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October 19, 2010
NND-10-0383

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTN: Document Control Desk

Subject: Virgil C. Summer Nuclear Station Units 2 and 3
Docket Numbers 52-027 and 52-028
Combined License Application – SCE&G Transmission Line
Siting Study Revision and Associated GIS Data

- References:
1. Letter from Ronald B. Clary to Document Control Desk, Submittal of Revision 2 to Part 3 (Environmental Report) of the Combined License Application for the V. C. Summer Nuclear Station Units 2 and 3, dated July 2, 2010.
 2. Letter from Ronald B. Clary to Document Control Desk, Voluntary Submittal for the Environmental Report to Update Transmission Line Information for V. C. Summer Nuclear Station Units 2 and 3, dated October 6, 2010.

By letter dated March 27, 2008, South Carolina Electric & Gas Company (SCE&G) submitted a combined license application (COLA) for V. C. Summer Nuclear Station (VCSNS) Units 2 and 3, to be located at the existing VCSNS site in Fairfield County, South Carolina. Subsequently the Environmental Report (ER), Part 3 of the application, was revised and submitted to the NRC (reference 1).

The enclosures to this letter provide the revised SCE&G transmission line siting study and related GIS data (hard drive) associated with Reference 2. Please note that the GIS data is provided to support the NRC's review of the VCSNS Environmental Report (ER), but does not comply with the requirements for electronic submissions as stated in NRC Guidance Document, "Guidance for Electronic Submissions to the NRC", dated October 29, 2008. The NRC staff requested that GIS and associated metadata be provided in native format. Formatting the hard drive to comply with the guidance on electronic submissions would not serve the request to provide this information in its native format.

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Please address any questions to Mr. Alfred M. Paglia, Manager, Nuclear Licensing, New Nuclear Deployment, P.O. Box 88, Jenkinsville, S.C. 29065; by telephone at 803-345-4191; or by email at apaglia@scana.com.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 19th day of October, 2010.

Sincerely,



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SOUTH CAROLINA ELECTRIC & GAS COMPANY

Columbia, South Carolina

*V.C. SUMMER NUCLEAR STATION
UNITS 2 AND 3
TRANSMISSION LINE SITING STUDY
ADDENDUM NUMBER 1*

SEPTEMBER 2010

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INTRODUCTION AND OVERVIEW

In August 2008, SCE&G conducted transmission line siting studies and completed a report entitled *V.C. SUMMER NUCLEAR STATION UNITS 2 AND 3 TRANSMISSION LINE SITING STUDY* ("2008 Siting Study Report" or "Report") that described potential routes for the four (4) new 230 kV transmission line circuits that must be built to add the generated electrical capacity of V.C. Summer Nuclear Station ("VCSNS") Units 2 and 3 to their electric transmission power grid. The Report explained that SCE&G planned to add the four (4) new circuits by building three new 230 kV lines (one new single-circuit line; one new double-circuit line; and upgrading one existing single-circuit line to a new double-circuit line). The following descriptions of these lines were included in the 2008 Siting Study Report:

1. **VCSNS–Killian 230 kV Line** —This SCE&G single-circuit line will be routed between the existing VCSNS 1 Switchyard and SCE&G's existing Killian Substation. The straight line distance is approximately 25-miles. This line will be called the **VCSNS-Killian Line** throughout this report.
2. **VCSNS–Lake Murray No. 2 230 kV Line** —This SCE&G single-circuit line will be routed between the VCSNS 2 and 3 Switchyard and SCE&G's existing Lake Murray Transmission Substation. SCE&G plans to upgrade an existing single-circuit 230 kV line that runs from the VCSNS 1 Switchyard to the Lake Murray Transmission Substation (the VCSNS-Lake Murray No. 1 230 kV Line) to a double-circuit 230 kV line; therefore, the VCSNS-Lake Murray No. 2 230 kV Line will run with the existing VCSNS-Lake Murray No. 1 230 kV Line on new double-circuit structures and will be built entirely within existing SCE&G transmission line right-of-way. The straight-line distance between the VCSNS 2 and 3 Switchyard and the Lake Murray Transmission Substation is approximately 18-miles. In this report, the new 230 kV Line that will run from the VCSNS 2 and 3 Switchyard to the existing Lake Murray Transmission Substation with the existing Lake Murray No. 1 230 kV Line is referred to as the **VCSNS-Lake Murray No. 2 Line**.
3. **VCSNS–St. George No. 1 and No. 2 230 kV Line** —The VCSNS -St. George No. 1 and No. 2 230 kV lines will be constructed as a single-pole, double-circuit line (circuits No. 1 and No. 2) running from the VCSNS 2 and 3 Switchyard to a new 230/115 kV transmission substation that will be built on property currently owned by SCE&G near St. George, S.C. The straight-line distance is approximately 86-miles. This line is called the **VCSNS-St. George Line** in this report.

The primary goal of the 2008 siting studies was to identify one potential route for the VCSNS-Killian Line and one for the VCSNS-St. George Line No. 1 and No. 2 Lines and document the magnitude of impacts that would likely result from construction of the lines over the potential routes. Additionally, at the time of the 2008 siting studies, SCE&G anticipated that the VCSNS-Lake Murray No. 2 Line would be built entirely within its existing VCSNS-Lake Murray No. 1 Line right-of-way as explained above. The 2008 Siting Study report addressed the predicted impacts that would result from construction of the new lines on the two potential routes and from upgrading the existing VCSNS-Lake Murray No. 1 Line to a double-circuit line to accommodate the VCSNS-Lake Murray No. 2 Line. SCE&G believed precise environmental, cultural, and land use resource effects associated with the final, precise line routes would have been very similar in magnitude to the effects that were presented in the 2008 Siting Study Report that were associated with the two potential routes and the known route associated with the VCSNS-Lake Murray No. 2 Line.

Concurrent with, and subsequent to, the 2008 siting studies that identified the potential routes, SCE&G engineers, transmission system planners and real estate professionals conducted comprehensive investigations to determine how existing SCE&G transmission line rights-of-way could be utilized to the maximum extent practicable as routes for the four new 230 kV circuits associated with VCSNS Units 2 and 3. By mid-2010 this effort led to the conclusion that virtually all of the new lines could be built on existing rights-of-way. Only one line segment of the future VCSNS-Killian 230 kV Line, approximately 6 miles in length, will require new right-of-way, and SCE&G has completed a comprehensive transmission line siting study and selected the route for this segment. The following are descriptions of the final, precise routes for the VCSNS-Killian 230 kV Line, the VCSNS-Lake Murray No. 2 230 kV Line and the VCSNS-St. George No. 1 and No. 2 Lines:

1. **VCSNS-Killian 230 kV Line** — This SCE&G line will connect to SCE&G's existing Killian 230/115 kV Substation near Killian, South Carolina. This line's total length is approximately 37 miles and is routed within existing SCE&G rights-of-way with the exception of an approximate 6 mile segment on the Killian end of the line. The line will be constructed within SCE&G's existing Parr-Winnsboro right-of-way from VCSNS Unit 1 Switchyard to Winnsboro and the existing Winnsboro-Blythewood right-of-way from Winnsboro to Blythewood. The final 6 mile segment, Blythewood to Killian, will occupy a new right-of-way that SCE&G has sited and selected by executing its comprehensive, three-phase transmission line siting process that is fully described in Chapter 2 of the 2008 Siting Study Report.

