

**V.C. SUMMER NUCLEAR STATION  
UNITS 2 AND 3  
TRANSMISSION LINE SITING STUDY  
SANTEE COOPER – REVISION #1**

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## **EXECUTIVE SUMMARY**

On August 25, 2008 the South Carolina Public Service Authority (Santee Cooper) submitted a Transmission Line Siting Study (2008 Siting Study) to support the combined license application (COLA) for the proposed expansion of the VC Summer Nuclear Station (VCSNS) located in Jenkinsville, South Carolina. An application for a combined construction and operating license for the two proposed nuclear units (Unit 2 and Unit 3) was submitted by SCE&G, acting for itself and as an agent for Santee Cooper, to the Nuclear Regulatory Commission (NRC) on March 31, 2008. The proposed expansion of the VCSNS includes the addition of two new nuclear units (Unit 2 and Unit 3) at the existing facility. Although Santee Cooper and SCE&G are partners in the VCSNS expansion, they have agreed to remain individually responsible for the transmission of their respective portions of the future power generated at the expanded VCSNS. The 2008 Siting Study was prepared to evaluate Santee Cooper's two proposed transmission lines designed to handle the new generation, VCSNS-Flat Creek and VCSNS-Varnville. Since completion of the 2008 Siting Study, changes in system-wide planning have necessitated alterations to the original plans for the transmission lines.

The primary purpose of this report is to provide detailed information regarding the changes to the transmission lines and address how those changes may have impacted each of the sections of the 2008 Siting Study, if at all. Environmental criteria discussed in the original report that did not significantly change as a result of the revisions to the proposed transmission lines (presented below) include Geology, Soils, Hydrology, Water Quality, Flood-prone areas, Resident Population, Noise, Electromagnetic Fields, Safety, Air Quality and Aviation. However, a brief description of each of these criteria remains included in this report.

Santee Cooper originally determined that two 230kV transmission lines will be necessary to transmit their portion of the electricity generated from the two proposed new nuclear units. The two 230kV transmission lines are referred to as the VCSNS-Flat

Creek line and the VCSNS-Varnville line. The basic routes and distances of the proposed transmission corridors have changed very little from the 2008 Siting Study. The VCSNS-Flat Creek line extends approximately 72 miles in a generally northeast direction from the VCSNS to the Flat Creek substation located in Lancaster County, South Carolina and the VCSNS-Varnville line extends approximately 167 miles in a generally southern direction from the VCSNS to the Varnville substation located in Hampton County, South Carolina. The VCSNS-Varnville line has increased approximately four miles in length (approximate 2.5% increase) in order to connect to a different substation in Dorchester County. Although these lines are longer than a straight-line corridor between the VCSNS and the respective terminus substations, Santee Cooper has taken this approach in order to minimize overall project impacts and, by connecting to various intermediate substations along each route, increase overall system-wide reliability.

With the required changes, Santee Cooper is no longer able to route nearly 99% of the new lines within existing, maintained right-of-way (ROW). For reliability purposes, Santee Cooper has recently determined that several segments of the proposed transmission line corridors will require the acquisition and development of approximately 37 miles of new ROW, primarily adjacent and parallel to the existing, maintained corridors. Combined with the 2.44 miles of new ROW detailed throughout the 2008 Siting Study, this report focuses on the approximately 39.5 miles of total new ROW now required for the proposed project. Although existing conditions and potential impacts to the previously identified 2.44 miles of new ROW was included in the 2008 Siting Study, this report discusses all new ROW together and does not separate out the previously evaluated new ROW.

Despite these revisions, Santee Cooper has still been able to route approximately 199.5 miles (approximately 83.5%) of the proposed transmission lines within existing, Santee Cooper-maintained transmission rights-of-way. By continuing to route a majority of the new lines within existing maintained ROW, Santee Cooper has significantly reduced the impacts of the project when compared to the alternative of acquiring and developing an

entirely new ROW. With the exception of approximately 39.5 miles (375 acres) of proposed new ROW, impacts will include the replacement of existing poles and/or the addition of new poles/structures, for the new 230kV lines, within the boundaries of the existing ROW. For a majority of the new ROW, impacts will primarily consist of the conversion of approximately 142 acres of existing forested areas to maintained right-of-way for utility use. However, this clearing will primarily occur adjacent to existing maintained ROW and will limit further fragmentation of forested habitat.

Beginning in October, 2007, Santee Cooper and their consultant, MACTEC Engineering and Consulting, Inc. (MACTEC), have coordinated with federal and state agencies, including the United States Fish and Wildlife Service (USFWS), the United States Army Corps of Engineers (USACE), the South Carolina Department of Health and Environmental Control (SCDHEC), and the South Carolina State Historical Preservation Office (SCSHPO), to discuss the VCSNS transmission line corridor project. During coordination with these agencies, a description of the VCSNS transmission corridor project has been presented and additional future assessments have been discussed. The United States Nuclear Regulatory Commission (NRC) has also communicated with federal and state agencies in coordination with SCE&G and Santee Cooper. Santee Cooper will continue to coordinate with all parties and complete additional work that may be required to meet state and federal regulations and to acquire the appropriate permits necessary to construct the VCSNS-Flat Creek and VSCNS-Varnville 230kV transmission lines.

Minimal impacts to environmental conditions are expected as a result of this project as Santee Cooper has routed a majority (approximately 83.5%) of the proposed VCSNS-Flat Creek and VSCNS-Varnville 230kV transmission lines within existing maintained rights-of-way. Santee Cooper will minimize impacts during the installation and replacement of new poles/structures through the use of best management practices (BMPs). Impacts associated with required clearing along existing forested areas of the 39.5 miles of proposed new ROW will also be minimized through the use of BMPs.

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## **1.0 INTRODUCTION**

### **1.1 Background Information**

In order to meet the projected demand for reliable electrical energy throughout South Carolina, the South Carolina Electric and Gas Company (SCE&G), a subsidiary of SCANA Corporation, has proposed the addition of two nuclear units to be constructed at the existing V.C. Summer Nuclear Station (VCSNS) located in Jenkinsville, Fairfield County, South Carolina. The South Carolina Public Service Authority, herein referred to as Santee Cooper, has partnered with SCE&G on this project and will be responsible for transmitting a portion of the electricity generated from the proposed units. An application for a combined construction and operating license for the two proposed nuclear units (Unit 2 and Unit 3) was submitted by SCE&G, acting for itself and as an agent for Santee Cooper, to the Nuclear Regulatory Commission (NRC) on March 31, 2008. Once approved, the combined operating license (COL) would authorize the addition of the two units to be constructed at the VCSNS. Electricity generated from these new units would be added to the power produced by Unit 1, currently in operation.

Although Santee Cooper and SCE&G are partners in the VCSNS expansion, they have agreed to remain individually responsible for the transmission of their respective portions of the future electricity generated at the expanded station. This report has been prepared to evaluate recent revisions to Santee Cooper's proposed transmission lines (described below) and to provide the NRC with additional information about Santee Cooper's portion of the transmission system to compliment the existing information presented in the COLA Environmental Report and Santee Cooper's 2008 Transmission Line Siting Study. SCE&G's transmission lines have been evaluated in a separate report under separate cover and are not included in this report.

## **1.2 New Transmission Lines**

SCE&G and Santee Cooper previously determined that a total of six new 230kV transmission lines (four single-circuit lines and one SCE&G double circuit line) will be necessary to transmit the additional electricity generated from the two proposed units to the power grid. The proposed SCE&G and Santee Cooper transmission lines will assist in fulfilling this need.

The following SCE&G transmission lines have been evaluated in a separate report under separate cover and are not included in this report.

### **SCE&G Lines**

1. VCSNS – Killian
2. VCSNS – Lake Murray No. 2
3. VCSNS – St. George

### **Santee Cooper Lines**

4. VCSNS – Flat Creek: this Santee Cooper 230kV single-circuit line extends approximately 72 miles in a generally northeast direction from VCSNS to the existing Flat Creek substation located in Lancaster County, South Carolina. The proposed line will intersect the existing Winnsboro and Richburg 69kV substations prior to terminating at the existing Flat Creek 69kV substation.

This report documents the recent modifications to the proposed VCSNS-Flat Creek line, which now requires 2.68 miles of new 50-foot ROW parallel and adjacent to the existing ROW between the VCSNS and the Winnsboro substation (VC Summer-Blythewood segment), and 13.57 miles of new 85-foot ROW parallel and adjacent to the existing ROW between the Richburg and Flat Creek substations (Cauthens-Richburg segment). Including the VCSNS-Flat Creek portion of the original 2.44 miles of new ROW (0.9 miles), this 72-mile line consists of approximately 17 miles of new ROW adjacent to existing ROW, with the remaining 55 miles located within existing Santee Cooper-maintained ROW.

5. VCSNS – Varnville: this Santee Cooper 230kV single-circuit line extends approximately 167 miles in a generally southern direction from VCSNS to the existing Varnville substation located in Hampton County, South Carolina. The proposed line will intersect and have taps along the way at an existing 69kV substation at Pomaria, and existing 115kV substations at Sandy Run, Orangeburg and Byrds (previously the St. George substation in the 2008 Siting Study), prior to terminating at the Varnville 230kV substation.

This report documents the recent modifications to the proposed VCSNS-Varnville line, which now require the following segments of new ROW parallel and adjacent to the existing ROW: 2.64 miles of 85-foot ROW between the VCSNS and the Pomaria substation (VC Summer-Newberry segment); 1.97 miles of 55-foot ROW between the VCSNS and the Pomaria substation (Pomaria-New Hope segment); 2.18 miles of 50-foot ROW between the Pomaria and Sandy Run substations (Pomaria-Chapin segment); 13.36 miles of 85-foot ROW between the Pomaria and Sandy Run substations (VC Summer-Blythewood segment); and 0.08 miles of 125-foot ROW adjacent to the St. George substation. Changes to the VCSNS-Varnville line also include 0.54 miles of new 100-foot ROW (the only segment not adjacent to existing ROW), which would connect two existing transmission corridors near the St. George substation. The VCSNS-Varnville line also includes the addition of 3.48 miles within an existing 125-foot ROW in order to route the line through the Byrds substation, rather than connect to the St. George substation. Including the VCSNS-Varnville portion of the original 2.44 miles of new ROW (1.54 miles), this 167-mile line consists of approximately 22 miles of new ROW adjacent to existing ROW and 0.54 miles of new ROW not parallel and adjacent to existing ROW, with the remaining 143 miles located within existing Santee Cooper-maintained ROW.

The revised Santee Cooper lines (Figure 1-1), totaling approximately 239 miles, have been routed within existing maintained transmission right-of-way (ROW) to the greatest extent possible. Santee Cooper was able to successfully route approximately 199.5 miles (approximately 83.5%) of the proposed lines within existing maintained ROW.

These existing ROWs currently range from 50 to 200 feet in width, with existing single pole or H-frame structures supporting 69kV, 115kV and/or 230kV lines. A majority (approximately 68%) of the existing corridors are 100-feet wide or less.

