). Foraging from June to September on the VEGP Site and on the RDC appears possible in wetland areas along stream drainages, ponds, drainage ditches. However, there are no records of wood stork colonies in the RDC or on the VEGP Site or within 32 km (20 mi) of the site and the proposed transmission line. This species does not likely nest in the RDC or on the VEGP Site. The wood stork is highly mobile and impacts associated with foraging during operation on the VEGP Site and construction and operation activities within the proposed transmission line ROW would be negligible.

GPC maintenance recommendations include identifying all active nesting wood stork colony rookeries that are within 1.6 km (1 mi) of a transmission line ROW. In areas within 230 m (750 ft) of an active rookery, GPC recommends mowing during the non-nesting season (Southern 2007). Therefore, activities related to the maintenance of the transmission line ROW are not expected to adversely affect the wood stork.

Based on the available information, the NRC staff has determined that operation of the proposed Units 3 and 4 and construction and operation of the proposed transmission system may affect, but are not likely to adversely affect, the wood stork.

5.3 Canby's Dropwort – Endangered

Canby's dropwort (*Oxypolis canbyi*) was listed as endangered by the FWS in 1986 (51 FR 6690). This species is native to the Coastal Plain from Delaware (historical only), Maryland, North Carolina, South Carolina, and Georgia. Historically, this plant was found in Burke, Dooly, Lee, and Sumter Counties in Georgia. There is no critical habitat designated for this species (FWS 1990).

Canby's dropwort has been found in a variety of habitats, including ponds dominated by pond cypress (*Taxodium ascendens*), grass-sedge-dominated Carolina bays, wet-pine savannahs, shallow-pineland ponds, and cypress-pine swamps or sloughs. The largest and most vigorous populations occur in open bays or ponds, which are wet throughout most of the year and have little or no canopy cover. Sites occupied by this species generally have infrequent and shallow inundations (5 to 30 cm [2 to 12 in.]). The species water requirements are narrow, with too little or too much water being detrimental (FWS 1990). Suitable habitat is normally on a sandy loam or loam soil underlain by a clay layer, which along with the slight gradient of the areas results in the retention of water.

Canby's dropwort has the potential to occur in the project area (FWS 2010b). However, Canby's dropwort was not found on the VEGP Site during the 2005 threatened and endangered species surveys, and there are no historical records of it occurring onsite (NRC 2008a, TRC 2006). There are two historical records of occurrence in Burke County around Waynesboro, Georgia (51 FR 6690), and these populations are currently thought to be extirpated (FWS 1990). There are no recorded occurrences within 16 km (10 mi) of the VEGP Site (GDNR 2007, GDNR 2009). Known soil types that support populations of Canby's dropwort are Rembert loam, Portsmouth loam, McColl loam, Grady loam, Coxville fine sandy loam, and Rains sandy loam. These soil types are similar in that they have a medium-to-high organic matter content, a high water table, and are deep, poorly drained, and acidic (FWS 1990). None of these soil types occur on the VEGP Site. Soil types found on the site include soils in the Chastain-Tawcaw association; Lucy, Osier, and Bibb soils; the Tawcaw-Shellbluff association; and Fuquay, Bonifay, and Troup series soils (NRCS 2003). It is unlikely that the VEGP Site contains suitable habitat for Canby's dropwort. Because of the lack of suitable habitat, it is unlikely there would be adverse impacts during operational activities at the VEGP Site.

There are no known occurrences of Canby's dropwort within the RDC. The nearest known occurrence is about 5.6 km (3.5 mi) from the RDC in Burke County (GDNR 2007). Soils known to support Canby's dropwort occur in the RDC (USGS 2001). These soils are associated with pond or wetland areas. GPC has committed to avoiding wetlands to the extent practicable during construction. In the event that wetlands are encountered, construction would be conducted in accordance with the necessary permits to protect wetland areas (GPC 2007). Therefore, it is unlikely that Canby's dropwort will be adversely affected during construction and operation activities along the transmission line ROW. GPC has implemented transmission line ROW maintenance procedures that include hand cutting in areas, such as wetlands, that have special environmental concerns (Southern 2008). In the October 20, 2010, letter from FWS to NRC, FWS noted that there are no documented occurrences of Canby's dropwort in the direct project area; however, FWS recommends that Canby's dropwort should be surveyed for, if habitat is encountered (FWS 2010b).