2. **VCSNS-Lake Murray No. 2 230 kV Line** -This SCE&G line would connect the VCSNS Units 2 and 3 Switchyard to the existing Lake Murray Switchyard near SCE&G's McMeekin and Saluda Hydro Stations near the eastern boundary of Lake Murray. The Lake Murray No. 2 Line will be built entirely within existing right-of-way by utilizing portions of SCE&G's Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-way. An existing SCE&G distribution line will be relocated on the Parr Hydro-Chapin segment to accommodate the line; the Saluda Hydro-Newberry right-of-way will accommodate the line without modifying or relocating the existing double-circuit 115 kV lattice tower line now on the right-of-way. The length of the VCSNS-Lake Murray No. 2 Line will be approximately 21 miles.
3. **VCSNS-St. George No. 1 and No. 2 230 kV Lines** — These SCE&G lines will originate at the VCSNS Units 2 and 3 Switchyard and run to a new substation near St. George, South Carolina. Departing the switchyard, the VCSNS-St. George No. 1 line will run with the new VCSNS-Lake Murray No. 2 Line on the existing Parr Hydro-Chapin right-of-way utilizing a double-circuit, single pole configuration. The VCSNS-St. George No.1 and the VCSNS-Lake Murray No. 2 lines will continue on the existing Saluda Hydro-Newberry right-of-way to the existing Lake Murray 230/115 Substation. The VCSNS-St. George No. 2 line will exit the VCSNS-2 and 3 Switchyard and run with the existing VCSNS-Lake Murray No. 1 230 kV Line to the Lake Murray 230/115 kV Substation. The existing Lake Murray No. 1 Line will be upgraded from a single-circuit H-Frame line to a double-circuit, single pole line to accommodate the St. George circuit. The St. George No. 1 and No. 2 lines will intersect near the Lake Murray 230/115kV substation. After intersecting, the VCSNS-St. George No. 1 and No. 2 230 kV lines will occupy various existing SCE&G rights-of-way corridors to a new 230/115 kV substation near St. George, SC. For the most part, existing SCE&G single pole, 115kv and 230kV lines will be removed and rebuild as double-circuit, single pole 115/230kV and/or 230/230kV configured lines. The length of the VCSNS-St. George No.1 Line will be approximately 98 miles; the VCSNS-St. George No. 2 Line will be approximately 94 miles long.

The total combined length of the four new SCE&G lines (VCSNS-Killian, VCSNS-Lake Murray, VCSNS-St. George No. 1, and VCSNS-St. George No. 2) will be approximately 251 circuit-miles (157 corridor-miles). Except for approximately 6 miles of

new right-of-way associated with the VCSNS-Killian Line, the four new SCE&G lines will be built entirely within existing SCE&G rights-of-way corridors. In addition to these four (4) new 230 kV Lines, SCE&G will construct three lines to connect the VCSNS Unit 1 and Units 2 and 3 Switchyards. The total length of these tie lines will be approximately 5 miles.

Figure 1 displays the locations of the four (4) new SCE&G 230 kV lines that will be built in conjunction with VCSNS Units 2 and 3; Figure 2 displays the locations of the three tie lines that will connect the existing VCSNS Unit 1 Switchyard with the VCSNS Units 2 and 3 Switchyard.

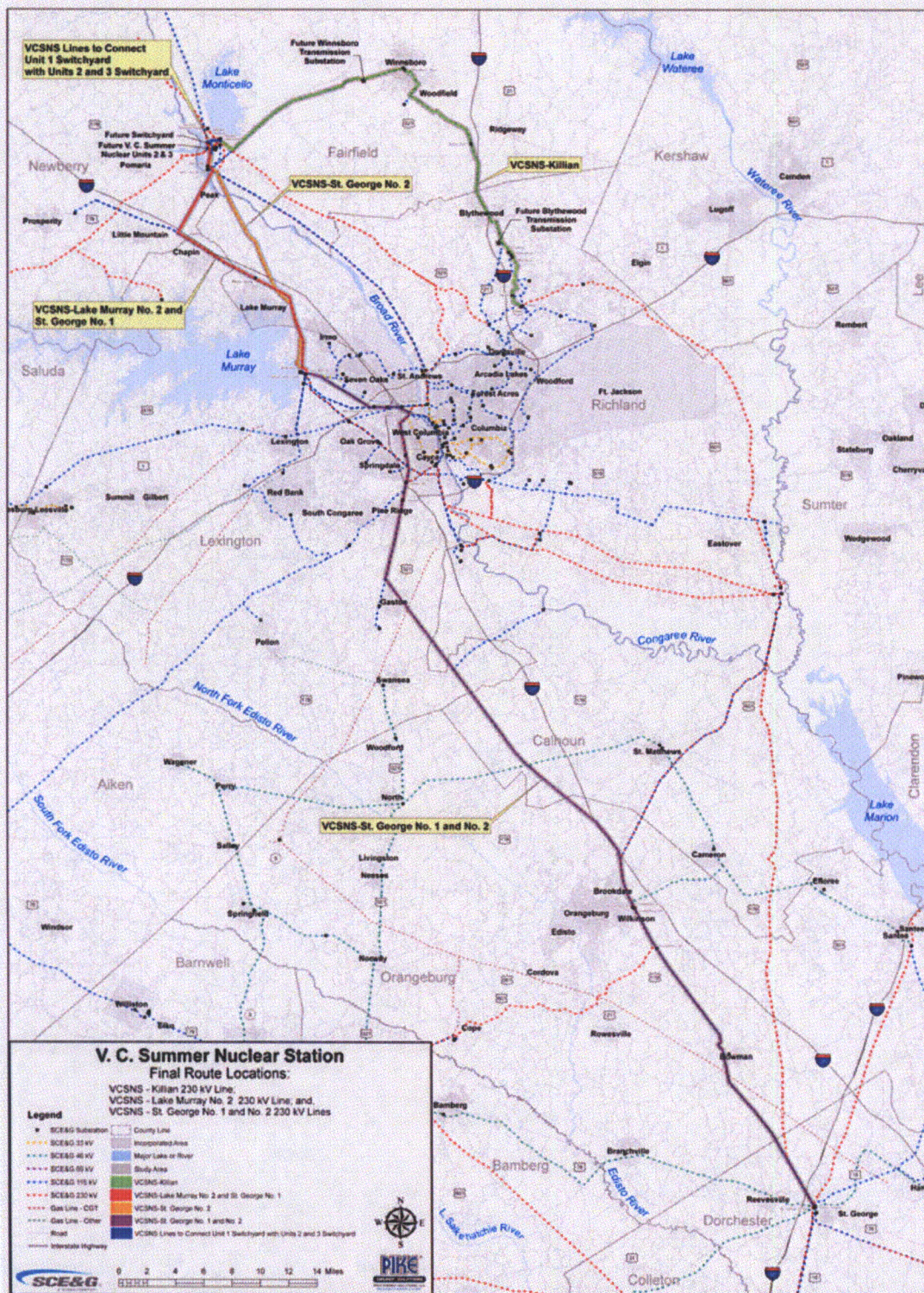


Figure 1: Final Line Route Locations

(VCSNS-Killian 230 kV Line; VCSNS-Lake Murray No. 2 Line; and VCSNS-St. George No. 1 and No. 2 Lines)