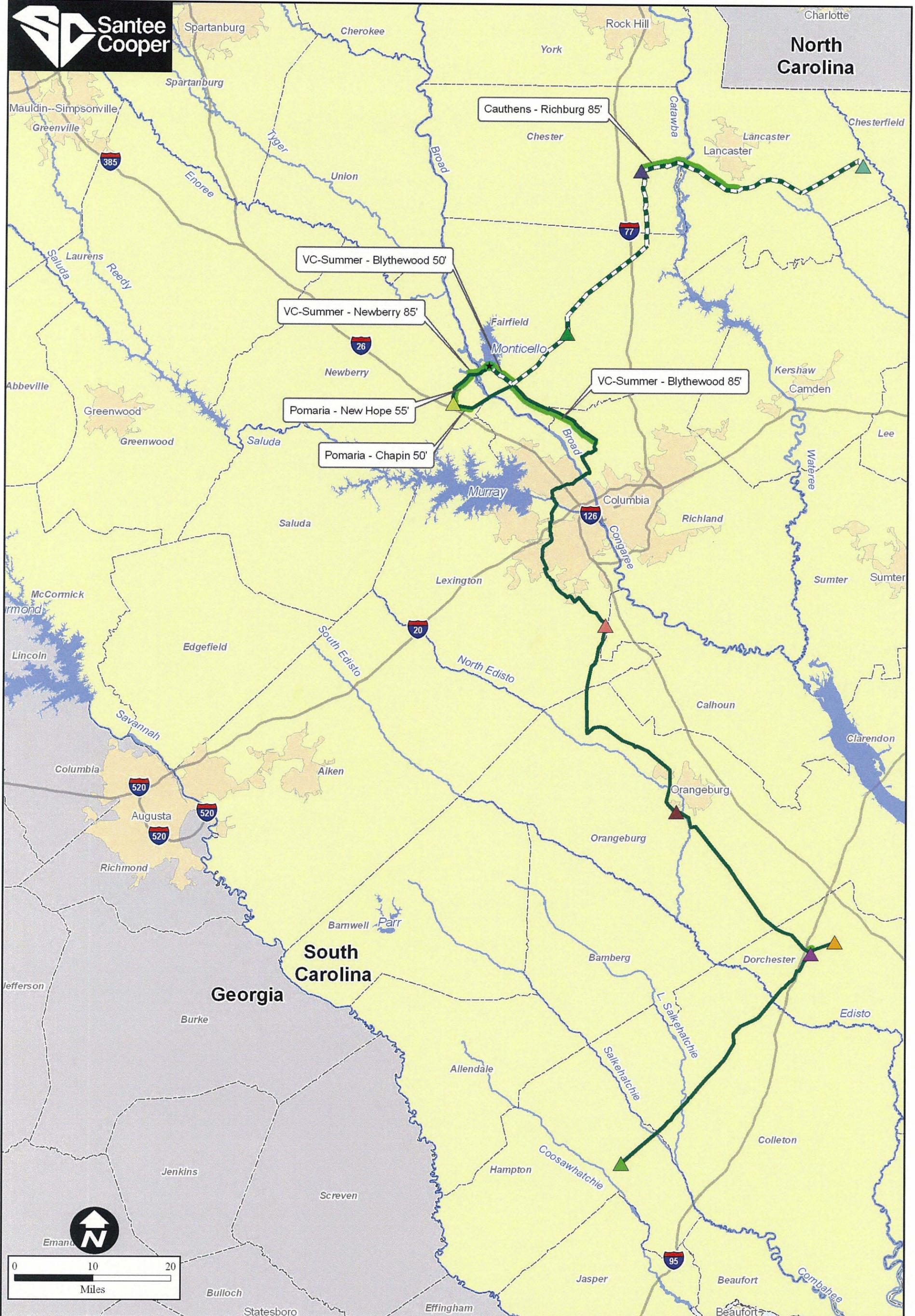
The remaining approximately 39.5 miles (approximately 16.5%) of the combined lines require new right-of-way, between 50 and 125-feet in width, for future acquisition and development. However, the new clearing for these lines will be adjacent and parallel to existing maintained transmission ROW, with the exception of 0.54 miles of new, overhead ROW located near the existing St. George substation in Dorchester County. The 39.5 miles of new ROW includes the 2.44 miles of new ROW discussed in the 2008 Siting Study. For the purposes of this report, all discussions of new ROW will be based on the revised total of 39.5 miles. Although the 2008 Siting Study included significant field efforts to identify existing conditions and potential impacts to the 2.44 miles of original new ROW, a detailed field analysis of the revised 39.5 miles of new ROW has been deferred until further engineering and ROW studies are completed by Santee Cooper and access can be arranged with the landowners at a mutually agreeable time.

## 2.0 PROJECT DESCRIPTION

### 2.1 Project Purpose & Need

Santee Cooper operates a vertically-integrated electric utility system, including facilities for generation, transmission, and distribution of electric power and energy at retail and wholesale levels. Santee Cooper has the responsibility to ensure sufficient capacity to provide safe, reliable electrical energy to many South Carolina Electric Membership Cooperatives and consumers in its established territory. To help meet these responsibilities, Santee Cooper has partnered with SCE&G in an effort to increase the power production capabilities at the V.C. Summer Nuclear Station (VCSNS). This report has been prepared to evaluate the changes to Santee Cooper's proposed transmission lines since the completion of the 2008 Transmission Line Siting Study (2008 Siting Study). Two new 230kV transmission lines have been planned to accommodate Santee Cooper's portion of the additional generating capacity.

As a result of the proposed VCSNS expansion, Santee Cooper has proposed the addition of two new 230kV transmission lines that will be of H-frame structure or single pole design, which will connect the switchyard(s) of the VCSNS to the existing Flat Creek and Varnville substations. The VCSNS-Flat Creek line extends approximately 72 miles in a generally northeast direction from VCSNS to the existing Flat Creek substation located in Lancaster County, South Carolina. The proposed line will intersect the existing Winnsboro and Richburg substations prior to terminating at the Flat Creek substation (Figure 2-1 in the 2008 Siting Study, Sheets A01-D01 and A02). The VCSNS-Varnville line extends approximately 167 miles in a generally southern direction from VCSNS to the existing Varnville substation located in Hampton County, South Carolina. The proposed line will intersect the Pomaria, Sandy Run, Orangeburg and Byrds substations prior to terminating at the Varnville substation (Figure 2-1 in the 2008 Siting Study, Sheets D01-N01). Any upgrades that may be required at the existing substations will occur within the existing footprint. The Byrds substation has not yet been constructed; however, development of this facility is included in Santee Cooper's



LEGEND	
<b>Substation Locations</b>	
Byrds	Richburg
Flat Creek	Sandy Run
Orangeburg	St. George (Bypassed by new ROW)
Pomaria	Varnville
	Winnsboro
VCSNS	VCSNS - Flat Creek Line
VCSNS - Varnville Line	New ROW Area (Not to Scale)
County Boundary	Population Centers > 14,000

Drawn By: CGS  
 Checked By: KMR  
 Approved By: AWC  
 October 26, 2009



**Figure 1-1: Regional Location Map Santee Cooper VCSNS Transmission Lines with New ROW Areas**

future plans in order to increase system-wide reliability. Therefore, the impacts of the Byrds substation are not addressed in this report or the impacts associated with the proposed VCSNS expansion.

## **2.2 Transmission Line Siting Process**

Santee Cooper considers the following five factors when selecting a route for new transmission lines: economics, environmental impact, safety, system reliability and long range implications to the transmission system. Economic factors may include the cost of acquiring easements for new ROW, clearing the land, transmission line construction and construction of new substations. Environmental impacts typically associated with transmission lines in this part of the United States may include wetlands, protected species, cultural resources, wildlife, aesthetics, noise, geology, prime farmland, hydrology, land use, land cover, electromagnetic fields, floodplains and air quality.

As specific potential routes for a new transmission corridor are determined, safety, system reliability and long range implications of the transmission system are addressed. The safety of a transmission route is often improved by making the route as direct as possible, thus minimizing the number of points of intersection and the number of crossings (roads, rail, water, etc). System reliability is improved by limiting the length of the corridor between substations and routing the corridor to be as accessible as possible (easily accessible terrain, near public access points, etc.), thereby providing more reliable service to end users. Long range implications to the transmission system refer to the design of a “looped” system, rather than a “radial” system, so that power flows to substations from more than one source, which minimizes potential power outages to end users. A “looped” system is where the transmission lines are connected through multiple substations to form a circle (or “loop”). A “radial” system is where transmission lines terminate at a single substation which is not linked to another substation or power source.

A detailed description of the following four general options that are typically considered by Santee Cooper when evaluating transmission line routing alternatives is included in Section 2.2 of the 2008 Siting Study: underground, overhead in new right-of-way (ROW), overhead in new ROW adjacent and parallel to existing maintained ROW, or overhead within an existing maintained ROW.

Based on the benefits and availability of routing overhead within an existing ROW, Santee Cooper has been able to route a majority of the new 230kV transmission lines within existing maintained ROW. Of the approximate 239 miles of transmission line corridor, approximately 39.5 miles (approximately 16.5%) consists of new ROW. A majority of this new ROW is located adjacent and parallel to existing Santee Cooper-maintained ROW, with less than one mile requiring new ROW not adjacent to existing maintained ROW. The remaining approximately 199.5 miles (approximately 83.5%) of the proposed lines are routed within existing, Santee Cooper-maintained ROW.

## **3.0 DESCRIPTION OF EXISTING ENVIRONMENT**

### **3.1 Geology, Soils and Prime Farmland**

#### **3.1.1 Geology**

A discussion of South Carolina geology and areas transected by the proposed transmission lines is included in Section 3.1.1 of the 2008 Siting Study. The proposed changes to the transmission corridors do not significantly alter the discussion in the previous report. The primary difference is that approximately 121 miles of the VCSNS-Varnville line is located in the Coastal Plain rather than 117 miles. It is also important to note that the segments of new ROW along the VCSNS-Flat Creek line are not in the proximity of the Forty Acre Rock Heritage Preserve located in Lancaster County.

#### **3.1.2 Soils**

A detailed discussion of soils associated with the proposed transmission lines is included in Section 3.1.2 of the 2008 Siting Study. The proposed changes to the transmission corridors do not materially affect the soils information provided in the previous report.

#### **3.1.3 Prime Farmland**

The USDA defines prime farmland as land that has the best combination of physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops (NRI, 2001). Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and generally results in the least damage to the environment. Farmlands of Statewide Importance consist of land with favorable, but not 'prime' physical and chemical properties; however, Farmlands of Statewide Importance can be farmed economically to produce high yields of crops when developed and managed with acceptable farming practices. Farmlands of Statewide Importance are identified at the state level. Table 3-1 indicates the acreages of Prime Farmland and Farmland of Statewide Importance that are located within the modified VCSNS-Flat Creek and

VCSNS-Varnville corridors. These estimates are based on the entire lengths of the proposed corridors and include both new and existing segments of ROW.