Based on the available information, the NRC staff has determined that operation of the proposed Units 3 and 4 and construction and operation of the proposed transmission system may affect, but are not likely to adversely affect, Canby's dropwort.

5.4 Eastern Indigo Snake – Threatened

The eastern indigo snake (*Drymarchon couperi*) was Federally listed as threatened by FWS in 1978 (FWS 1978). Historically, the eastern indigo snake occurred through Florida and in the coastal plain of Georgia, Alabama, and Mississippi (FWS 2006). Most, if not all, of the remaining viable populations of the eastern indigo snake occur in Georgia and Florida. Diemer and Speak (1983) conducted a 2-year study to survey the distribution of the eastern indigo snake and to characterize and delineate its habitat in Georgia. Results from this study indicated that the stronghold for the species was in a contiguous block of approximately 41 southeastern and south-central Georgia counties. The status and distribution in Georgia was recently reviewed by Stevenson (2006). He determined that populations of eastern indigo snakes still remain widespread in Georgia with recent records from 25 of the original 41 counties identified in the study by Deimer and Speak (1983). There are no historic or recent records for the upper Coastal Plain or Fall Line sandhill region of Georgia, including Burke, McDuffie, Jefferson, and Warren Counties (FWS 2006; Deimer and Speake 1983; Stevenson 2006). In its October 20, 2010, letter to NRC, FWS noted that there are no documented occurrences of the indigo snake in the area; however, FWS recommends that any pedestrian surveys of sandhill habitats, especially those with gopher tortoise burrows, should include cursory indigo snake surveys (FWS 2010b).

The eastern indigo snake occupies a broad range of habitats, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, edges of freshwater marshes, agricultural fields, and human altered habitats (FWS 1982). In the northern parts of its range, including southeastern Georgia, eastern indigo snakes are tied to the use of gopher tortoise burrows and longleaf pine habitat (FWS 2006). The gopher tortoise burrows are used by the eastern indigo snakes not only to protect against cold in the winter and heat in the summer, but also for foraging, nesting, mating, and shelter prior to shedding (FWS 2006). Habitat use often varies seasonally between upland and wetland areas in Georgia (FWS 2006). Movement between habitat types may relate to the needs for thermal refugia, differences in habitat use by the juveniles and adults, or seasonal differences in availability of food resources. For these reasons, it is particularly vulnerable to habitat fragmentation (FWS 2006).

The eastern indigo snake is not documented in Burke County or any of the counties crossed by the proposed transmission line ROW. Suitable habitat may occur in the RDC, and gopher tortoise burrows are in the vicinity. However, the project area is outside the historic and current range of the eastern indigo snake.

Based on the available information, the NRC staff has determined that operation of the proposed Units 3 and 4 and construction and operation of the proposed transmission system may affect, but are not likely to adversely affect, the eastern indigo snake.

6.0 Cumulative Effects

Construction and operation of two new nuclear units at the VEGP Site were evaluated to determine the magnitude of their contribution to regional cumulative adverse impacts on terrestrial ecological resources. An assessment of potential impacts caused by plant construction was made for important terrestrial species (animal and plant) and habitats (as defined in the publication *Standard Review Plans for Environmental Reviews for Nuclear Power Plants* [NRC 2000]) by evaluating the impact of construction in light of other past, present, and future actions in the region. An assessment of potential impacts caused by plant operation was made for resource attributes normally affected by cooling tower operation, transmission line operation, and ROW maintenance. For this analysis, the geographic region encompassing past, present, and foreseeable future actions is the area immediately surrounding the VEGP Site, including adjoining sections of the Savannah River bottomland. GPC completed a transmission line study in 2007 to identify potential ROWs for the proposed 500-kV transmission line (GPC 2007). For the analysis of cumulative impacts related to the addition of the transmission line and its ROW, the geographic region encompassing past, present, and foreseeable future actions is the original study area identified by the GPC (GPC 2007).