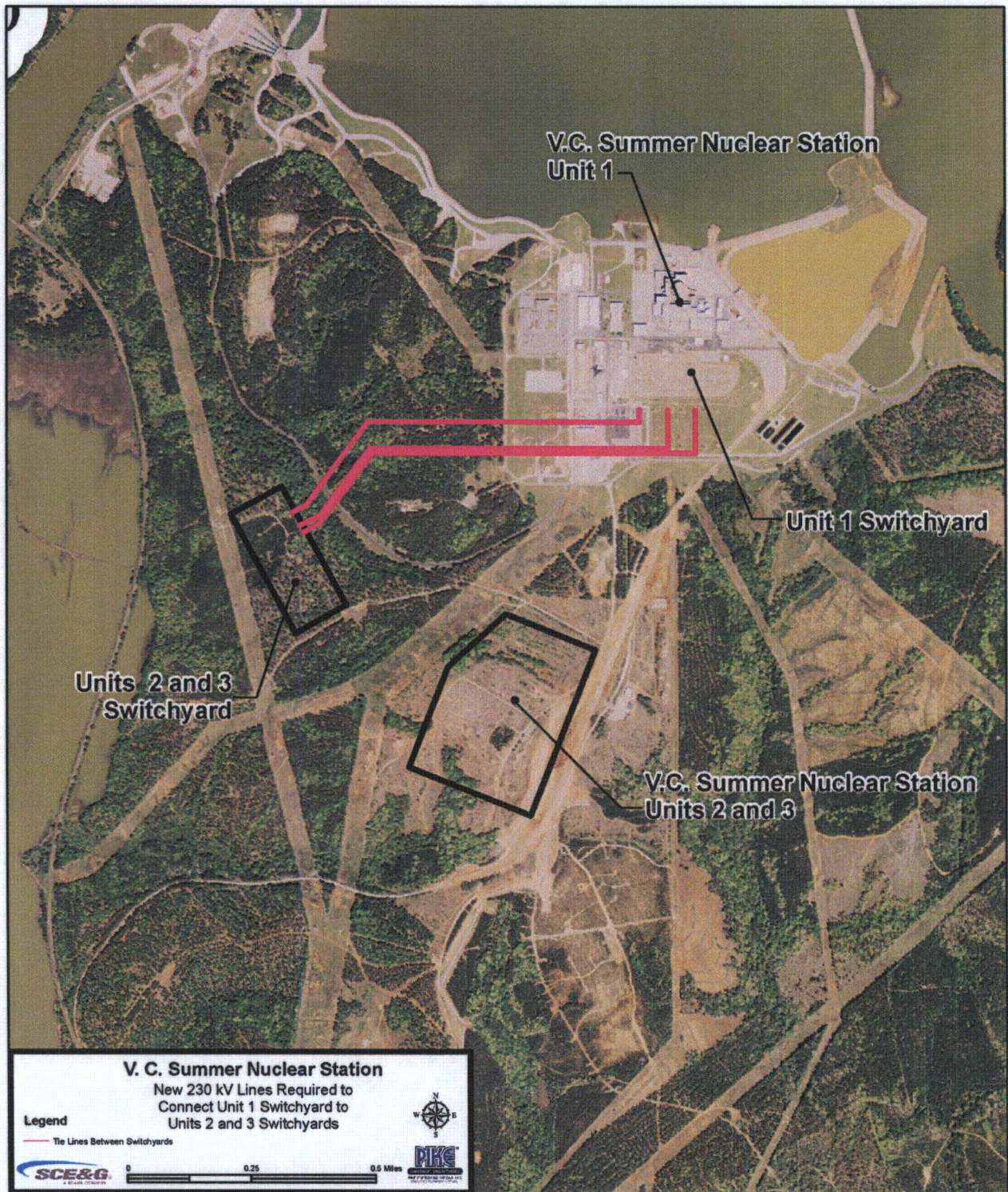


Figure 2: Final Route Locations for Switchyard Connector Lines

1.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes short- and long-term affects to environmental resources, land use, and cultural resources that will occur as a result of construction and operation of SCE&G 230 kV lines associated with VCSNS Units 2 and 3. For reference, it constitutes an update to Chapter 6 of the 2008 Siting Study Report. Throughout this chapter, the future VCSNS 230 kV lines will be referred to by the corridors they will occupy rather than by their individual line nomenclature. For example, the VCSNS-Lake Murray No. 2 230 kV Line and VCSNS-St. George No. 1 230 kV Line will occupy a common corridor from the VCSNS Unit 2 and 3 Switchyard to a point near the Lake Murray 230/115 kV Substation; thus, they are referred to jointly to the extent that they will run together. In this chapter, the assessment and quantification of potential impacts are predicated on a corridor basis, and the following nomenclature describes the individual corridors within which all new SCE&G 230 kV lines associated with the VCSNS Units 2 and 3 will be built:

- VCSNS-Killian 230 kV Line;
- VCSNS-Lake Murray No. 2 230 kV Line and VCSNS-St. George No. 1 230 kV Line;
- VCSNS-St. George No. 2 Line (*From the VCSNS Units 2 and 3 Switchyard to the intersection with the VCSNS-St. George No. 1 circuit near Lake Murray*);
- VCSNS-St. George No. 1 and No. 2 230 kV Lines (*From intersection of St. George No. 1 and No. 2 circuits near Lake Murray to St. George, SC*); and,
- VCSNS Lines (3) to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard.

When reference is made to the combined total of these corridors throughout this chapter, they shall be referred to as the “**VCSNS 230 kV Lines**”.

1.1 Soils

The potential for soil erosion exists where it will be necessary to expose mineral soils during grading associated with access road construction and augering for transmission structure erection. Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts and disturbed soils will be stabilized with vegetation as construction progresses over the length of the affected rights-of-way. Very minimal grading and earthwork activities are anticipated due to the utilization of existing rights-of-way (over 96% of the total corridor-miles) and access roads. Moreover, SCE&G will use “no-grub” clearing techniques wherever clearing is required and will comply with the S.C. Stormwater Management and Sediment Reduction Act with all right-of-way and line construction operations. SCE&G will use clearing, seeding, and erosion-

control procedures that meet or exceed the standards set forth in local, state, and federal requirements and will comply with agency recommendations regarding prevention of soil erosion and sediment movement.

1.2 Prime Farmlands and Farmlands of Statewide Importance

Prime farmland is comprised of soils (and slopes) that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to sound farming methods. In general, prime farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time. Typically, they do not flood during the growing season or they are protected from flooding.

Farmlands of Statewide Importance are soils that are, in addition to prime farmland, important for the production of food, feed, fiber, forage, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 1.2-1 lists the acreage of prime farmland and farmland of statewide importance that occur in the right-of-way corridors of the VCSNS 230 kV Lines (*Figure 1.2-1*).

Chart 1.2-1 Affected Prime Farmland and Farmland of Statewide Importance

	Acres
VCSNS-Killian	
Prime Farmland	93.6
Farmland Of Statewide Importance	37.6
Prime Farmland If Drained	0.0
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	6.7
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	3.1
Not Prime Or Important Farmland	223.4
VCSNS-Lake Murray No. 2 and St. George No. 1	
Prime Farmland	69.7
Farmland Of Statewide Importance	119.1
Prime Farmland If Drained	0.0
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	14.5
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	2.5
Not Prime Or Important Farmland	75.2
VCSNS-St. George No. 2	
Prime Farmland	33.9
Farmland Of Statewide Importance	98.6
Prime Farmland If Drained	0.0
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	5.2
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	5.3
Not Prime Or Important Farmland	94.6
VCSNS-St. George No. 1 and No. 2	
Prime Farmland	350.1
Farmland Of Statewide Importance	268.4
Prime Farmland If Drained	55.4
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	27.3
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	5.3
Not Prime Or Important Farmland	478.7
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Prime Farmland	0.0
Farmland Of Statewide Importance	9.3
Prime Farmland If Drained	0.0
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	0.2
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	0.0
Not Prime Or Important Farmland	41.4

Farming, including crop production, is a permitted use on SCE&G transmission line right-of-way throughout its system.

Although the new right-of-way segment for the VCSNS-Killian line crosses lands classified as prime farmland and farmland of statewide importance, none of the lands are presently being used for agricultural production. In most cases, construction plans within existing right-of-way call

for the replacement of H-frame and lattice-type structures with single steel poles; therefore, there will likely be a net reduction in direct impacts to Prime Farmland and Farmland of Statewide Importance due to the decrease in the cumulative footprint area of structures.

1.3 Water Resources

The VCSNS 230 kV Lines will cross numerous streams along their routes from the VCSNS Switchyards to their respective terminal points (*Figure 1.3-1*). Any existing low-growing vegetation will be left intact to the maximum practical extent in stream buffer zones, and root mats in any specified buffer zones will not be disturbed.

Construction of the VCSNS 230 kV Lines will present the potential for erosion and runoff contributions to nearby streams and wetlands; however, the use of existing, established rights of way greatly minimizes the potential of this impact. Where required, SCE&G will carefully design measures and plan work to prevent any sediment-laden runoff beyond designed erosion-control devices (sediment basins, sediment traps, silt fences, etc.). SCE&G will comply with the S.C. Stormwater Management and Sediment Reduction Act related to water quality protection and will comply with the recommendations of various regulatory agencies, including the S.C. Department of Natural Resources, S.C. Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc. All activities will be conducted in a manner that will not jeopardize the State water quality standards and existing water uses. The erosion-control measures and Best Management Practices employed will be sufficient to prevent any sediment movement beyond construction limits during a 10-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas.

The VCSNS 230 kV Lines will span over wetlands along their routes (*Figure 1.3-2*); however, no access roads will be built in wetlands; wetland contours will not be changed; and no wetlands will be converted to uplands. To the maximum extent practical, SCE&G will design the lines to avoid placement of line structures in wetlands. SCE&G will use selective clearing measures in forested wetlands, leaving the root zone and as much low growing vegetation as possible in the wetlands and associated wetland buffers to prevent erosion. Only those trees that pose a current or potential safety problem (i.e., trees that would interfere with the reliable, safe operation of the lines) will be removed. Clearing in forested wetlands will be done by hand-clearing methods or by high-flotation equipment suitable for operation in wetlands. Moreover, all work in wetlands will be done in strict compliance with U.S. Army Corps of Engineers 404 permit conditions, which SCE&G will obtain before line construction begins.