Table 3-1: Prime Farmland and Farmland of Statewide Importance (acres)

<b>Classification</b>	<b>VCSNS-Flat Creek</b>	<b>VCSNS-Varnville</b>
Prime Farmland	221	645
Prime Farmland if drained	0	152
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	40	38
Prime farmland if protected from flooding or not frequently flooded during the growing season	24	68
Farmland of Statewide Importance	171	760
<b>Total Classified Acres (approximate % of total acres)</b>	<b>456 (39%)</b>	<b>1,663 (59%)</b>

Source: NRCS 2008

## 3.2 Water Resources

### 3.2.1 Hydrology

According to the USGS National Hydrography Dataset (NHD), which contains hydrographic data at a 1:100,000 scale (USGS 2008), no additional stream crossings were identified on either the VCSNS-Flat Creek line or the VCSNS-Varnville line as a result of the additional new ROW. No changes to the watersheds and/or river basins transected by the transmission corridors have occurred with the alterations to the proposed lines. Hydrology and watershed information is included in Section 3.2.1 of the 2008 Siting Study. The only update to this section from the previous report is that the approximate 1,300 foot crossing of the Fishing Creek Reservoir along the VCSNS-Flat Creek line is no longer within the existing ROW. This crossing is located in an area that will now require 85-feet of additional ROW adjacent and parallel to the north of the existing Santee Cooper-maintained ROW

### 3.2.2 Wetlands

Estimates of the extent of potential regulated wetlands and other waters of the U.S. along the revised VCSNS-Flat Creek and VCSNS-Varnville transmission corridors was developed from available U.S. Department of Agriculture (USDA) county soil surveys, U.S. Fish and

Wildlife National Wetland Inventory (NWI) maps and U.S. Geological Survey (USGS) topographic maps, and are presented below. Discussions of wetland areas associated with applicable Physiographic Provinces and stream/navigable water crossings are included in Section 3.2.2 of the 2008 Siting Study. Those discussions are not repeated in this report, as that information has not changed as a result of the revisions to the proposed transmission lines. Although the description and explanation of the data reviewed to determine wetland acres remains consistent from the previous report, it is included below to provide background information for the revised wetland estimates.

The interpretation of the USDA county soil survey and USFWS NWI wetlands data offer an estimate of the location and extent of jurisdictional wetlands within the proposed VCSNS-Flat Creek and VCSNS-Varnville transmission corridors. They include wetlands that may appear isolated and thus outside of the USACE's jurisdiction under Section 404 of the Clean Water Act. No attempt was made to distinguish regulated wetlands from non-regulated wetlands. The presence of stream channels was primarily based on USGS National Hydrography Dataset. This data source is generally reliable in determining the existence of large perennial streams, but does not necessarily depict the presence of smaller perennial and intermittent streams with accuracy. This methodology offers a reasonable approximation of the boundaries of potential wetlands and other waters of the U.S. for the purposes of this evaluation. The information here offers an approximation of wetlands and other waters of the U.S., which are subject to change following further delineation and verification (if required) by the USACE, Charleston District.

Data from two federal sources were used to estimate wetlands. USDA soil surveys were used to define streams, open water and potential wetland habitat types based on soil type. "Whole unit hydric" soil refers to an entire mapping unit being classified as poorly to very poorly drained soils. This classification is a good indication that wetlands are potentially present. Soil with "hydric inclusions" indicates that the mapping unit is classified as somewhat poorly drained and includes soils that are poorly to very poorly drained. Table 3-2 lists the hydric soil acreages along each corridor. Also listed is the total hydric soil acreage (sum of "whole map unit hydric" and "hydric inclusions") for each

corridor. Alternatively, on the USFWS NWI Land Use/Land Cover Data, wetlands along each corridor generally fall into one of three categories: Forested Wetland, Non-Forested Wetland and Open Water (Cowardin et.al. 1979). The NWI classifies wetland habitat types based on photo-interpretation of aerial and/or satellite imagery.

Table 3-2: Approximate wetland acres based on USDA hydric soil / USFWS NWI data

Analysis		VCSNS-Flat Creek		VCSNS-Varnville	
		Area	Percent of Corridor	Area	Percent of Corridor
<b>USDA Hydric Soil</b>	<i>Whole Unit Hydric</i>	23 Acres	2%	502 Acres	18%
	<i>Hydric Inclusions</i>	53 Acres	5%	652 Acres	23%
	<i>Total Hydric soil</i>	76 Acres	6%	1154 Acres	41%
<b>USFWS NWI Wetlands</b>		21 Acres	2%	249 Acres	9%

Sources: NRCS 2008 and SCDNR 2008b

For the VCSNS-Flat Creek line, the amount of “whole map unit hydric” soils (approximately 23 acres) is very similar to the estimated NWI wetlands (approximately 21 acres), each comprising approximately 2% of the corridor. The similar results for the approximate wetland areas along the VCSNS-Flat Creek corridor is likely attributable to two factors; wetlands in the Piedmont Physiographic Province generally occur only within well defined drainages, and these wetlands primarily support deciduous vegetation, which do not mask wetlands on aerial or satellite imagery, unlike pine woodlands and pine plantations. These two factors allow a more precise photo interpretation estimate by the NWI, within the Piedmont Physiographic Province.

On the contrary, for the VCSNS-Varnville line the whole unit hydric soils estimated by the county soil surveys (approximately 502 acres or 18%) is roughly double the NWI wetland estimate (approximately 249 acres or 9%). This discrepancy is likely attributable to less reliable photo interpretation provided by the NWI. Wetland areas are often underestimated by the NWI in the Coastal Plain Physiographic Province due to the masking effect of evergreen pine woodlands and pine plantations. The VCSNS-Varnville corridor lies largely within the Coastal Plain Physiographic Province where wetlands are more likely to cover a broader area than is typical in the Piedmont Physiographic Province.

The proposed VCSNS-Flat Creek and VCSNS-Varnville transmission lines will cross South Carolina navigable water bodies at an estimated 18 locations. However, four of these navigable water crossings are now located in areas of proposed new ROW. These four crossings consist of Fishing Creek Reservoir (Catawba River impoundment) along the VCSNS-Flat Creek line and Parr Reservoir, Little River and Cedar Creek along the VCSNS-Varnville line. The Parr Reservoir (Broad River impoundment) crossing was previously identified as a new ROW crossing in the 2008 Siting Study. The remaining 14 navigable water crossings are expected to remain within existing right-of-way at the existing crossings.

### **3.2.3 Surface Water Quality**

Information pertaining to surface water quality has not changed as a result of the revisions to the proposed transmission lines. Refer to Section 3.2.3 of the 2008 Siting Study for a discussion of this issue.

### **3.2.4 Flood-prone Areas**

No changes to flood-prone areas associated with the proposed transmission lines have occurred with the alterations to the lines. Information regarding flood-prone areas is located in Section 3.2.4 of the 2008 Siting Study.

## **3.3 Land Use**

The information in this section summarizes the existing land use conditions along the proposed corridors. Of the approximate 239 miles of combined lines, approximately 199.5 miles (approximately 83.5%) will be located within existing Santee Cooper maintained right-of-way (ROW). The existing ROW includes low-growing vegetation, with transmission lines connected to single-pole or H-frame structures lined down the center or down one side of the ROW. The single pole structures range in height from 55 to 80 feet and are typically spaced 400 to 500 feet apart. Average height for the H-frame structures range from 75 to 110 feet tall and are usually spaced 700 to 800 feet apart. Land cover along the existing corridors, associated with the utility (ROW) land use, is provided in Section 3.4 of the 2008 Siting Study.

The remaining 39.5 miles of new ROW (17.2 miles and 22.3 miles on the VCSNS-Flat Creek and VCSNS-Varnville lines, respectively) include a variety of land uses, a majority of which is classified as cropland/pastures or undeveloped woodlands. The proposed segments of new ROW vary in width from 50 to 125 feet and include a total of approximately 375 acres (approximately 161 acres and 214 acres on the VCSNS-Flat Creek and VCSNS-Varnville lines, respectively). A majority of the 39.5 miles of proposed new ROW is located adjacent and parallel to existing maintained electrical transmission ROW, with the exception of 0.54 miles (6.57 acres) of proposed new 100-foot ROW near the St. George substation. The 2.44 miles of new ROW discussed in detail in the 2008 Siting Study are included as portions of the new ROW discussed in this report.

A breakdown of the current Land Use classifications and estimated acreages along the proposed new ROW segments is listed in Table 3-3. The land cover categories listed in this table are based on 1989 and 1994 USFWS NWI data, in order to identify general land use types and acreages in the area of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines.

Table 3-3: Current land use within proposed new ROW

<b>Land Use within New ROW</b>	<b>Land Area</b>
<b>VCSNS-Flat Creek</b>	
Cropland/Pasture	78.2 acres
Residential	2.2 acres
Other Urban (Commercial, Industrial, Transportation, Utilities, etc.)	2.7 acres
Undeveloped Woodlands	73.0 acres
Wetlands	1.9 acres
Open Water	3.1 acres
<b>VCSNS-Varnville</b>	
Cropland/Pasture	97.1 acres
Residential	0.9 acres
Other Urban (Commercial, Industrial, Transportation, Utilities, etc.)	2.1 acres
Undeveloped Woodlands	104.7 acres
Wetlands	3.8 acres
Open Water	5.4 acres