6.1 VEGP Site

Approximately 353 ha (873 ac) of land would be disturbed by construction of the proposed Units 3 and 4 (NRC 2010i), including hardwood forest, planted pine plantations, open fields, and previously disturbed industrial areas. An estimated 3.7 ha (9.23 ac) of wetlands habitat on the site would be disturbed (USACE 2010). Most of the wetlands acreage involved would be in the Savannah River floodplain. The amount of wetland acreage that would be disturbed represents about 5 percent of the total 69 ha (170 ac) of wetlands currently present onsite. There are no Federally listed threatened or endangered species that would be adversely affected during construction of the proposed Units 3 and 4 (NRC 2008b; FWS 2008).

The area around the VEGP Site is rural and primarily forested and farmland. The habitats that would be disturbed at VEGP are not considered to be critical for the survival of any species, including those that are Federally protected. In addition, the percent of wetlands that would be disturbed represents only a small portion of the available wetlands in the vicinity of the site. Therefore, the staff concludes that the impact of development of the VEGP Site on the cumulative habitat loss and important species in the region associated with construction impacts would be negligible.

There are five fossil-fueled power generating stations within 145 km (90 mi) of the VEGP Site: the South Carolina Electric and Gas (SCE&G) Urquhart station, 34 km (21 mi) from the VEGP

Site; the SCE&G D area powerhouse station, 32 km (20 mi) from the VEGP Site; the GPC Plant McIntosh, 134 km (83 mi) from the VEGP Site; the GPC Port Wentworth, 124 km (77 mi) from the VEGP Site; and Plant Wilson, located on the VEGP Site. Fossil-fueled power plants release a variety of emissions to the air, including carbon dioxide, mercury, nitrous oxides, and sulfur dioxide. Nitrous oxides and sulfur dioxides can combine with water to form acid rain, which can lead to erosion and changes in soil pH levels. Mercury can deposit on soils and surface water, which may then be taken up by terrestrial plant and animal species, and poses the risk of bioaccumulation in the soil. For these reasons, these fossil-fueled power plants are likely to have current and future impacts to the environment on the VEGP Site and surrounding area (NRC 2008a).

There are three non-power generating plants that are on the Savannah River within the geographic area: the International Paper Corporation, the Savannah Industrial and Domestic Water plant, and the Beaufort-Jasper Water and Sewer authority wastewater treatment plant chemical discharges and the resulting bioaccumulation from these plants have the potential to have impacts on the surrounding area, including vegetation, wildlife, and wetlands (NRC 2008a).

DOE's Savannah River Site could impact terrestrial habitats, including habitats used by Federally listed threatened or endangered species. The Savannah River Site facility includes non-operational nuclear reactors, a currently operational coal-fired generating plant, and a proposed facility to convert weapons-grade plutonium into nuclear reactor fuel. The Savannah River Site, when originally constructed, added runoff from additional roads and impervious surfaces, increased development on wetlands and riparian zones, and decreased forest habitat. Current operations at the Savannah River Site, through chemical discharges and water withdrawal, could also have a cumulative impact on the geographic area. Future actions, such as additional construction and maintenance of buildings and facilities could affect the VEGP Site and the surrounding area (NRC 2008a).

Because the proposed Units 3 and 4 are nuclear plants, there would be little additional impact to the nearby environment from airborne releases typical of fossil fuel or other industrial facilities. Therefore, even when combined with emissions from the facilities described above, the operation of Units 3 and 4 would not result in unacceptable deposition rates of airborne pollutants. Furthermore, terrestrial habitat loss or alteration for the proposed action would be confined primarily to the VEGP Site. This loss or alteration of habitat, even in combination with chemical discharges and habitat modification associated with the other facilities in the region as discussed above, would not destabilize terrestrial resources, including Federally listed threatened or endangered species.

No other past, present, or future actions in the region were identified that could significantly affect Federally listed threatened or endangered species and critical habitat in ways similar to those associated with the proposed Units 3 and 4 site cooling tower operation (cooling tower

noise, drift from cooling towers, and bird collisions with cooling towers). The impacts associated with cooling tower operation were considered to be negligible for the VEGP Site; the cumulative adverse impact of these types of activities in the region also would be considered to be minor. Consequently, the NRC staff concludes that contributions of VEGP Site cooling tower operation to cumulative impacts on Federally listed threatened or endangered species and critical habitat in the region would be minimal.