Before construction begins on the transmission lines supervisors will be given plan-and-profile drawings for the projects to provide them with locations of the structures and specific locations and requirements of any sensitive areas, including stream buffers and wetlands. All state and federal permits related to wetlands and water quality protection will be obtained before construction begins.

Chart 1.3-1 lists all hydrological resources that could potentially be affected by construction activities associated with the construction of transmission lines in the VCSNS 230 kV Lines.

Chart 1.3-1 Affected Wetlands and Stream Buffers

	Acres
VCSNS-Killian	
Acres of river, lake or pond in the right-of-way	1.0
Acres of wetland within the right-of-way impacted by clearing within the wetland	15.4
Acres of wetland within the right-of-way <u>not</u> impacted by clearing within the wetland	15.6
Acres of upland within the right-of-way requiring hand clearing within 100' of any stream, river, lake, pond, or wetland	5.3
Acres of upland within the right-of-way and <u>not</u> requiring clearing within 100' of any stream, river, lake, pond, or wetland	327.1
VCSNS-Lake Murray No. 2 and St. George No. 1	
Acres of river, lake or pond in the right-of-way	2.7
Acres of wetland within the right-of-way impacted by clearing within the wetland	6.1
Acres of wetland within the right-of-way <u>not</u> impacted by clearing within the wetland	1.9
Acres of upland within the right-of-way requiring hand clearing within 100' of any stream, river, lake, pond, or wetland	15.3
Acres of upland within the right-of-way and <u>not</u> requiring clearing within 100' of any stream, river, lake, pond or wetland	255.2
VCSNS-St. George No. 2	
Acres of river, lake or pond in the right-of-way	1.6
Acres of wetland within the right-of-way impacted by clearing within the wetland	0.1
Acres of wetland within the right-of-way <u>not</u> impacted by clearing within the wetland	3.2
Acres of upland within the right-of-way requiring hand clearing within 100' of any stream, river, lake, pond, or wetland	2.2
Acres of upland within the right-of-way and <u>not</u> requiring clearing within 100' of any stream, river, lake, pond or wetland	230.4
VCSNS-St. George No. 1 and No. 2	
Acres of river, lake or pond in the right-of-way	16.2
Acres of wetland within the right-of-way impacted by clearing within the wetland	15.9
Acres of wetland within the right-of-way <u>not</u> impacted by clearing within the wetland	167.1
Acres of upland within the right-of-way requiring hand clearing within 100' of any stream, river, lake, pond, or wetland	6.9
Acres of upland within the right-of-way and <u>not</u> requiring clearing within 100' of any stream, river, lake, pond or wetland	979.0
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Acres of river, lake or pond in the right-of-way	0.0
Acres of wetland within the right-of-way impacted by clearing within the wetland	0.4
Acres of wetland within the right-of-way <u>not</u> impacted by clearing within the wetland	0.0
Acres of upland within the right-of-way requiring hand clearing within 100' of any stream, river, lake, pond, or wetland	6.2
Acres of upland within the right-of-way and <u>not</u> requiring clearing within 100' of any stream, river, lake, pond or wetland	44.3

1.4 Flood-Prone Areas

SCE&G obtained the Federal Emergency Management Agency National Flood Insurance Program maps for areas that might be affected by the VCSNS 230 kV Lines (*Figure 1.4-1*). The maps were compiled and intersected with the line corridors to ascertain the affects. The results are summarized in Chart 1.4-1.

Chart 1.4-1 Affects to FEMA Flood Zones

	Acres
VCSNS-Killian	
Zone AE - Floodway	1.3
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	3.5
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	3.4
Zone C - Areas of Minimal Flooding	243.3
Zone X - Areas Determined to be Outside 500-Year Flood Plain	112.9
VCSNS-Lake Murray No. 2 and St.George No. 1	
Zone AE - Floodway	0.2
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	0.2
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	21.5
Zone C - Areas of Minimal Flooding	30.1
Zone X - Areas Determined to be Outside 500-Year Flood Plain	229.1
VCSNS-St. George No. 2	
Zone AE - Floodway	0.2
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	0.2
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	8.5
Zone C - Areas of Minimal Flooding	56.4
Zone X - Areas Determined to be Outside 500-Year Flood Plain	172.2
VCSNS-St. George No. 1 and No. 2	
Zone AE - Floodway	24.0
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	37.5
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	24.8
Zone B - Areas Between Limits of the 100-Year Flood and 500-Year Flood	194.7
Zone X - Areas of 500-Year Flood	10.0
Zone C - Areas of Minimal Flooding	192.5
Zone X - Areas Determined to be Outside 500-Year Flood Plain	701.6
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Zone C - Areas of Minimal Flooding	50.9

The U.S. Department of Agriculture, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used on the VCSNS 230 kV Lines will have no measurable effect on floodplain values, and the reliability of the lines will not be affected by the

segments of the lines that will reside in floodplain zones. Moreover, when engineering the VCSNS 230 kV Lines, SCE&G will avoid locating transmission line structures in flood zones to the maximum extent practical.

1.5 Land Use

The most significant effect to land use resulting from construction of the VCSNS 230 kV Lines will be the permanent restriction on the erection of buildings and timber production in the 6 mile (approximate) segment of the VCSNS-Killian Line that will require new right-of-way (*Figure 1.5-1*). Those restrictions are currently in effect along the remaining 146 corridor miles of the VCSNS 230 kV Lines. Permitted uses in the right-of-way will include pastures, crop production, road construction, parking lots, and other uses that will not interfere with the safe, reliable operation of the future lines. Chart 1.5-1 lists the acreages of land uses within the right-of-way for the potential line routes.

Chart 1.5-1 Affected Land Use

	Acres
VCSNS-Killian	
Communication Tower with 100' Buffer	0.1
Electrical Transmission Right-of-Way - Duke Energy	0.0
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	272.8
Gas Pipeline Right-of-Way - Carolina Gas Transmission Company	0.2
Land Dedicated to Public Use	8.8
Major Roadway	1.1
No Designated Land Use	62.6
Place of Worship	3.5
Power Facility	1.7
Railroad Right-of-Way	2.6
Recreational Land	1.0
Secondary Roadway	10.0
VCSNS-Lake Murray No. 2 and St. George No. 1	
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	259.5
Major Roadway	2.0
Power Generation	13.3
Railroad Right-of-Way	0.1
Secondary Roadway	6.2
VCSNS-St. George No. 2	
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	223.9
Major Roadway	1.5
Power Generation	7.1
Secondary Roadway	5.0
VCSNS-St. George No. 1 and No. 2	
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	1144.3
Major Roadway	11.5
Secondary Roadway	29.4
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Electrical Transmission Right-of-Way - Santee Cooper	0.9
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	11.8
Power Generation	38.1
Secondary Roadway	0.1

The locations of all occupied buildings within 1,000' of the VCSNS 230 kV Lines were digitized from aerial photography and compiled in a GIS data base (*Figure 1.5-2*). Chart 1.5-2 displays the quantity of occupied buildings that will be within various distances of VCSNS 230 kV Lines.

Chart 1.5-2 Proximity of Occupied Buildings

	Number
VCSNS-Killian	
Number of occupied buildings within the proposed line's R/W (New R/W)	0
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	86
Number of occupied buildings between 200' and 500' of the proposed line	401
Number of occupied buildings between 500' and 1000' of the proposed line	901
Total	6449
VCSNS-Lake Murray No. 2 and St. George No. 1	
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	1*
Number of occupied buildings outside of the R/W and within 200' of the proposed line	147
Number of occupied buildings between 200' and 500' of the proposed line	429
Number of occupied buildings between 500' and 1000' of the proposed line	609
Total	1186
VCSNS-St. George No. 2	
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	132
Number of occupied buildings between 200' and 500' of the proposed line	375
Number of occupied buildings between 500' and 1000' of the proposed line	507
Total	1014
VCSNS-St. George No. 1 and No. 2	
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	451
Number of occupied buildings between 200' and 500' of the proposed line	1035
Number of occupied buildings between 500' and 1000' of the proposed line	2027
Total	3603
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Number of occupied buildings encroaching on the proposed line's R/W (existing SCE&G Property)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	0
Number of occupied buildings between 200' and 500' of the proposed line	3**
Number of occupied buildings between 500' and 1000' of the proposed line	6**
Total	9

* This encroachment is a mobile home that has been built in an un-cleared section of right-of-way.