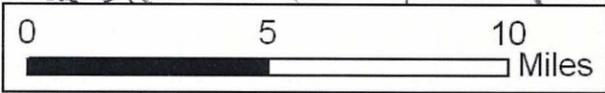
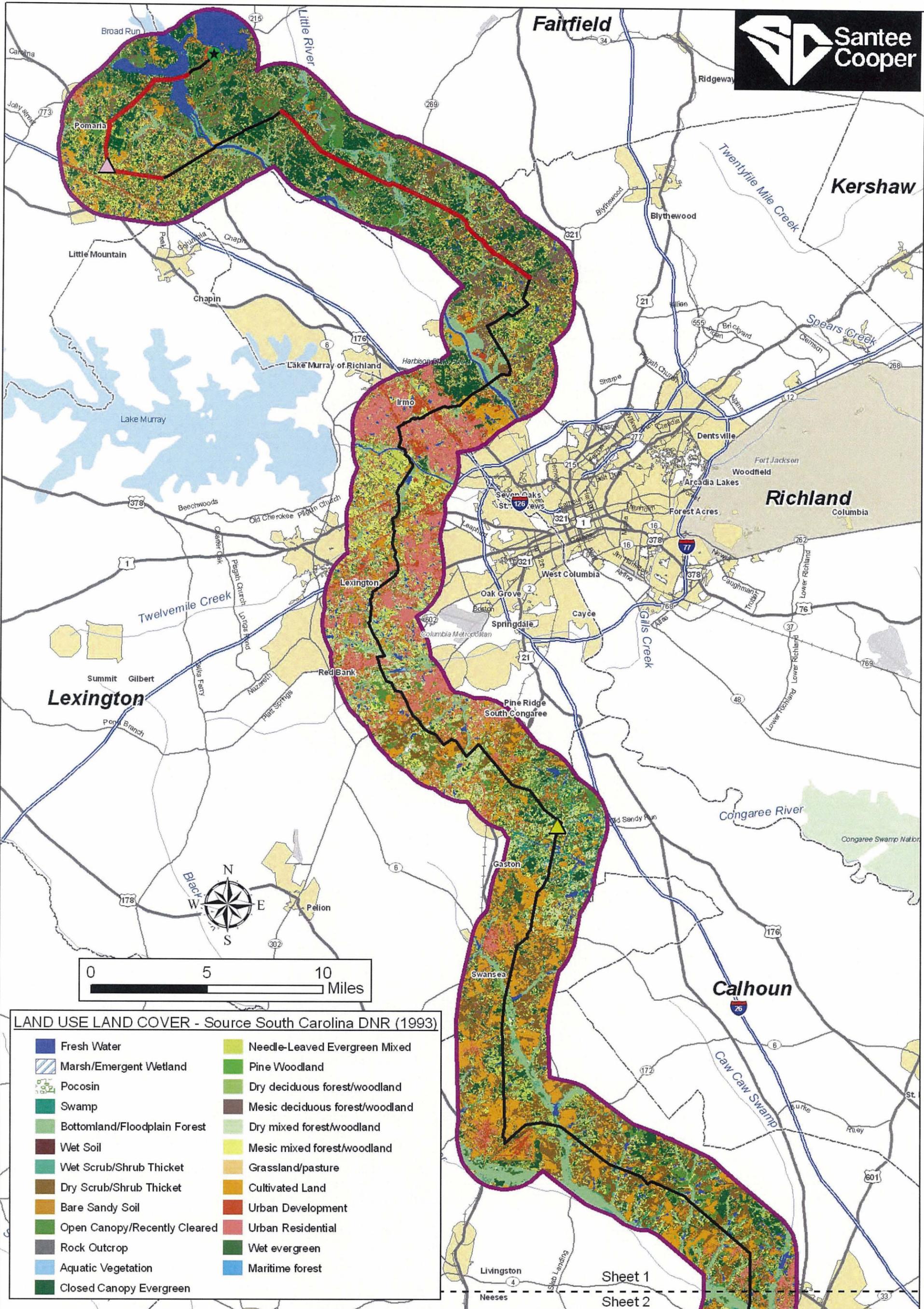
Source: SCDNR 2008b

### **3.4 Land Cover / Vegetation**

The GAP Analysis project, administered by the U.S. Geological Survey, Biological Resources Division, from Landsat TM imagery dating from 1991 to 1993, was used to determine the general land cover types and acreages in the area of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines (Figures 3-1 and 3-2). The GAP Analysis data was acquired from the South Carolina Department of Natural Resources (SCDNR 2008b). This section provides descriptions of the vegetation and habitats (land cover) located in the new segments of ROW. Descriptions of the land cover types located in both the existing and new segments of ROW, including a detailed list of species likely to occur in these classifications, are provided in Section 3.4 of the 2008 Siting Study.

A total of nearly 200 miles (approximately 83.5%) of the combined proposed VCSNS-Flat Creek and VCSNS-Varnville transmission lines currently consist of maintained transmission ROW. Land cover types that occur along the existing corridor are the result of some form of vegetation management by the utility provider or landowner and are thoroughly described in the 2008 Siting Study. The remaining 39.5 miles of proposed new ROW (including the original 2.44 miles of new ROW) primarily consists of wooded areas and agricultural properties adjacent and parallel to existing maintained transmission right-of-way. General land cover types located along the proposed new ROWs, as identified from the GAP Analysis data, are described below. Land cover estimates provided below may vary slightly from land use acreages provided in Table 3-3 due to different information sources.

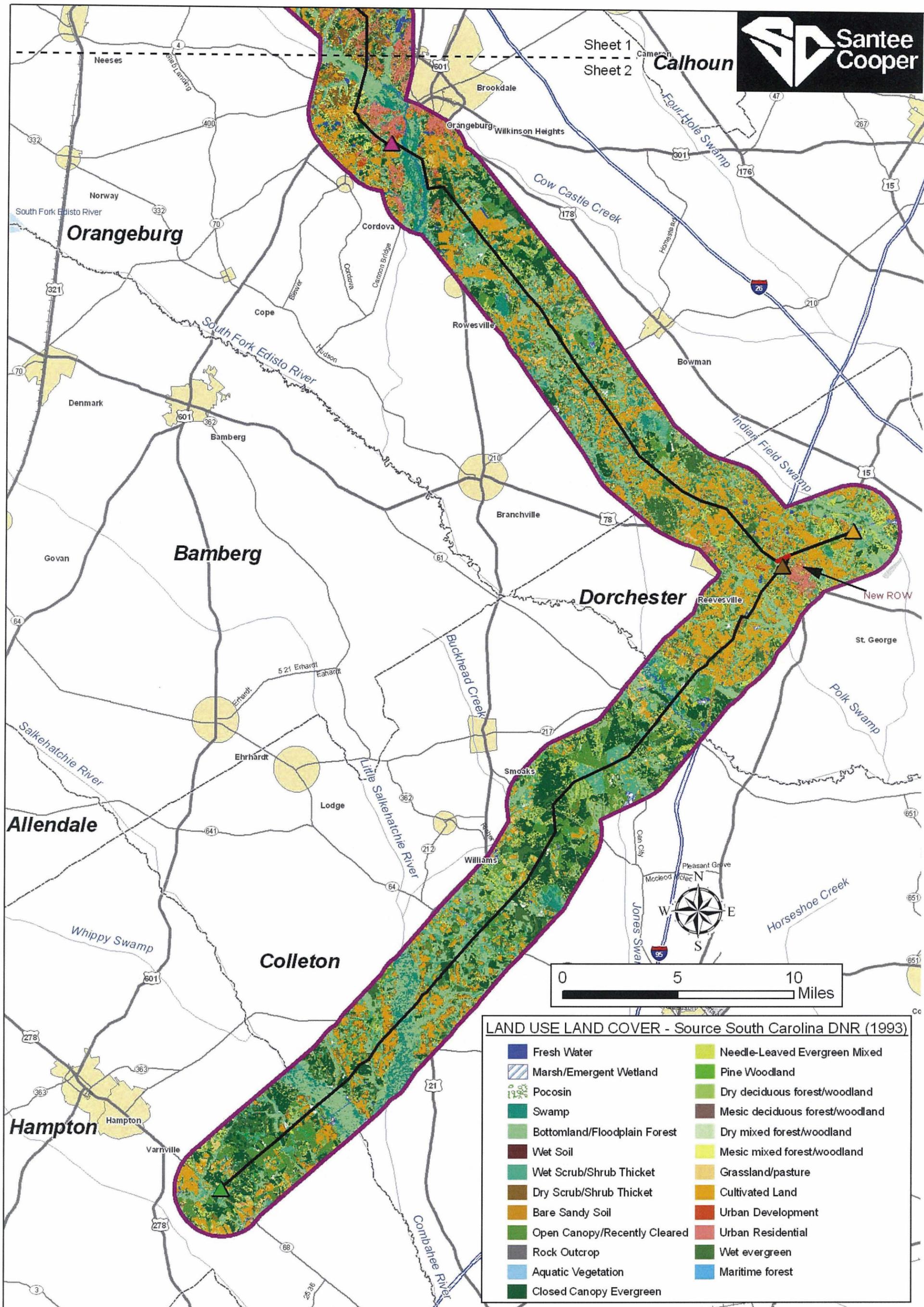
*Early Successional Upland:* This land cover class consists of areas that are in an early stage of succession, primarily as a result of human or natural disturbance, which may include clear cutting, mowing, application of herbicides and/or fire. They are typically open xeric to mesic habitats that lack tall woody vegetation and are dominated by perennial grasses, herbs and shrubby vegetation. Based on SCDNR GAP Analysis, the Early Successional Upland land cover is expected to exist along segments of the proposed new ROW within areas mapped as:



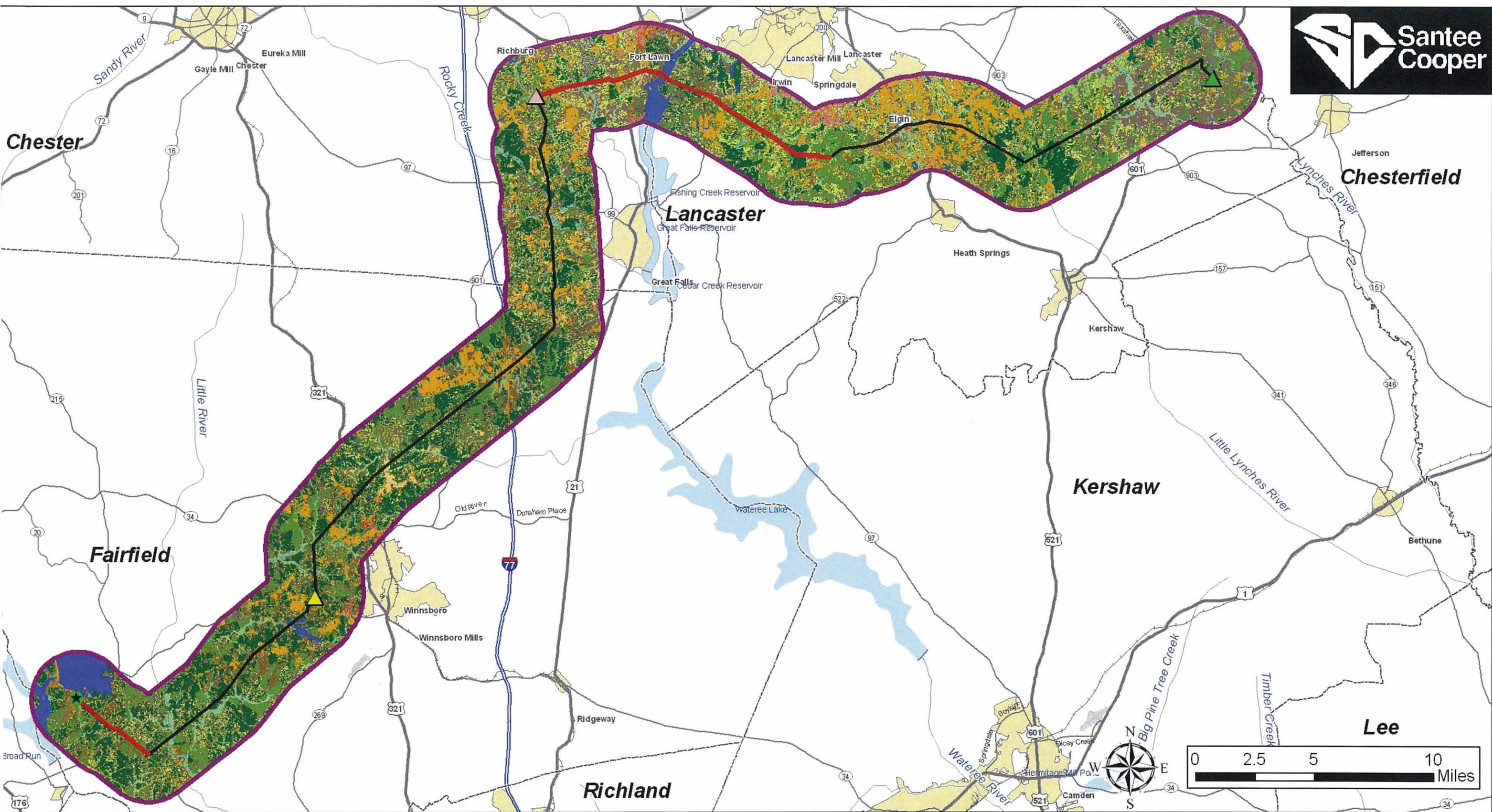
**LAND USE LAND COVER - Source South Carolina DNR (1993)**