6.2 Transmission Line ROW

The exact extent and type of wildlife habitat within the proposed new transmission line ROW is not known at this time because Southern and the GPC are evaluating ROW alternatives within the RDC. It is anticipated that the transmission line would cross Burke, Jefferson, McDuffie, and Warren Counties and would be 45 m (150 ft) wide and 97 km (60 mi) long (NRC 2008a). There are no U.S. Forest Service Wilderness Areas, Wild/Scenic Rivers or Wildlife Refuges, or State or National Parks within the RDC (GPC 2007). If possible, wetland areas would be avoided in the routing (GPC 2007).

A hypothetical transmission line ROW that represents what the GPC believes is a feasible route within the RDC was identified as part of a 2007 study (GPC 2007). Based on the GPC analysis, habitats within the ROW could include approximately 60 ha (148 ac) of forested habitat, 37 ha (91.5 ac) of forested wetlands, 133 ha (329 ac) of planted pine, 2.6 ha (6.4 ac) of open water, and 64 ha (158 ac) of open land (GPC 2007). Other land-use categories identified as potentially being impacted, such as mine/quarry, utility, transportation, and row crops, provide little value as wildlife habitat. In the region surrounding the proposed transmission line ROW, there are approximately 18,085 ha (44,688 ac) of forest, 16,956 ha (41,898 ac) of forested wetlands, 1354 ha (3346 ac) of open water, and 17,262 ha (42,656 ac) of open land (GPC 2007). Assuming the actual routing would be similar to the hypothetical route, the number of acres of forested habitat, forested wetlands, open water, open land, and planted pine forest that would be affected represent a very small portion of the available habitat. If the actual route would be similar to the hypothetical route, impacts on wildlife habitat in the region would be negligible. However, if the actual route differs from the hypothetical route, wildlife habitat impacts could either be greater or smaller.

There are no known occurrences of Federally listed threatened and endangered species within the RDC. However, suitable habitat for the red-cockaded woodpecker (*Picoides borealis)*, wood stork (*Mycteria americana*), Canby's dropwort (*Oxypolis canbyi*), and the eastern indigo snake (*Drymarchon couperi*) could exist within the RDC. The GPC would site the transmission line in accordance with Georgia Code Title 22, Section 22-3-161. Part of the GPC procedures for implementing this regulation include consultation with FWS and GDNR and an evaluation of impacts to special habitats and threatened and endangered species. In addition, the GPC has guidelines for transmission line maintenance practices for nests and rookeries in Georgia (Southern 2007), has developed an APP that provides guidance for minimizing impacts to bird

species when siting new transmission lines (GPC 2006), would use good engineering and construction practices, and would comply with all applicable laws, regulations, and permit requirements (Southern 2008). Based on this review, cumulative impacts on important species and habitat loss in the region associated with construction of the transmission line ROW would be negligible.

No other past, present, or future actions in the region were identified that could significantly affect Federally listed threatened or endangered species and critical habitat in ways similar to those associated with transmission line operation and ROW maintenance (i.e., bird collisions with transmission lines, flora and fauna affected by EMFs and ROW maintenance, and floodplains and wetlands affected by ROW maintenance). Therefore, because these impacts were considered negligible for the VEGP Site transmission line operation and ROW maintenance, the cumulative adverse impacts of these types of activities in the region also would be minor. Consequently, the staff concludes that the contribution of transmission line operation and the maintenance of transmission line ROWs to cumulative impacts on wildlife and wildlife habitat in the region would be minimal.

6.3 Summary

The cumulative terrestrial resource impacts of the proposed action, including to Federally listed threatened or endangered species, may be detectable, but they are expected to be minor and not destabilizing to the resource. Therefore, the NRC staff concludes that cumulative impacts to terrestrial resources resulting from construction and operation of the proposed Units 3 and 4, including consideration of impacts from transmission line ROW construction and operation, would be minor.

7.0 Conclusions

The potential impacts to the protected species listed in Table 1 from operating the proposed Units 3 and 4 at the VEGP Site, considered cumulatively with the potential impacts of construction and operation of the offsite transmission line, are shown in Table 2. The known distributions and records of these species, in combination with the potential ecological impacts of the proposed action on the species, their habitat, and their prey, have been considered in making the impact determinations in this BA.