**These are occupied (industrial) buildings associated with VCSNS.

1.6 Land Cover

A land cover inventory was developed for the VCSNS-230 kV Lines from 2009 United States Department of Agriculture (USDA) aerial photography (*Figure 1.6-1*); wetland areas were further defined by an analysis of 2006 Color Infrared USGS Digital Ortho Quad (DOQ), USDA Soils Data, USGS/SCDNR Hypsography, and USFWS National Wetlands Inventory. Scrub/Shrub (mostly vegetation re-growth within existing rights-of-way) is the predominate land cover in each of the corridors. Chart 1.6-1 lists the quantity and types of land cover that will be affected the VCSNS

230 kV Lines.

Chart 1.6-1 Affects to Land Cover

	Acres
VCSNS-Killian	
Barren	13.4
Cropland	0.5
Grass/Pasture	33.1
Hardwood Forest	20.0
Mixed Hardwood/Pine Forest	2.4
Pine Forest	10.6
Riparian Vegetation	0.0
Scrub/Shrub	239.3
Urban/Built-up	13.0
Water	1.3
Wetland	31.0
VCSNS-Lake Murray No. 2 and St. George No. 1	
Barren	10.1
Cropland	5.6
Grass/Pasture	23.6
Hardwood Forest	87.6
Pine Forest	24.4
Scrub/Shrub	109.9
Urban/Built-up	9.8
Water	2.3
Wetland	8.0
VCSNS-St. George No. 2	
Barren	8.0
Cropland	2.2
Grass/Pasture	55.9
Hardwood Forest	11.5
Pine Forest	6.4
Scrub/Shrub	143.6
Urban/Built-up	5.2
Water	1.5
Wetland	3.2
VCSNS-St. George No. 1 and No. 2	
Barren	83.3
Cropland	175.3
Grass/Pasture	151.6
Hardwood Forest	18.7
Mixed Hardwood/Pine Forest	1.7
Pine Forest	14.1
Riparian Vegetation	0.4
Rock	0.9
Scrub/Shrub	493.1
Urban/Built-up	48.7
Water	14.6
Wetland	183.2
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Barren	1.2
Grass/Pasture	3.4
Hardwood Forest	16.6
Pine Forest	6.6
Scrub/Shrub	16.2
Urban/Built-up	6.4
Wetland	0.4

1.7 Wildlife

Various studies (Duke Power Company et al., 1976; Michael et al., 1976; Shreiber et al., 1976; Cavanagh et al., 1976) conclude that rights-of-way clearing through forested areas will have

an effect on the fauna of the immediate area. In the Duke Power study, which was conducted in the Piedmont section of South Carolina (Rock Hill-Lancaster region), it was found that herbaceous and brushy plant communities that become established in Piedmont transmission line corridors provide a habitat that:

- 1) Preclude use of the area by some of the pre-existing species such as some woodland birds and small mammals;
- 2) Enhance aspects of the area for some pre-existing species, providing them with certain beneficial factors associated with food and cover; and,
- 3) Encourage invasion by species previously absent in the area.

Species discouraged from inhabiting cleared areas of the corridor are those restricted to woodland habitats. Of the birds of the Piedmont, such species would include many warblers, woodpeckers, Carolina chickadee, tufted titmouse, yellow-billed cuckoo, crested flycatcher, brown-headed nuthatch, wood thrush, red-eyed vireo, and rose-breasted grosbeak, among others. Examples of mammals that would be discouraged from the area would be the white-footed mouse and golden mouse.

Species that would benefit from the new habitat provided by cleared areas include vultures, hawks, foxes, and possibly other predators. These species, though generally associated with other habitats, seem to concentrate portions of their activities in cleared corridors. Vultures and hawks (especially the red-tailed hawk) are commonly seen perched on transmission line towers or soaring over the corridors. Possibly these perches, in conjunction with the dense rodent populations of the corridors, provide better hunting areas. The fact that small mammal populations are denser in corridors than in woodlands may account for the use of corridors by foxes. Studies have shown that foxes commonly feed on the cotton rat and meadow vole in transmission line corridors. Thus, a typical woodland animal, such as the gray fox, may commonly venture into corridor habitats because of the accessible food supply.

Species previously absent or uncommon that move into an area following the establishment of a transmission line corridor, are those typically associated with open spaces or with herbaceous or brushy habitats. In the Piedmont, such species of birds would include various sparrows, meadowlark, red-winged blackbird, blue grosbeak, prairie warblers, yellow-throat, yellow-breasted chat, and indigo bunting, among others. Mammals include the rice rat, cotton rat, meadow vole, and harvest mouse. Certain amphibians (upland chorus frog, southern leopard frog) that prefer to breed in open grassy areas also benefit from transmission line corridors.

Among the birds that inhabit transmission line corridors, some actually live in the herbaceous vegetation of the corridor, while others inhabit areas along streams passing through the corridor or trees adjacent to the corridor. Examples of the former include the field sparrow, song sparrow, meadowlark, red-wing, and yellow-throat, among others. Species inhabiting trees on the immediate edge of a corridor or trees along a stream crossing are sometimes called "edge species". These species, which include in part the indigo bunting, yellow-breasted chat, prairie warbler, and towhee, prefer to inhabit woodlands adjacent to open spaces. Thus, while they inhabit trees, their presence is due to the open nature of the corridor.

Also, transmission line corridors, as managed by SCE&G, support an assemblage of non-game species. The planted and invading native vegetation, in conjunction with the small trees left in selected locations, create a habitat for various species preferring open herbaceous habitats and edge habitats. These anticipated and predicted corridor clearing effects will occur over approximately 13.26% of the VCSNS-Killian Line route corridor; 42.02% of the VCSNS-Lake Murray No. 2 and VCSNS-St. George No. 1 route corridor; and 40.46% of the VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard route corridors as forested areas are converted to open areas. Only minor clearing will be required along the VCSNS-St. George No. 2 route corridor (7.57%) and VCSNS-St. George No.1 and No. 2 route corridor (4.35 %).

The creation of linear openings in heavily timbered areas is a standard wildlife management technique to increase the carrying capacity for woodland game. Thus, the open corridor segments on the VCSNS 230 kV Lines with invading herbaceous species should be advantageous to the larger game animals in the area (deer and wild turkey), as well as certain non-game species.

1.8 Cultural Resources

The potential for impacts to cultural resources resulting from construction of the VCSNS 230 kV Lines to documented cultural resources is low. The documented sites listed in the records of the South Carolina Institute of Anthropology and Archaeology ("SCIAA") and South Carolina Department of Archives and History ("SCDAH") were provided to SCE&G by those agencies and overlaid onto the VCSNS 230 kV Line routes. Within the 157 corridor miles of lines, twenty-two archaeological sites exist within the rights-of-way. Of this total, only two are not within cleared rights-of-way presently occupied by existing transmission lines.

No documented historic sites reside within the 157 corridor miles of rights-of-way. Residing within ¼ mile of the rights-of-way are three (3) historic sites that are listed on the National Register of Historic Places ("NRHP") and sixteen (16) that are classified as "eligible" or "potentially eligible" for the NRHP. In the distance zone that ranges from ¼ to ½ mile away from the VCSNS 230 kV Lines reside six (6) recorded historic sites that are on the NRHP and seven (7) that are classified "eligible" or "potentially eligible". In the distance zone from ½ to 1¼ mile from the VCSNS 230 kV lines reside twelve (12) historic sites that are on the NRHP and twenty (20) that are "eligible" or "potentially eligible" for inclusion on the NRHP. Affects to these historic resources will be very small since the VCSNS 230 kV Lines in proximity to them will be running with or replacing existing lines.

The identification, assessment, and protection of cultural resources along the routes of the VCSNS 230 kV Lines will be pursuant to a Cultural Resources Management Plan and Agreement that has been executed by the State Historic Preservation Officer, SCE&G and the U.S. Army Corps of Engineers. The terms of the document are designed to ensure that cultural resources along the routes of the VCSNS 230 kV Lines are properly identified, assessed, and protected during construction and operation of the lines.