Fresh Water	Needle-Leaved Evergreen Mixed
Marsh/Emergent Wetland	Pine Woodland
Pocosin	Dry deciduous forest/woodland
Swamp	Mesic deciduous forest/woodland
Bottomland/Floodplain Forest	Dry mixed forest/woodland
Wet Soil	Mesic mixed forest/woodland
Wet Scrub/Shrub Thicket	Grassland/pasture
Dry Scrub/Shrub Thicket	Cultivated Land
Bare Sandy Soil	Urban Development
Open Canopy/Recently Cleared	Urban Residential
Rock Outcrop	Wet evergreen
Aquatic Vegetation	Maritime forest
Closed Canopy Evergreen	

<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li> VCSNS</li> <li> Varnville Substation (Terminus of VCSNS - Varnville Line)</li> <li> Byrds Substation</li> <li> Orangeburg Substation</li> <li> Pomaria Substation</li> <li> Sandy Run Substation</li> <li> St. George Substation (Bypassed by new ROW)</li> <li> VCSNS - Varnville Line</li> <li> New ROW Area</li> <li> 2 Mile Buffer</li> <li> County Boundary</li> </ul>	<p>Created by: CGS          Checked by: KMR          Approved by: AWC          Date: October 13, 2009</p>	<p><b>Figure 3-2: Land Use/Land Cover          VCSNS - Varnville          Sheet 1</b></p>



<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li> VCSNS</li> <li> Varnville Substation (Terminus of VCSNS - Varnville Line)</li> </ul>	<ul style="list-style-type: none"> <li> Byrds Substation</li> <li> Orangeburg Substation</li> <li> Pomaria Substation</li> <li> Sandy Run Substation</li> <li> St. George Substation (Bypassed by new ROW)</li> </ul>	<ul style="list-style-type: none"> <li> VCSNS - Varnville Line</li> <li> New ROW Area</li> <li> 2 Mile Buffer</li> <li> County Boundary</li> </ul>	<p>Created by: CGS Checked by: KMR Approved by: AWC Date: October 13, 2009</p>	<p>Figure 3-2: Land Use/Land Cover VCSNS - Varnville Sheet 2</p>
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**LEGEND**

- VCSNS
- Flat Creek Substation (Terminus of VCSNS - Flat Creek Line)
- Richburg Substation
- Winnsboro Substation
- VCSNS - Flat Creek Line
- New ROW Area
- 2 Mile Buffer
- County Boundary

**LAND USE/LAND COVER - Source: South Carolina DNR (1993)**

Fresh Water	Dry Scrub/Shrub Thicket	Pine Woodland	Urban Development
Marsh/Emergent Wetland	Bare Sandy Soil	Dry deciduous forest/woodland	Urban Residential
Pocosin	Open Canopy/Recently Cleared	Mesic deciduous forest/woodland	Wet evergreen
Swamp	Rock Outcrop	Dry mixed forest/woodland	Maritime forest
Bottomland/Floodplain Forest	Aquatic Vegetation	Mesic mixed forest/woodland	
Wet Soil	Closed Canopy Evergreen	Grassland/pasture	
Wet Scrub/Shrub Thicket	Needle-Leaved Evergreen Mixed	Cultivated Land	

Created by: CGS  
 Checked by: KMR  
 Approved by: AWC  
 Date: October 19, 2008



Figure 3-1: Land Use/Land Cover VCSNS - Flat Creek

- Open Canopy/Recently Cleared – 124 Acres
- Grassland/Pasture – 26 Acres
- Dry Scrub/Shrub Thicket – 37 Acres

This indicates that approximately 187 acres of Early Successional Upland exists along the proposed segments of new ROW.

Early Successional Wetland: This land cover class includes non-tidal streamsides, floodplains adjacent to large streams or major river crossings, depression wetlands/bays, beaver-impounded wetlands that generally contain hydric soils or standing water and support persistent emergent or aquatic vegetation, marsh vegetation, wet meadow, or evergreen or deciduous wetland shrub vegetation. Based on SCDNR GAP Analysis, the Early Successional Wetland cover is expected to exist along the proposed new ROW within areas mapped as:

- Wet Soil – <1 Acre
- Marsh/Emergent Wetland – <1 Acre
- Wet Scrub/Shrub Thicket – 5 Acres

This would indicate that approximately five to seven acres of Early Successional Wetland occurs along the proposed new ROW.

Upland Pine-Hardwood Forest: This land cover class is primarily located within the Piedmont Physiographic Province and contains hills and ridges with accompanying swales and bottomland. The swales along the corridor are lower than adjacent ridges but have upland vegetation and non-hydric soils. Small rock outcrops are evident on some portions of the proposed new ROW, with those areas with more topographical relief exhibiting more outcrops. Based on SCDNR GAP Analysis, the Upland Pine-Hardwood Forest land cover is expected to exist along the proposed new ROW within areas mapped as:

- Mesic Mixed Forest/Woodland – 4 Acres
- Closed Canopy Evergreen – 36 Acres
- Dry Deciduous Forest/Woodland – <1 Acre

- Pine Woodland – <1 Acre
- Mesic Deciduous Forest/Woodland – 50 Acres
- Needle-Leaved Evergreen Mixed – 36 Acres

This would indicate that approximately 127 acres of Upland Pine-Hardwood Forest occurs along the proposed new ROW.

Bottomland Forest: This land cover class is found along bottomlands adjacent to streams and rivers that are crossed by the proposed segments of new ROW. Based on SCDNR GAP Analysis, the Bottomland Forest land cover is expected to exist along areas of the proposed new ROW mapped as:

- Bottomland/Floodplain Forest – 14 Acres
- Swamp – <1 Acre

This would indicate that less than 15 acres of Bottomland/Floodplain Forest occurs along the segments of proposed new ROW.

Cropland/Residential: This land cover class includes agricultural fields, wildlife food plots, golf courses and residential lawns. Vegetation in this category primarily consists of grasses or agricultural/wildlife crops, such as corn, wheat, soybeans, millet, lespedeza and pea. Based on SCDNR GAP Analysis, the Cropland/Residential land cover is expected to exist along segments of the proposed new ROW within areas mapped as:

- Cultivated Land – 26 Acres
- Urban Residential – 4 Acres

This would indicate that approximately 30 acres of Cropland and/or Residential property exists along the proposed new ROW.

Urban Development: This land cover class primarily consists of impermeable surfaces, buildings, streets, highways, and high-density residential, commercial or industrial developments. Vegetation in this category is primarily limited to maintained landscaping around buildings. Based on SCDNR GAP Analysis, Urban Development constitutes approximately four acres of the proposed new ROW.

Open Water: This land cover class occurs within both the existing and the new rights-of-way and includes rivers, lakes, ponds or other areas that are regularly flooded or intermittently exposed. Based on SCDNR GAP Analysis, the Fresh Water land cover class comprises approximately eight acres of the proposed new ROW. This acreage is in large part due to the crossing of two large water bodies, the Broad River/Parr Reservoir and Catawba River/Fishing Creek.

### **3.5 Wildlife**

Wildlife habitats along the existing rights-of-way (ROW) were assessed in the 2008 Siting Study using Level III Ecoregions (USEPA 2008a) and the South Carolina Department of Natural Resources Land Use data (SCDNR 2008b). Ecoregions identify areas of general ecological similarity, while land cover data identifies specific vegetation composition and structure. The project area traverses the Piedmont, Middle Atlantic Coastal Plain and the Southeastern Plains ecoregions of South Carolina (Figure 3-6 of the 2008 Siting Study). During the 2008 assessment the following land cover types occurring within existing maintained ROW were identified as valued wildlife habitat; pasture/grasslands, shrublands, marsh/emergent wetlands and cultivated fields. This assessment has identified additional land cover types within the proposed new ROW segments that are considered valued wildlife habitat. These include upland deciduous and pine woodlands, and bottomland hardwood floodplain forests. These land cover types provide breeding and foraging habitat for a variety of forest-dwelling species.

The upland pine/hardwood habitats primarily consist of planted pine, mixed pine/hardwood forests and mesic deciduous forests. These habitats currently exist as a mosaic throughout the proposed new ROW segments, with diverse vegetative age and structure evident. Many species of birds, such as pine warbler (*Dendroica pinus*), great crested flycatcher (*Myiarchus crinitus*), summer tanager (*Piranga rubra*) and Eastern wood pewee (*Contopus virens*) use the upland pine/hardwood forest as breeding habitat. Resident and wintering bird populations frequent these habitats throughout the winter months. Species frequently found include Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), downy woodpecker (*Picoides pubescens*), red-

breasted nuthatch (*Sitta canadensis*) and ruby-crowned kinglet (*Regulus calendula*). Game species typically found in the upland pine/hardwood habitats include whitetail deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), gray squirrel (*Sciurus carolinensis*) and Eastern cottontail (*Sylvilagus floridanus*).

Bottomland hardwood forest habitats generally occur as linear wetland drainages and are described as floodplain swamps characterized by the presence of deciduous trees. The wetlands and waters associated with these habitats provide breeding habitats for a diverse assemblage of herpetofuana. Some common species found in these wetland systems include marbled salamander (*Ambystoma opacum*), Spring peeper (*Hyla crucifer*), Southern leopard frog (*Rana sphenocephala*), snapping turtle (*Chelydra serpentina*), rough green snake (*Opheodrys aestivus*) and cottonmouth (*Agkistrodon piscivorus*). Game species frequently found in the bottomland hardwood habitats include whitetail deer, wild turkey, wood duck (*Aix sponsa*) and gray squirrel.

On-site habitat assessments were conducted along 2.44 miles of proposed new ROW in 2008 and were presented in Section 3.5 of the 2008 Siting Study. The schedule provided for this report precluded site access for the completion of on-site habitat assessments of the revised 39.5 miles of new ROW. Santee Cooper plans to conduct on-site habitat assessments along all new ROW segments prior to committing resources for new ROW development.

