230KV AND 525KV TRANSMISSION LINE ECOLOGICAL SURVEY REPORT

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JULY 2009

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ECOLOGICAL SURVEY REPORT

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Introduction

1.1 Project Overview

Duke Energy Carolinas, LLC (Duke) is proposing to construct a transmission line right-of-way (ROW) corridor that would connect the existing 230 kV and 525 kV lines with the proposed William S. Lee III Nuclear Station (Lee Nuclear Station), located in Cherokee County, South Carolina. A comprehensive transmission line study narrowed 21 potential corridor routes to the selection of the current two redundant routes (Route K [west line] and Route O [east line]) (FPS 2008).

In each route, a new 525 kV line would extend from the Oconee-Newport 525 kV line to the Lee Nuclear Station switchyard (Switchyard) and a new 230 kV line would extend from the Pacolet Tie-Catawba 230 kV line to the Switchyard. The west 525 kV line would extend 17.42 miles to the Switchyard. The west 230 kV line would run parallel to the 525 kV line for 7.95 miles to the Switchyard. The east 525 kV line would extend 13.87 miles to the Switchyard. The east 230 kV line would run parallel to the 525 kV line for 7.09 miles to the Switchyard. The 525 kV line ROW from the Oconee-Newport line to the Pacolet Tie-Catawba line would be 200 feet wide in both routes. The ROW from the Pacolet Tie-Catawba line to the Switchyard, where the lines parallel each other in a single corridor, would be 325 feet wide in both routes.

In association with this project, Duke requested that HDR|DTA conduct a survey of the proposed transmission line routes to identify, delineate, and characterize jurisdictional waters of the U.S., including wetlands. In addition, HDR|DTA was requested to survey for the presence of any federally rare, threatened, or endangered (RTE) species occurring within the corridors. This report presents the methodology, findings, and conclusions of the requested study.

1.2 East Route

Seventy jurisdictional streams and four wetlands were identified within the eastern route. Streams range from small, first order headwater channels to the Pacolet River. Wetlands vary in

size, ranging from small fringe wetlands associated with small streams to larger wetlands located in active floodplains. No RTE species were identified during the survey. While there are populations of a heartleaf species (*Hexastylis spp.)* in the northern portion of the east route, careful examination of these specimens led investigators to the conclusion they are not the federally protected dwarf-flowered heartleaf (*Hexastylis naniflora*) (Weakley 2006).

1.3 West Route

Forty-six jurisdictional streams and twelve jurisdictional wetlands were identified within the western route. Streams range from small, first order headwater channels to the Pacolet River. Wetlands vary in size, ranging from small fringe wetlands associated with small streams to very large wetland stream complexes. Notable wetlands within the western ROW include a large (i.e., +10 acres) beaver-induced wetland and several areas that were once forested wetlands, but have been converted to pasture and active game land. No RTE species were identified during the survey.

Section 2

Methodology and Site Description

2.1 Aquatic Resources

2.1.1 Wetlands

During the field surveys, jurisdictional wetlands found within or immediately adjacent to (i.e., 25 feet or less) the subject property were delineated using the 1987 U.S. Army Corps of Engineers (USACE) wetland delineation method (Environmental Laboratory 1987). For this survey, the Project boundary is defined as the 200ft or 325ft ROW. The "routine on-site determination method" was selected as the most appropriate delineation technique. This technique uses a multi-parameter approach, which requires positive evidence of three criteria:

1. **Hydrophytic vegetation** – This parameter is defined by the USACE as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987).

   In 1988, the U.S. Fish and Wildlife Service (USFWS) developed a national list of hydrophytic plants, which was later revised in 1996 (USFWS 2006). These plants are known to be either tolerant or intolerant of saturated or semi-saturated soil conditions. The USFWS divided the U.S. into regions and assigned probabilities (i.e., indicator status) of plants occurring in saturated or semi-saturated soil conditions in and around wetland habitats within these regions. Table 1 lists the designated plant indicator status categories.

TABLE 1
PLANT INDICATOR STATUS CATEGORIES

Indicator Status	Probability of Occurring in a Wetland	Examples
Obligate Wetland Plants (OBL)	99% to 100%	Smooth Cordgrass (*Spartina alterniflora*) Bald Cypress (*Taxodium distichum*)
Facultative Wetland Plants (FACW)*	67% to 99%	Green Ash (*Fraxinus pennsylvanica*) American Elm (*Ulmus americana*)
Facultative Plants (FAC)*	33% to 67%	Honey Locust (*Gleditsia triacanthos*) Roundleaf Greenbrier (*Smilax rotundifolia*)
Facultative Upland Plants (FACU)*	1% to 33%	Northern Red Oak (*Quercus rubra*) Tall Cinquefoil (*Potentilla arguta*)
Obligate Upland Plants (UPL)	<1%	Shortleaf Pine (*Pinus echinata*) Soft Brome (*Bromus hordeaceus*)

*The facultative categories are subdivided by (+) and (-) modifiers.

During the transmission line survey, investigators positively identified the dominant plants present within a potential wetland habitat to the species level. Plant identification was confirmed using recognized field guides such as Newcomb's Wildflower Guide (1977) and Wofford's Guide to the Vascular Plants of the Blue Ridge (1989). Once identified, each dominant species present was referenced to the hydrophytic plant list and assigned an indicator status. For the hydrophytic vegetation parameter to be met, greater than 50 percent of the dominant vegetation within a given area must be considered hydrophytic (i.e., Facultative to Obligate).