With regard to historic districts, the existing right-of-way upon which the VCSNS-Killian Line will be built crosses 0.4 acres of area that has been delineated as the Rockton and Rion Railroad Historic District. The area will not be affected since the new line will replace an existing one in the vicinity of the historic district.

Chart 1.8-1 lists cultural resource factors listed in the records of the South Carolina Institute of Anthropology and Archaeology ("SCIAA") and South Carolina Department of Archives and History ("SCDAH") that might be affected (*Figure 1.8-1*).

Chart 1.8-1 Affected Cultural Resources

	Number/Acres
VCSNS-Killian	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	4
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	1
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	3
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	0
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	3
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	6
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	5
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	2
Acres of Designated Historic District Listed on the NRHP in the R/W	.4
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	1.1
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	49.7
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	79.1
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	220.1

VCSNS-Lake Murray No. 2 and St. George No. 1	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	4
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	0
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	1
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	0
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	6
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	6
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	2
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	3
Acres of Designated Historic District Listed on the NRHP in the R/W	0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	0

Chart 1.8-1 Affected Cultural Resources (Continued)

	Number/Acres
VCSNS-St. George No. 2	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	3
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	0
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	0
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	10
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	3
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	8
Acres of Designated Historic District Listed on the NRHP in the R/W	0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	0
VCSNS-St. George No. 1 and No. 2	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	11
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	2
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	5
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	2
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	1
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	2
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	7
Acres of Designated Historic District Listed on the NRHP in the R/W	0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	26.9
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	51.9
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	54.4

Chart 1.8-1 Affected Cultural Resources (Continued)

	Number/Acres
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	4
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	0
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	1
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	0
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	0
Acres of Designated Historic District Listed on the NRHP in the R/W	0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	0

1.9 Rare, Threatened and Endangered Species

SCE&G obtained both the United States Fish and Wildlife Service ("USFWS") and S.C. Heritage Trust Program digital databases for protected species, combined them, and overlaid the combined data onto the VCSNS 230 kV Line routes (*Figure 1.9-1*).

There are no documented federally protected species within 2000' of any of the transmission line corridors. There is one Bald Eagle siting recorded in the S.C. Heritage Trust Program digital database approximately 1000' from the VCSNS-St. George No. 1 and No. 2 Transmission line corridor. The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act ("Eagle Act") and the Migratory Bird Treaty Act ("MBTA").

SCE&G will conduct a comprehensive biological survey of the entire length of new right-of-way (i.e., the approximate 6 mile segment of the VCSNS-Killian Line) following the centerline survey and any "impact areas" (areas requiring clearing within existing route right-of-way corridors). If any protected species are discovered, SCE&G will take appropriate action, which may include notifying appropriate agencies, marking the species in the field for protection during construction and operation of the lines, relocating plants, or other measures as may be required.

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that all new transmission structures be equipped with design features that prevent these electrocutions. Such features typically include designs that (1) make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail. The structures that will be used for the transmission lines built in the VCSNS-Killian, VCSNS-Lake Murray No. 2 and VCSNS-St. George No. 1, VCSNS-St. George No. 2, VCSNS-St. George No. 1 and No. 2, and VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard right-of-way corridors will be "raptor safe" and meet the guidelines recommended in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated on this project.

1.10 Population

Population distribution and density was modeled along the VCSNS230 kV Lines based on Year 2000 Census data (*Figure 1.10-1*). Chart 1.10-1 displays the length of each route in miles that will pass through various population density areas:

Chart 1.10-1: Population Density Along Transmission Line Right-of-Way Corridors

	Miles
VCSNS-Killian	
< 0.5 Acres per Person	7.3
0.51 - 1 Acres per Person	0.8
1.1 - 2 Acres per Person	3.4
2.1 - 4 Acres per Person	1.1
4.1 - 10 Acres per Person	4.0
> 10 Acres per Person	20.6
VCSNS-Lake Murray No. 2 and St. George No. 1	
< 0.5 Acres per Person	3.6
0.51 - 1 Acres per Person	1.8
1.1 - 2 Acres per Person	0.9
2.1 - 4 Acres per Person	1.6
4.1 - 10 Acres per Person	4.7
> 10 Acres per Person	9.6
VCSNS-St. George No. 2	
< 0.5 Acres per Person	3.1
0.51 - 1 Acres per Person	1.9
1.1 - 2 Acres per Person	0.9
2.1 - 4 Acres per Person	0.8
4.1 - 10 Acres per Person	5.1
> 10 Acres per Person	6.7
VCSNS-St. George No. 1 and No. 2	
< 0.5 Acres per Person	5.9
0.51 - 1 Acres per Person	2.4
1.1 - 2 Acres per Person	4.3
2.1 - 4 Acres per Person	6.6
4.1 - 10 Acres per Person	19.5
> 10 Acres per Person	36.7
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
< 0.5 Acres per Person	0.9
> 10 Acres per Person	4.2

1.11 Aviation

Federal Aviation Administration ("FAA") Regulations, Part 77, establishes standards for determining obstructions in navigable airspace and sets forth requirements for FAA notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level. Also, notification is required if the obstruction is more than specified heights and falls within any restricted airspace in the approach to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For heliports, the restricted space extends 5,000 feet (0.8 nautical miles). No airports or airstrips are within 3.3 nautical miles of the project. No VCSNS 230 kV Line structures will exceed 200 feet in height. Chart 1.11-1 list the number of aviation facilities along each of the transmission line corridors (*Figure 1.7-1*).

Chart 1.11-1: Aviation Facilities Along Transmission Line Right-of-Way Corridors

	Number of Facilities
VCSNS-Killian	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	1
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	0
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	1
VCSNS-Lake Murray No. 2 and St. George No. 1	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	1
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	0
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	0
VCSNS-St. George No. 2	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	1
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	0
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	0
VCSNS-St. George No. 1 and No. 2	
Private Use Airport within 10,000' of the proposed transmission line	4
Private Use Airport within 20,000' of the proposed transmission line	4
Public Use Airport within 10,000' of the proposed transmission line	4
Public Use Airport within 20,000' of the proposed transmission line	2
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	3
VCSNS Lines to Connect Unit 1 Switchyard with Units 2 and 3 Switchyard	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	0
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	0
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	0

Note: An aviation facility may fall within the reporting distance (5,000', 10,000', and 20,000') of more than one transmission line corridor, but for reporting purposes it is only counted against the closest line; therefore, facilities are not counted more than once.

Following engineering of the individual lines that comprise the VCSNS 230 kV Lines, SCE&G will file proper notifications with the FAA, consult with them as necessary to resolve any conflicts and determine any measures that must be implemented to insure aviation safety.

1.12 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air in the vicinity of the conductors of a transmission line. When the intensity of

the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a "hissing" sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on the conductor can also serve as sources of corona.

Corona on transmission line conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and not very noticeable outside the transmission line right-of-way.

Another type of radio and television interference, known as gap-type noise, is caused by an oxidized film at the point of contact between two metallic electric hardware pieces. The film acts as an insulator between the surfaces and small electric sparks, which produce noise and interference. Gap type interference normally causes radio or television interference within a mile or less of the source. When such an interference condition occurs, corrective actions can be taken to eliminate the source.

SCE&G's construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the VCSNS 230 kV Lines; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with their operation.

1.13 Safety

To provide for public safety and protection, SCE&G will design and construct the VCSNS 230 kV Lines in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of construction. SCE&G commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of these facilities.

1.14 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970's, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, "Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard." The NAS went on to say, "No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is "weak." They stated that "the results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger." NIEHS Director Kenneth Olden, Ph.D., said, "The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to encourage reductions in exposure should continue."