### **3.6 Endangered, Threatened and Candidate Species**

Plants and animals listed as federally threatened and endangered are protected under the Endangered Species Act (P.L. 92-205) (ESA), which is administered and enforced by the United States Fish and Wildlife Service (USFWS). A detailed explanation and discussion of protected species potentially occurring along the proposed transmission lines was provided in Section 3.6 of the 2008 Siting Study. A majority of the information provided in the original report remains unchanged and/or is not relevant to segments of the transmission lines where new ROW is required. The original analysis provided a

complete list of federally endangered, threatened and candidate species occurring in the counties transected by the transmission corridors. The list was reviewed by qualified biologists in order to eliminate listed species that would not be found within existing maintained rights-of-way based on habitat requirements and occasional human disturbance. The results of this review are provided in Table 3-10 of the 2008 Siting Study. The South Carolina Heritage Trust Program (SCHTP) Rare and Endangered Species Inventory (Inventory) website (SCDNR 2009), a Geographic Information System (GIS) natural resources data layer that includes the locations of all documented occurrences of federally endangered, threatened and candidate species, was also reviewed for known occurrences of such species proximate to the transmission lines.

For this revised analysis a complete list of federally endangered, threatened and candidate species occurring in the counties where new ROW is located (Lancaster, Chester, Fairfield, Newberry, Richland and Dorchester) was compiled. Existing habitat types along the new segments of ROW were estimated using available aerial photography and land use/land cover maps. A description of these general land cover types is included in Section 3.4. This review of existing habitat along the new segments of ROW was compared to suitable habitat for the protected species known to occur in the subject county. Based on this review, it was determined that each of the species identified in the original report were identified as having suitable habitat along segments of the new ROW in one or more of the counties reviewed, with the exception of the flatwoods salamander. There were no additional species that were not previously discussed in the 2008 Siting Study identified in the current investigation. The SCHTP Inventory was reviewed again for the current analysis and no documented occurrences of federally endangered, threatened or candidate species were identified within areas of the new ROW. Table 3-4 presents the list of protected species potentially occurring in the study area.

Table 3-4: Federally endangered, threatened and candidate species potentially in the study area

Common Name	Scientific Name	Status	General Habitat Type	County Occurrence*
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA	coastlines, rivers, large lakes or streams	Chester, Fairfield, Newberry, Richland and Dorchester
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	mature pine forests	Chester, Richland and Dorchester
Wood stork	<i>Mycteria americana</i>	E	feed in fresh and brackish wetlands; nest in cypress or other wooded swamps	Richland and Dorchester
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	E	most major river systems along the eastern seaboard	Richland and Dorchester
Flatwoods salamander	<i>Ambystoma cingulatum</i>	T, PCH	Open mesic pine/wiregrass flatwoods dominated by longleaf pine, fire maintained; isolated, shallow, small depressions for breeding	NA
Carolina heelsplitter	<i>Lasmigona decorata</i>	E, CH	cool, slow-moving, small to medium sized streams and rivers; mud, muddy sand, or muddy gravel substrates along stable, well shaded stream banks	Lancaster, Newberry and Richland
Pondberry	<i>Lindera melissifolia</i>	E	swamp and pond margins, sandy sinks, swampy depressions, wet flats	Dorchester
Canby's dropwort	<i>Oxypolis canbyi</i>	E	pond-cypress savannahs dominated by grasses, sedges or ditches next to bays; borders and shallows of cypress-pond pine ponds and sloughs	Richland and Dorchester
Smooth coneflower	<i>Echinacea laevigata</i>	E	prairie remnants, open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, power line ROW's, usually on magnesium and calcium rich soils	Lancaster and Richland
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	E	prairie and glade remnants, clearings and edges of upland woods on clayey soils with high gravel content	Lancaster
Rough-leaved loosestrife	<i>Lysimachia asperulaefolia</i>	E	sandhills in ecotones or edges between longleaf pine uplands and pond pine pocosins; moist to seasonally saturated sands; on shallow organic soils overlaying sand	Richland
Black spored quillwort	<i>Isoetes melanospora</i>	E	rock-rimmed shallow pools on granite outcrops	Lancaster
Little amphianthus	<i>Amphianthus pusillus</i>	T	vernal pools on large isolated granite domes or gently rolling granite outcrops	Lancaster
Georgia aster	<i>Symphotrichum georgianum</i>	C	prairie remnants, road ROW's, utility ROW's, other openings	Chester, Fairfield and Richland
Bog asphodel	<i>Nartheccium americanum</i>	C	savannahs, usually with water moving through substrate; sandy bogs along streams and rivers	Dorchester

Source: USFWS 2008 and SCDNR 2008a

- E – Federally endangered
  - P – Proposed in the Federal Register
  - BGEPA – Federally protected under the Bald and Golden Eagle Protection Act
  - C – Candidate: the USFWS has on file sufficient information on biological vulnerability and support proposals to list these species; however, they are not legally protected at this time.
  - T – Federally threatened
  - CH – Critical Habitat
- threat(s) to

\* Only counties that include segments of new ROW are included in this table column

The SCDNR was contacted via email on September 6, 2009 to determine if any additional information regarding protected species was available for the USGS quadrangle maps which encompasses the new ROW areas. Ms. Julie Holling, Data Manager, SCDNR responded on September 8, 2009 via email that “no additional information has been reported” for this area.

General descriptions of the species listed in Table 3-10 were provided in the 2008 Siting Study and are not repeated below. The information presented below for each protected species identifies the closest known occurrences of the species to the proposed new segments of ROW.

Bald Eagle: The closest bald eagle nest to the proposed new line segments is the previously identified nest known to occur approximately 3 miles upstream from the proposed new ROW along the Parr Reservoir in Newberry County.

Red-Cockaded Woodpecker (RCW): The closest known RCW group to the proposed new segments of ROW occurs approximately 8 miles from the new line segment in Dorchester County. No other known RCW groups were identified near the segments of new ROW.

Wood Stork: There are no known occurrences of nesting wood stork colonies along or near the new ROW segments in Richland and Dorchester counties.

Shortnose Sturgeon: The proposed new ROW in Dorchester County will not cross any river systems that support shortnose sturgeon.

Carolina Heelsplitter: Proposed segments of new ROW cross Little River and Cedar Creek in Richland County and Rocky Creek in Newberry County. These water bodies (part of the Broad River system) contain potential habitat for Carolina heelsplitter. However, there are no known records of this species from the Broad River system, despite surveys conducted from 1987-1990 (USFWS 1993). Carolina heelsplitter is also known to occur upstream of the new ROW segment of the VCSNS-Flat Creek line in the Waxhaw Creek and Gills Creek drainages (SCDNR 2009). These water bodies (part of

the Catawba River system) contain designated critical habitat for the Carolina heelsplitter (USFWS 2002). However, these known populations are located approximately 15 miles north and 12 miles northeast, respectively, of the proposed new ROW segment located in Lancaster County.

Pondberry: Pondberry is found in shallow depression ponds of the sandhills, along margins of cypress ponds in the pineland coastal areas of South Carolina, and in seasonally wet, low areas among bottomland hardwoods in interior areas. The segment of proposed new ROW located in Dorchester County does not appear to include habitat types that would support pondberry.

Canby's dropwort: Canby's dropwort occurs in pond cypress savannas, shallows and edges of cypress/pond pine sloughs, and wet pine savannas. Typical sites are characterized by open conditions with savannah-like herbaceous layers. Habitat types that would support Canby's dropwort are not expected within the areas of the proposed new ROW located in Richland and Dorchester counties.

Smooth coneflower, Schweinitz's sunflower, Rough-leaved loosestrife and Georgia aster: With the exception of Georgia aster, these species are known to occur in Lancaster and/or Richland counties. Georgia aster is known to occur in Chester, Fairfield and Richland counties. The preferred habitat for these species is naturally-occurring open areas, as well as transmission line rights-of-way and other disturbed areas. These types of open habitats are known to occur in areas of the proposed new ROW in Lancaster Chester, Fairfield and Richland counties. However, the proposed increase in maintained transmission corridor may increase the amount of suitable habitat for these species.

Black spored quillwort and Little amphianthus: Black spored quillwort and Little amphianthus occur on large isolated granite domes or gently rolling granite flatrocks (USFWS 1992). These species are typically found in shallow flat-bottomed pools found on the crest and flatted slopes of unquarried outcrops. No granite outcrops were identified along the proposed new ROW located in Lancaster County.

**Bog asphodel:** Bog asphodel is known to occur historically in Dorchester County, South Carolina. However, all extant populations are in the Pine Barrens region of New Jersey (USFWS 2007). The segment of proposed new ROW located in Dorchester County does not include suitable habitat that would support Bog asphodel.

In 2008 an on-site threatened and endangered species survey was conducted along the original 2.44 miles of proposed new ROW to determine the occurrence of, or potential for, federally listed endangered or threatened species to exist within this area. The results of this survey were presented in Section 3.6 of the 2008 Siting Study. The schedule provided for this report precluded site access for the completion of on-site protected species surveys of the revised 39.5 miles of new ROW. Although no documented occurrences of federally endangered, threatened or candidate species were identified within areas of the new ROW, suitable habitat for these protected species may occur along segments of new ROW. Santee Cooper plans to conduct additional protected species surveys along new ROW segments prior to committing resources for new ROW development.

### **3.7 Cultural Resources**

A comprehensive cultural resources literature and records review was conducted in July 2008 for a two kilometer (1.25 mile) radius, as specified by the NRC Environmental Standard Review Plan (USNRC 1999), along the length of the VCSNS-Flat Creek and VCSNS-Varnville transmission line corridors. The purpose of the research was to collect information on previously identified structures and archeological sites within 1.25 miles of the VCSNS-Flat Creek and VCSNS-Varnville transmission line corridors, with special attention to NRHP-listed and -eligible properties within or immediately adjacent to the transmission corridors. A summary of this investigation is included in Section 3.7 of the 2008 Siting Study. The changes to the transmission lines discussed in this report do not affect the results of the previous cultural resources investigations conducted in 2008.

### **3.8 Resident Population**

Population density for the census tracts that the transmission corridors traverse were collected from the U.S. Census in year 2000 and are shown in Figure 3-7 and Table 3-12 of the 2008 Siting Study. No changes to the census tracts transected by the proposed transmission lines occurred as a result of the changes to the rights-of-way. A detailed discussion of population is included in Section 3.8 of the 2008 Siting Study.

### **3.9 Aesthetics and Noise**

#### **3.9.1 Aesthetics**

A majority (approximately 83.5%) of the combined VCSNS-Flat Creek and VCSNS-Varnville transmission lines have been routed within existing maintained transmission line rights-of-way (ROW). These existing ROW are cleared of tall growing woody vegetation and are generally lined with single pole and/or H-frame structures averaging in height from 55 to 80 feet.

The remaining 39.5 miles (approximately 16.5%) of the combined VCSNS-Flat Creek and VCSNS-Varnville transmission lines will require a new ROW, primarily adjacent and parallel to existing maintained ROW. The 39.5 miles of new ROW consists of numerous land use and land cover/vegetation types as described in Sections 3.4 and 3.5, respectively. A majority of this area currently consists of undeveloped woodlands or agricultural fields adjacent and parallel to existing maintained transmission ROW. Although new clearing of approximately 178 acres of wooded areas will be required, these areas have already been somewhat fragmented by the existing adjacent ROW, with the exception of 0.54 miles (6.57 acres) of new ROW near the St. George substation that is not adjacent to existing ROW. In addition to approximately 178 acres of forest, the new ROW also includes approximately 5.7 acres of wetlands and approximately 8.5 acres of open water.