Table 2. Federally Listed Species Potentially Affected by Operation of the Proposed Units 3 and 4 at the VEGP Site and Construction and Operation of the Proposed Transmission Line Right of Way

Scientific Name	Common Name	Federal Status	Determination
Birds			
Mycteria americana	wood stork	E	May affect, not likely to adversely affect
Picoides borealis	red-cockaded woodpecker	E	May affect, not likely to adversely affect
Reptile			
Drymarchon couperi	Eastern Indigo Snake	T	May affect, not likely to adversely affect
Vascular Plant			
Oxypolis canbyi	Canby's dropwort	E	May affect, not likely to adversely affect

8.0 References

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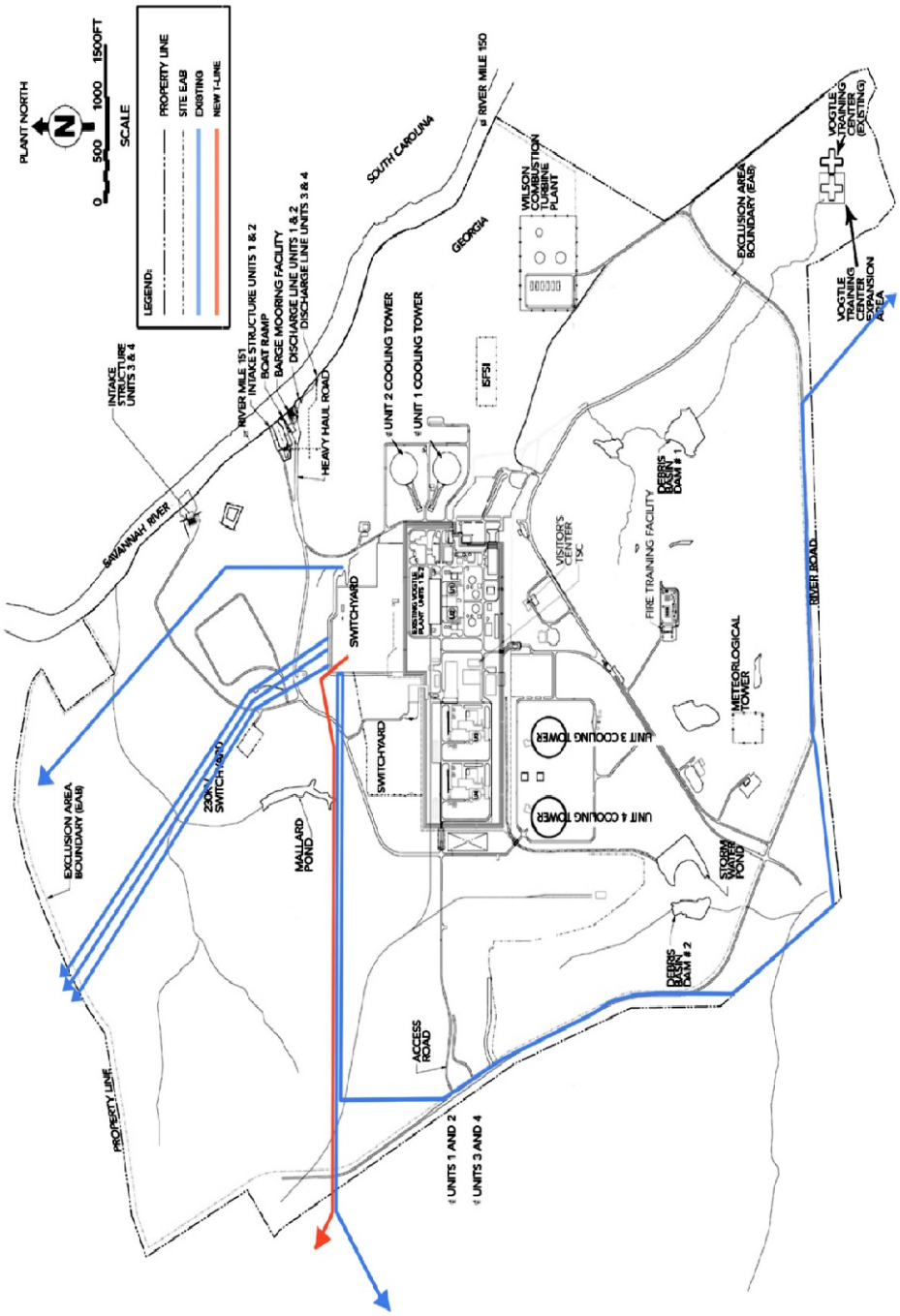