EMF levels drop sharply with increased distance from a power source. SCE&G has published information listing the typical 60 hertz magnetic field levels associated with 115kV lines. Directly under the line, the range is 2.1-19.3 milliGauss (mG); at the edge of the right-of-way, the range is 0.6-3.4 mG; 50' from the edge of the right-of-way, the range is 0.3-1.9 mG. This data is the same as published by Duke Energy Corporation with respect to 100 kV lines. Moreover, Duke Energy publishes the following information regarding 230 kV Lines (SCE&G has not published similar data for 230 kV lines):

Under the line:	4.5 - 29.0 mG
Edge of right-of-way:	1.9 - 6.4 mG
50' from edge of right-of-way:	1.0 - 3.5 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. The following are typical magnetic field strength ranges for certain equipment as published by SCE&G and Duke Energy:

Equipment	1 Inch	1 Foot	3 Feet
Microwave oven	140.0 mG	65.0 mG	10.0 mG
Refrigerator	6.0 mG	4.0 mG	1.2 mG
Electric Range	250.0 mG	25.0 mG	2.0 mG
Electric Razor	500.0 mG	-	-
Hair Dryer	100.0 mG	30.0 mG	-
Electric can opener	5,000.0 mG	-	-
Computer terminal / TV	26.0 mG	3.4 mG	1.2 mG
Electric Clock	130.0 mG	15.5 mG	2.5 mG

1.15 Ozone

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. SCE&G takes care to eliminate or minimize corona discharge from random arcing through careful design of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765

kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The VCSNS 230 kV Lines s should not produce any detectable amount of ozone under any operating condition, and thus will pose no threat to environmental quality.