### **3.9.2 Noise**

A detailed discussion of noise associated with transmission lines is included in Section 3.9.2 of the 2008 Transmission Line Siting Study. The information provided in the previous report has not been affected by the recently-proposed changes to the transmission lines.

### **3.10 Electromagnetic Fields**

Existing portions of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines currently consist of various voltage transmission lines. The existing transmission lines generally associated with the proposed VCSNS-Flat Creek line is predominantly 69kV (58.03 miles), with the remainder consisting of a 230kV line. The existing transmission lines generally associated with the proposed VCSNS-Varnville line is predominantly 115kV (114.56 miles), with the remaining segments consisting of 69kV and 230kV lines. The changes to the VCSNS-Flat Creek and VCSNS-Varnville transmission lines do not affect the voltage of the existing or proposed lines. The discussion of electromagnetic fields in Section 3.10 of the 2008 Siting Study remains applicable to the current project.

### **3.11 Safety**

A discussion of the potential safety risk of electric shock related to the increased electric field associated with the VCSNS-Flat Creek and VCSNS-Varnville transmission lines was included in Section 3.11 of the 2008 Siting Study. Changes to the proposed transmission lines do not alter the Safety discussion presented in the original report.

### **3.12 Air Quality**

The 2008 Transmission Line Siting Study includes a discussion of U.S. Environmental Protection Agency (EPA) National Ambient Air Quality Standards and their potential to be affected by the development and operation of the proposed transmission lines (Section 3.12). The counties transected by the proposed transmission lines have not changed with the alterations to the lines. Therefore, no update to the Air Quality information is required in this report.

### **3.13 Aviation**

Section 3.13 of the 2008 Siting Study details the Federal Aviation Administration (FAA) requirements for notification of construction which has the possibility of interfering with air traffic. The airports which are located within a specified distance/elevation of the proposed transmission lines were also previously identified in Section 3.13. No significant changes to the information presented in Section 3.13 of the previous report have occurred as a result of the modifications to the proposed transmission lines, with the exception that the St. George Municipal Airport is located approximately 2.2 miles from the revised VCSNS-Varnville line along the existing 125-foot transmission corridor extending to the Byrds substation. FAA notification will be required if taller transmission line structures are replaced in this segment of the ROW. The St. George airport is included in Figure 2-1, Sheet K01 of the 2008 Siting Study.

## **4.0 ENVIRONMENTAL IMPACTS**

Transmitting the additional electricity generated as a result of the proposed expansion of the VCSNS will require Santee Cooper to increase the number and size of the lines culminating from the VCSNS. Santee Cooper has been able to minimize impacts, while still meeting their obligation to transmit additional electricity generated, by routing two new 230kV transmission lines within existing maintained ROW to the greatest extent possible (roughly 83.5% of approximately 239 miles of combined transmission line). With the exception of the approximate 39.5 miles (approximately 16.5%) of proposed new ROW, development impacts will include replacing existing single pole or H-frame structures with new, non-wood single pole or H-frame structures; moving existing transmission lines to the side of the existing ROW and adding new, non-wood single pole or H-frame structures within the existing ROW; and for some segments of the corridors, just installing new 230kV line on existing H-frame structures. Adding the VCSNS-Flat Creek and VCSNS-Varnville 230kV lines within the existing rights-of-way and developing the 39.5 miles of proposed new ROW will be conducted in a phased approach over the course of several years.

Limited impacts discussed in Section 4.0 of the 2008 Siting Study may occur as a result of the installation and replacement activities within existing portions of the transmission corridors. The current design plans for the proposed transmission lines now require the development of approximately 39.5 miles (375 acres) of new ROW adjacent and parallel to existing maintained ROW, with the exception of 0.54 miles (6.57 acres) of new ROW near the St. George substation, which is not adjacent to existing ROW. The segments of new ROW will require clearing of approximately 142 acres of woodlands. A majority of the remaining new ROW (approximately 213 acres) consists of open habitat (grasslands, pasture, agricultural fields, scrub/shrub, etc.) that will require minimal alteration during construction and operation activities. Santee Cooper will utilize best management practices (BMPs), as defined in Santee Cooper maintenance documents (Appendix B of the 2008 Siting Study) and based on common industry standards, to the greatest extent possible in order to minimize impacts.

#### **4.1 Landform, Geology and Soils**

Potential impacts to the geologic environment as a result of the development of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines within the approximately 199.5 miles (approximately 83.5%) of existing right-of-way include erosion, sedimentation and relocation of soils. Additional minor impacts associated with the development of the 39.5 miles of proposed new right-of-way may include topographic changes, variation of existing drainage patterns, and potential loss of mineral resources and restriction on the use of prime farmland soils.

A detailed description of the structure and 230kV line installation process that will occur along the entire length of the proposed transmission corridors is included in Section 4.1 of the 2008 Siting Study. The current modifications to the right-of-way plans described in this report do not affect this process and impacts to vegetative cover and soils associated with the installation of the transmission lines and structures discussed in the previous report remain accurate. However, engineering controls and BMPs to prevent and limit sedimentation and erosion will be implemented during the installation process, as previously discussed in the 2008 Siting Study. Implementation of these control measures are expected to minimize erosion and sedimentation during construction and maintenance activities. As a result, significant impacts to soils or geological features are not expected.

Although a significant portion of the proposed transmission corridors (both new and existing segments) traverse numerous areas of Prime Farmland (886 acres) and Farmlands of Statewide Importance (931 acres), less than half of these designated areas are currently used for agricultural activities (approximately 720 acres, including pastureland). During construction and maintenance of the lines, impacts to farmlands will be minimized by entering rights-of-way from the perimeter of agricultural fields. Santee Cooper allows and encourages continued farming activities by property owners within their transmission line rights-of-way.

Development of the 39.5 miles (375 acres) of new ROW will primarily consist of clearing existing woody vegetation within the proposed ROWs. In the performance of this work, vegetation will be removed from the ROW, exposing soils to potential erosion from precipitation, wind and vehicles. In order to minimize the potential for erosion of soils, a designed sedimentation and erosion control program as part of a Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the development of the transmission lines within the segments of proposed new ROW. The implementation of these control measures and any others specified in the SWPPP, are expected to minimize erosion and sedimentation during construction activities. Implementation of the SWPPP will minimize the minor impacts that may occur to landform and geology during the development of the 39.5 miles of proposed new ROW.

## **4.2 Water Resources**

### **4.2.1 Hydrology and Water Quality**

Impacts to Hydrology and Water Quality as a result of the proposed project are discussed in Section 4.1 of the 2008 Siting Study. The minimal impacts and use of BMPs associated with erosion and sedimentation discussed in the original report remain consistent with the current evaluation. Santee Cooper will prepare one or more Stormwater Pollution Prevention Plan (SWPPP), in accordance with SCDHEC's *Standards for Stormwater Management and Sediment Reduction*, (SCDHEC 2002), for development of the approximate 39.5 miles of proposed new ROW. Adherence to the project specific SWPPP will minimize impacts to sediment quality during transmission line construction along the proposed new ROW.

### **4.2.2 Wetlands Impacts**

Santee Cooper has consulted with both the United States Army Corps of Engineers (USACE) and the South Carolina Department of Health and Environmental Control (DHEC) regarding the need for the VCSNS-Flat Creek and VCSNS-Varnville transmission lines as a result of the proposed VCSNS expansion. Detailed summaries of these discussions and descriptions of regulated activities in jurisdictional and navigable waters, including streams and wetlands, are provided in Section 4.2.2 of the

2008 Siting Study. In addition, this section of the original report includes a discussion of the potential minor impacts associated with the installation of new transmission structures within the ROW and measures for the protection of wetlands, streams and other waters. A majority of the information presented in Section 4.2.2 of the 2008 Siting Study remains consistent for this evaluation and is not repeated here. It is expected that only minor and/or temporary impacts to wetlands will be associated with the development and maintenance of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines.

The major difference is the addition of approximately 37 miles of new ROW, primarily adjacent and parallel to existing maintained ROW, to the proposed project. The segments of new ROW (including the original 2.44 miles of new ROW) are estimated to include no more than approximately six acres of wetlands. These wetland areas, as well as other jurisdictional waters of the U.S., will be delineated and verified by the USACE prior to transmission line development. Wetlands identified during this process will be protected throughout the transmission line development process to the greatest extent possible. Unavoidable wetland impacts along the segments of new corridor will consist of clearing of vegetation according to Part A2 (Clearing Specifications; Appendix B of the 2008 Siting Study) of Santee Cooper's Section IV Technical Requirements. Following development of the approximate 39.5 miles of proposed new corridor, Santee Cooper will maintain the right-of-way in accordance with their current ROW Management Unit Plan. No fill or other significant discharge in wetlands is currently expected along either the VCSNS-Flat Creek or VCSNS-Varnville transmission lines.

The VCSNS-Flat Creek and VCSNS-Varnville transmission lines continue to cross navigable waters of the state at an estimated 18 locations. However, four of these navigable water crossings are now located in areas of proposed new ROW (see Section 3.2.2 for additional information). These lines will be installed to acceptable DHEC specifications.

Santee Cooper will continue to coordinate with the USACE and SCDHEC and provide the agencies with requested information that has been updated according to the most recent design plans. Once the COLA is approved, Santee Cooper will advance the design of the proposed VCSNS-Flat Creek and VCSNS-Varnville transmission lines and will file for the appropriate USACE and SCDHEC permit(s) (including CZM certification by OCRM), as necessary.

#### **4.2.3 Floodplain Impacts**

Information regarding floodplain impacts is provided in Section 4.2.3 of the 2008 Siting Study. No change to this information is required as a result of the revisions to the proposed transmission lines.

#### **4.3 Land Use**

A majority (approximately 83.5%) of the approximate 239 miles of proposed transmission lines will not significantly affect local or regional land use, as these portions of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines are routed, and will be developed within, existing Santee-Cooper maintained ROW. However, the sections of proposed new ROW, totaling approximately 39.5 miles (375 acres), will affect existing land use in these areas. A breakdown of the land use in these areas is provided in Table 3-3. The wooded portions of the proposed segments of new ROW will be cleared for the development of the transmission lines. This unavoidable impact will permanently change the land use of approximately 178 acres of undeveloped woodlands (includes approximately 37 acres of early successional scrub/shrub thicket) to transportation/utilities. The impacts associated with the clearing of wooded areas along segments of new ROW are discussed in more detail in sections 4.4 and 4.5.

#### **4.4 Land Cover / Vegetation**

Temporary and minor impacts to land cover resulting from the installation of new lines and structures within the existing approximately 83.5% of the proposed transmission line corridors are discussed in Section 4.4 of the 2008 Siting Study. This section of the

previous report also includes a detailed discussion of vegetation management within the rights-of-way, both prior to development and during the operation/maintenance phase, as outlined in Santee Cooper's ROW Management Unit Plan (Appendix B of the 2008 Siting Study). Mitigative measures and engineering controls to offset disturbance during development are also discussed in the original report. This information has not changed as a result of the modifications to the project and is not included in the current discussion. Routing approximately 199.5 miles (approximately 83.5%) of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines within existing maintained ROW will significantly decrease the extent and degree of environmental impacts as a result of this project. Using existing maintained transmission rights-of-way will prevent significant impacts from the loss of forested habitat that would result if routing required a greater percentage of new right-of-way.