Figure 1. Proposed VEGP Site Footprint

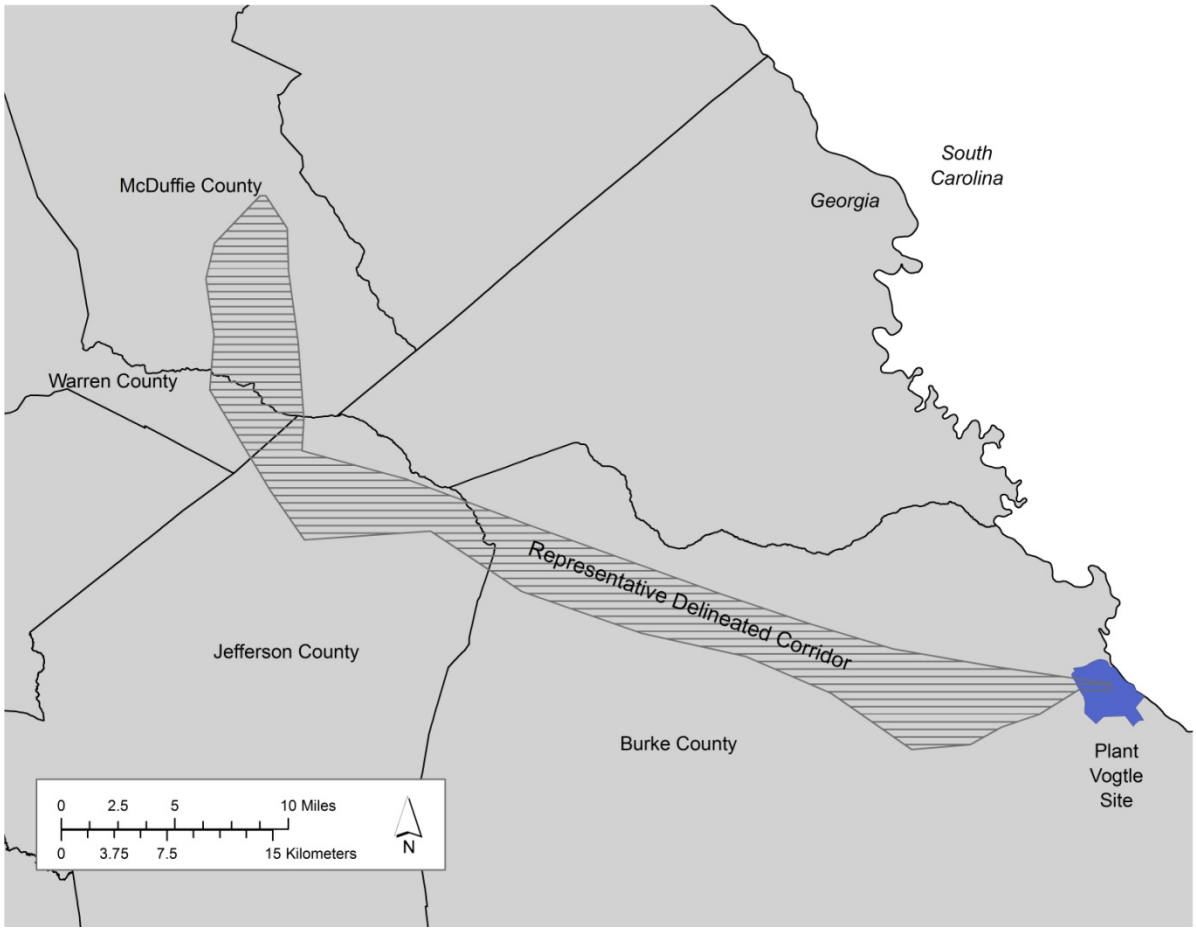

Figure 2. Representative Delineated Corridor