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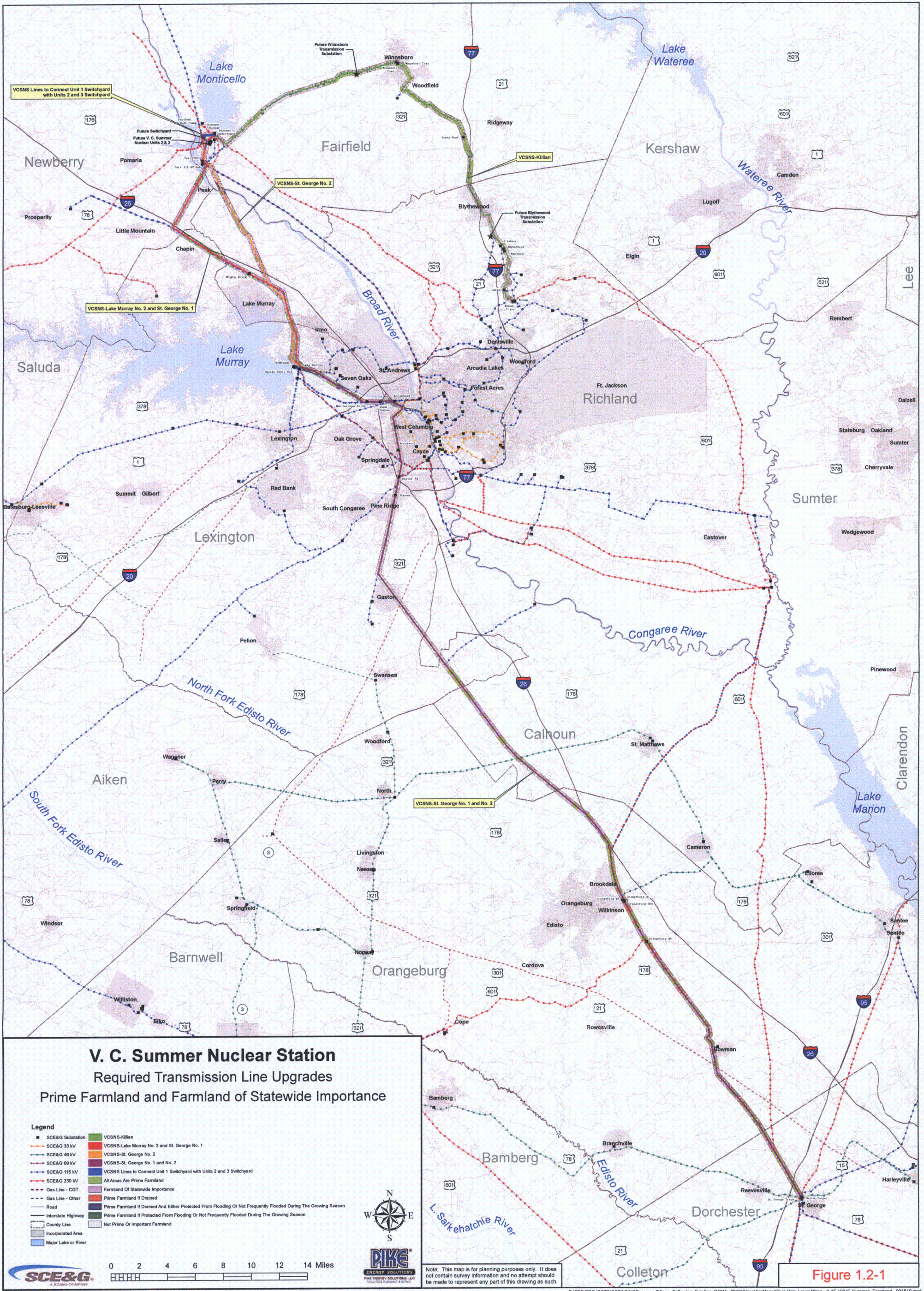
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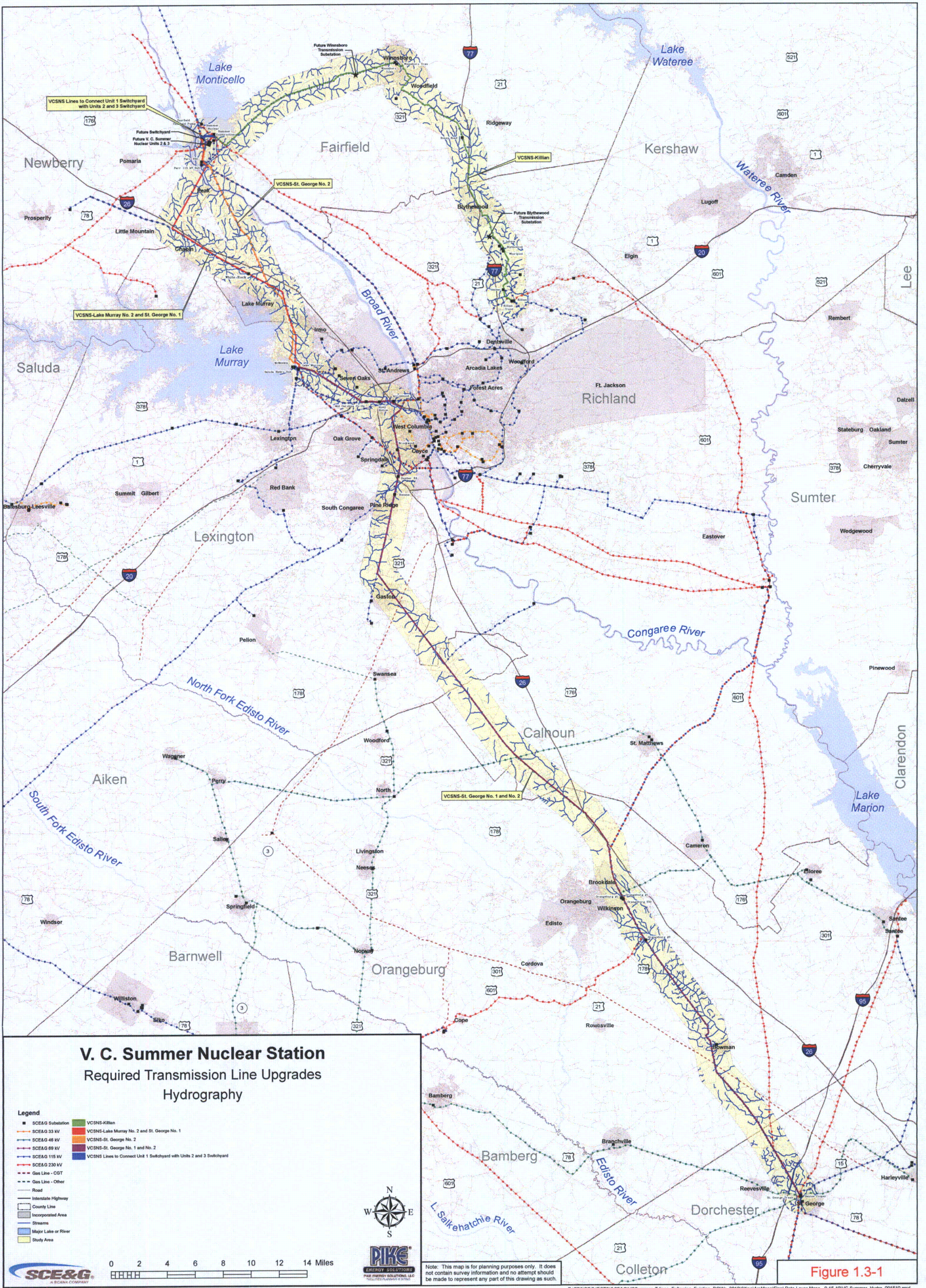
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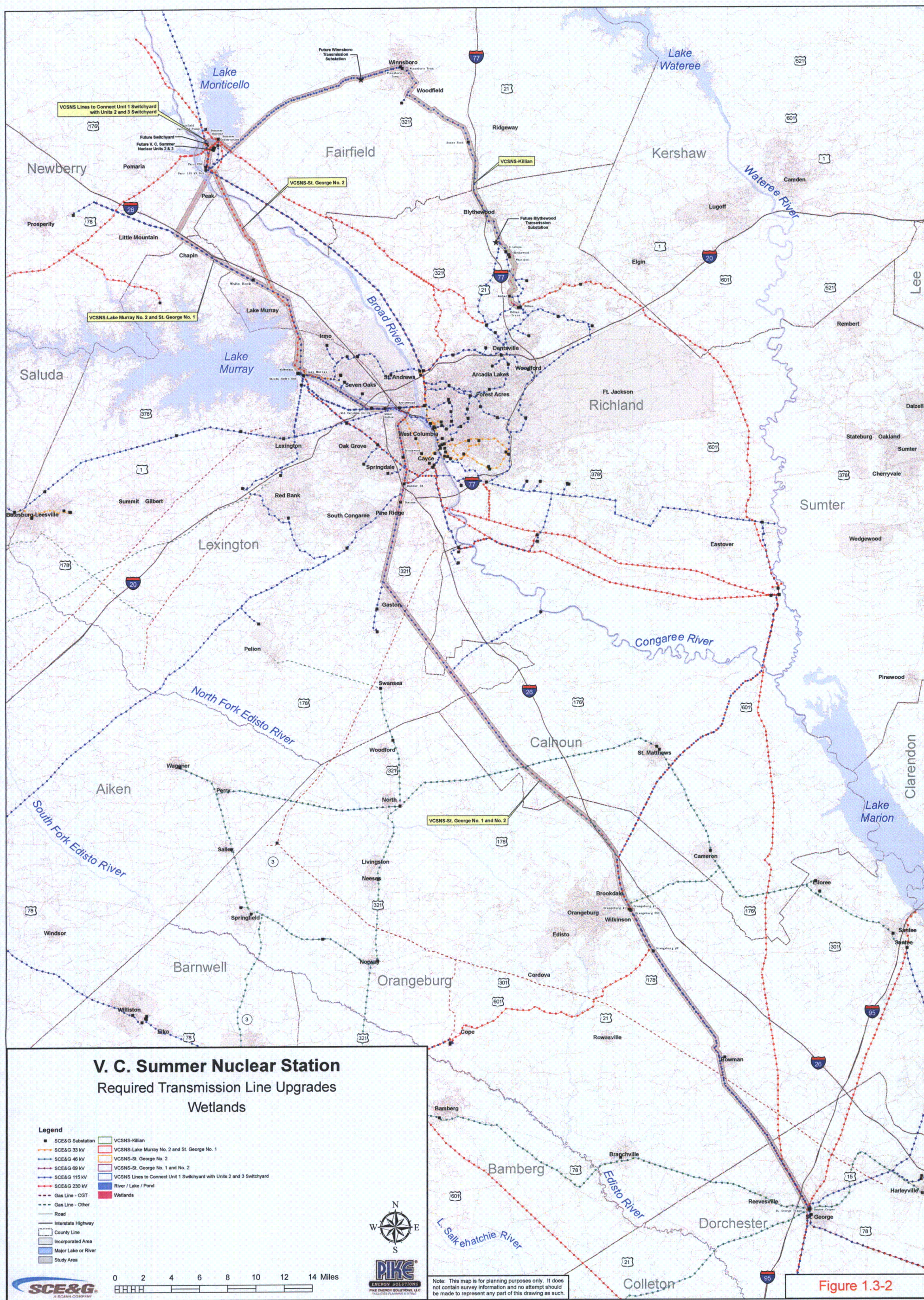
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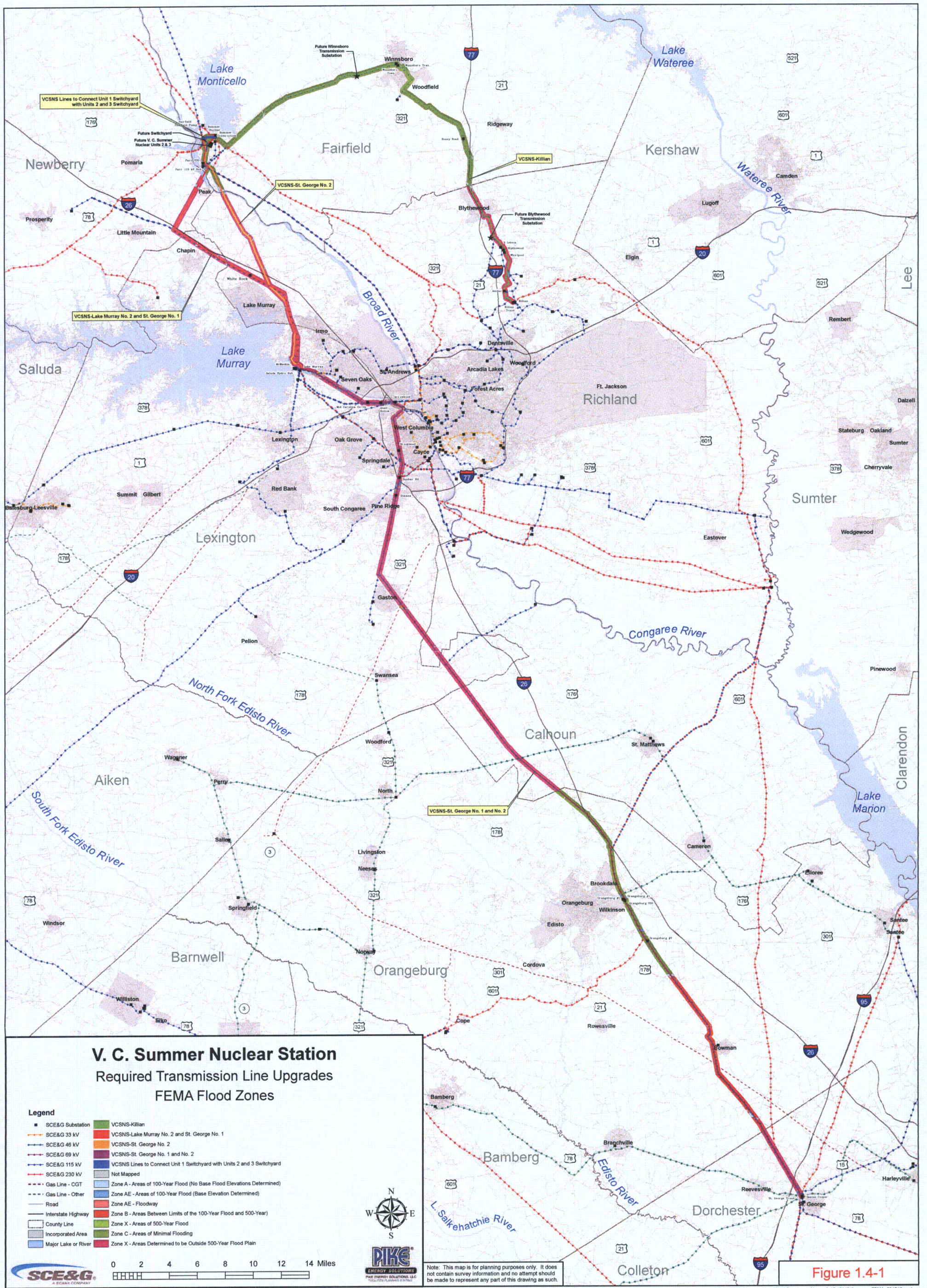
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