Portions of the approximate 39.5 miles of proposed new ROW that currently contain Upland Pine-Hardwood Forest and Bottomland Forest will require approximately 142 acres of new clearing. These areas will be converted to an open vegetation habitat as a result of transmission line development. Permanent conversion of forest habitat to grassland and shrubland habitats will alter the species composition and the habitat structure (layered forest), as well as affect adjacent habitats (streams, rivers, lakes and adjacent forest). Loss of tree canopy cover for water bodies/streams within the 39.5 miles of proposed new ROW will change edge habitat and shading quality. Minimal losses of forest wildlife habitat are unavoidable in these areas; however, only limited alteration of edge habitat and forest fragmentation will occur because the majority of proposed new ROW is immediately adjacent to existing, maintained ROW. The wooded areas to be cleared contain a range of habitat quality and no significant or critical woodland habitats will be altered as a result of this project. In addition, given the high proportion of forested land cover in the areas proximate to the VCSNS-Flat Creek and VCSNS-Varnville transmission lines, the impact of the areas to be converted for this project are minimal.

#### **4.5 Wildlife**

A discussion of the impacts to the vegetative structure and composition of wildlife habitat types along the existing transmission corridors as a result of the proposed project was presented in Section 4.5 of the 2008 Siting Study. This discussion is not repeated in here as it remains accurate for a majority (approximately 83.5%) of the proposed transmission lines.

The development of the segments of new ROW will result in the permanent conversion of approximately 142 acres of wooded habitat to Early Successional habitat. However, this clearing will primarily occur adjacent to existing maintained ROW and will limit fragmentation of forested landscapes. The new Early Successional habitat will be maintained according to Santee Cooper's ROW Management Unit Plan and will provide valuable nesting and foraging habitats as presented in Section 4.5 of the 2008 Siting Study. Although some breeding and foraging bird species will be displaced by the loss of wooded habitats, the species currently using these areas are ubiquitous and will likely take advantage of suitable habitats adjacent to the new ROW.

Games species identified in Section 3.5 as using these wooded habitats tend to be generalists, with the ability to thrive in a variety of habitats. These species are likely to continue to use habitats converted from wooded to early successional habitats. Impacts to wetland habitats will be temporary during the development of the new ROW. Herpetofauna identified in Section 3.5 as currently using these wetland habitats will continue to benefit from some wetland function that will continue after transmission line development.

For species which prefer edge-type habitats, the transmission corridor will provide good habitat and may result in an increase in abundance. In general, no significant impacts to wildlife are expected as a result of the development and operation of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines.

#### **4.6 Endangered, Threatened and Candidate Species**

The South Carolina Heritage Trust Program Rare and Endangered Species Inventory (Inventory) digital database was compared to the study area for the segments of new ROW along the VCSNS-Flat Creek and VCSNS-Varnville lines and found no documented occurrences of federally endangered, threatened or candidate species within the new ROW (SCDNR 2009). The following endangered, threatened or candidate species are known to occur in one or more counties transected by the segments of new ROW along the VCSNS-Flat Creek and VCSNS-Varnville transmission corridors: bald eagle, red-cockaded woodpecker, wood stork, shortnose sturgeon, Carolina heelsplitter, pondberry, Canby's dropwort, smooth coneflower, Schweinitz's sunflower, rough-leaved loosestrife, black spored quillwort, little amphianthus, Georgia aster and bog asphodel.

Aerial photographs and land use/land cover maps were reviewed to approximate existing habitat types along the new ROW areas. Estimated habitat along each section of new ROW was then compared to suitable habitat for the species known to occur in the subject county. Based on this comparison it has been determined that the changes to the proposed transmission lines will have no effect on the shortnose sturgeon and will not likely adversely affect the remaining species listed above, with the exception of the red-cockaded woodpecker (see discussion below). Additional information regarding potential impacts and possible mitigation measures associated with protected species along the entire length of the corridors is discussed in Section 4.6 of the 2008 Siting Study.

The red-cockaded woodpecker (RCW) occurs in mature open pine forests. According to the USFWS RCW survey protocols, determinations for the presence or absence of RCWs must be undertaken for projects that will involve the removal of pine trees 30 years or older (USFWS 2003). No mature pine trees will be removed during the structure installation/replacement activities along the existing VCSNS-Flat Creek and VCSNS-Varnville transmission corridors. Present within the new ROW areas are commercially managed pine and mixed pine-hardwood forests. These are typically isolated tracts of land under intensive commercial timber management. Although very

few trees of sufficient age, if any, will be removed within the areas of new ROW, a pedestrian survey will be conducted along wooded areas of the new ROW to identify potential RCW habitat prior to clearing these portions of the ROW for transmission line construction.

In October 2007, Santee Cooper met with the USFWS Charleston Ecological Field Services Office to discuss the need for the VCSNS-Flat Creek and VCSNS-Varnville transmission lines as a result of the proposed VCSNS expansion. Based on the changes to the proposed transmission lines and the previous requests from the USFWS, additional pedestrian surveys will be conducted along the segments of new ROW where suitable habitat for protected species has been identified. Santee Cooper will submit a sampling plan identifying these areas within the rights-of-way, as well as Santee Cooper's standard operating procedure (SOP) for clearing and maintenance of ROWs, to the USFWS prior to initiating these surveys. Once the COLA is approved, Santee Cooper will advance the design of the proposed transmission lines and will coordinate with the USFWS for concurrence. The additional protected species surveys will be performed prior to committing resources for the new ROW development.

#### **4.7 Cultural Resources**

A summary of the results of a cultural resources investigation conducted in July 2008 was included in Section 4.7 of the 2008 Siting Study. The changes to the proposed transmission lines discussed in this report do not affect the findings of the previous cultural resources on this project.

Santee Cooper has met with the South Carolina State Historic Preservation Office (SCSHPO) on numerous occasions, most recently in August 2009, to provide project information and details regarding Santee Cooper's transmission line siting associated with the expansion of the VCSNS. Santee Cooper will continue to coordinate with the SCSHPO and will comply with requirements necessary for Section 106 compliance and SCSHPO concurrence for the project, including the completion of a Cultural Resources Management Plan that will be agreed upon by both Santee Cooper and the SCSHPO.

## **4.8 Resident Population**

The VCSNS-Flat Creek and VCSNS-Varnville transmission lines have been routed within existing transmission corridors to the greatest extent possible (approximately 83.5% of the entire length). The remaining approximately 39.5 miles (approximately 16.5%) of proposed new ROW is located adjacent to existing maintained ROW, with the exception of 0.54 miles of new ROW near the St. George substation that is not adjacent to existing ROW. The segments of new ROW include 4 acres classified as residential. Santee Cooper will verify that no residences are located proximate to these new ROW areas prior to the completion of design plans. No changes to the census tracts transected by the proposed transmission lines occurred as a result of the changes to the rights-of-way. Resident populations in the counties and census tracts transected by the two transmission lines are expected to remain minimally impacted by this project.

## **4.9 Aesthetics and Noise**

### **4.9.1 Aesthetics**

Continuing to route a majority of the new 230kV transmission lines within existing maintained ROW will result in potential minor aesthetic impacts. Limited aesthetic impacts within the existing transmission line corridors were discussed in Section 4.9.1 of the 2008 Siting Study.

The approximate 39.5 miles of proposed new ROW will include new clearing adjacent to existing maintained rights-of-way, with the exception of 0.54 miles (6.57 acres) of a 100-foot wide ROW near the St. George substation that is not adjacent to existing ROW. The proposed new ROW primarily consists of wooded and agricultural properties. Approximately 142 acres of forest and approximately 6 acres of wetlands will require permanent clearing for the new transmission lines; however, the species composition and habitat structure (layered forest) of the area will not be significantly altered as the new clearing will be adjacent to existing maintained ROW. No new forest fragmentation will occur as a result of this project. Although new ROW required for the project has increased to approximately 16.5% of the total length of the

combined corridors and will require the addition of new transmission structures for the proposed transmission lines, which may be closer to some residential properties, impacts to the aesthetics of these areas are expected to remain minimal as the vast majority (nearly 99%) of new ROW is located adjacent and parallel to existing maintained ROW.

#### **4.9.2 Noise**

Section 4.9.2 of the 2008 Siting Study concluded that there should be minimal impacts related to noise from the operation of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines. Minimal construction noise is expected to be temporary and can be mitigated in several ways. The changes to the proposed transmission lines do not significantly affect the conclusions related to noise discussed in the previous report. Proposed transmission lines in the new portions of ROW may be closer in proximity to a few scattered residential properties. However, the segments of new ROW will not include areas with existing residential structures and as previously discussed in the original report, expected audible noise from the transmission lines is less than the level of ambient noise in an average home.

#### **4.10 Electromagnetic Fields**

The changes to the VCSNS-Flat Creek and VCSNS-Varnville transmission lines do not affect the voltage of the existing or proposed transmission lines. The design of the new structures and lines also has not changed and is expected to minimize magnetic and electric fields near the transmission lines, as discussed in Section 4.10 of the 2008 Siting Study. The segments of new ROW primarily consist of wooded and agricultural properties adjacent and parallel to existing ROW, with only 4 acres in areas classified as residential. Santee Cooper will verify that segments of new ROW will minimize potential impacts to previously unaffected residents and property owners from extremely low frequency electromagnetic field (ELF/EMF) prior to the completion of design plans. ELF/EMF is not expected to be a health concern due to the expected low magnetic field levels associated with the new lines and location of the majority of the new lines within existing transmission corridors.

#### **4.11 Safety**

Changes to the proposed transmission lines do not affect the information pertaining to public safety presented in Section 4.11 of the 2008 Siting Study. The VCSNS-Flat Creek and VCSNS-Varnville 230kV transmission lines will be designed to meet or exceed the requirements of the NESC in effect at the time of design.

#### **4.12 Air Quality**

The 2008 Siting Study concluded that the development and operation of the VCSNS-Flat Creek and VCSNS-Varnville transmission lines is not expected to cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS). The alterations to the proposed transmission lines do not affect the Air Quality impacts discussed in Section 4.12 of the 2008 Siting Study.

#### **4.13 Aviation**

The 2008 Siting Study identified portions of the transmission line corridors located within the established FAA restricted space of four airports. Modifications of the proposed transmission lines presented in this report have no impact on the conclusions and requirements presented in Section 4.13 of the 2008 Siting Study; with the exception of an additional airport that will require the completion of a “Notice of Proposed Construction or Alteration” (form SF 7460-1). FAA notification will still be required for new structures located in the restricted space of the four airports previously identified, as well as the St. George Municipal Airport, which was identified approximately 2.2 miles from the revised VCSNS-Varnville line along the existing 125-foot transmission corridor extending to the Byrds substation.

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