2. **Hydric soils** – These are soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions (low to no oxygen) in the upper parts of the soil (Environmental Laboratory 1987). Hydric soils are saturated or semi-saturated for a long enough period during the growing season to influence and favor the growth and dominance of hydrophytic vegetation. The Natural Resource Conservation Service (NRCS) maintains a national list of hydric soils that is annually updated and distributed by the National Technical Committee for Hydric Soils (NTCHS) (NRCS 2009). The NRCS maintains soils maps for each state that can be used for preliminary wetland determinations; however, field delineations such as those performed under this study plan must use field indicators to make hydric soil determinations. Table 2 lists the field indicators of hydric soils approved for use in delineations by the USACE. For the hydric soil parameter to be met, one or more of the hydric soil indicators must be present.

TABLE 2
HYDRIC SOIL FIELD INDICATORS

Hydric Soil Indicator* (Non-sandy Soils)	Description
Organic soils (Histosols)	Either more than 50% (by volume) of the upper 81 centimeters (32 inches) of soil is comprised of organic soil material, or organic soil material of any thickness rests on bedrock. Example: peats or mucks.
Histic epipedon	A 20 to 40 centimeters (8 to 16 inches) layer at or near the surface of a mineral hydric soil that is saturated with water for 30 consecutive days or more in most years and contains a minimum of 20% organic matter when no clay is present or a minimum of 30% organic matter when clay content is 60% or greater.
Sulfidic material	Mineral soil emitting an odor of rotten eggs (i.e., hydrogen sulfide). Hydrogen sulfides are only produced in a reducing environment.
Aquic or peraquic moisture regime	Aquic – A moisture regime that is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe. Peraquic – A moisture regime characterized by the presence of ground water always at or near the soil surface.
Reducing soil conditions	Soils saturated for long or very long duration will usually exhibit reducing conditions. Under such conditions, ions of iron are transformed from a ferric valence state to a ferrous valence state. This condition can often be detected in the field by a ferrous iron test.
Soil colors	Colors of soil components are strongly influenced by the frequency and duration of soil saturation. Mineral hydric soils will be either gleyed or will have bright mottles and/or low matrix chroma.
Soils appearing on hydric soils list	Soils listed by the NTCHS have reducing conditions for a significant portion of the growing season in a major portion of the root zone and are frequently saturated within 30 centimeters (12 inches) of the soil surface. To be used accurately, the description of the mapping unit must conform to that of the sampled soil.
Iron and manganese concretions	Iron and manganese concretions 2 millimeters in diameter occurring within 7.5 centimeters of the surface are evidence that the soil is saturated for long periods near the surface.

*Indicators are listed in order of decreasing reliability.

During the field survey, investigators examined the soil matrix down to approximately 45 centimeters (18 inches) using a soil auger, probe, or shovel. Soil characteristics were analyzed in the field for the hydric soil indicators using the Field Indicators of Hydric Soils in the United States, a Guide for Identifying and Delineating Hydric Soils, Version 6.0 (NRCS 2006) and Munsell Soil Color Charts (Munsell 2000).

3. **Wetland hydrology** – This parameter refers to all the hydrological characteristics of an area that is inundated or has saturated soils at or near the surface during parts of the growing season (Environmental Laboratory 1987). Wetland hydrology must be present for a long enough period to exert influence on the formation of hydric soils and the dominance of hydrophytic vegetation through the creation of anaerobic conditions during the active growing season. The USACE has determined that although this parameter is the least precise of the three-parameter approach, it is essential to document that soils are inundated or saturated during the growing season. Although the field hydrology indicators listed in Table 3 do not provide evidence of occurrence within the growing season, they do indicate that at some point the soil was inundated and/or saturated to the surface.

TABLE 3
PRIMARY AND SECONDARY WETLAND HYDROLOGY INDICATORS

Wetland Hydrology Indicators	Description
Primary Indicators*	
Inundation	Visual observation of ponded areas within potential wetland border. Investigators must consider recent weather and seasonal conditions when applying this indicator.
Soil saturation	Visual observation of water within a 40 centimeters (16 inches) soil pit. Water must be within a major portion of the root zone (usually within 30 centimeters [12 inches]).
Water marks	Water stains on tree bark or other fixed objects such as pilings, fences, bridges, etc.
Drift lines	Generally found adjacent to streams and waterways. Evidence of inundation through visual observation of racked debris (i.e., twigs, leaves, trash) accumulated in a line at the water mark or in vegetation. Drift lines are usually lower than the high inundation mark.
Sediment deposits	Visual observation of layers, coatings, or depositions of mineral or organic soils on plants or other vertical surfaces.
Drainage patterns within wetlands	Surface evidence of drainage through a potential wetland area. Because drainage patterns (i.e., scour) occur in uplands as well, topography must be taken into account before applying this indicator.
Secondary Indicators**	
Oxidized root channels	Oxidization around root channels in upper 30 centimeters (12 inches).
Water stained leaves	Dark leaf litter resulting from ponding or inundation.
Local soil survey data	Used to determine soil type drainage class. Soil profile must match the soil description for this indicator to be used.
FAC-neutral test	Indicator relies on the results of the hydrophytic parameter indicator status determination. Distinct indicator statuses are tallied and species with an indicator status of FAC (+ or -) are disregarded. If the remaining species are greater than 50% hydrophytic, this parameter can be used.

*Parameter requires presence of one or more primary indicators to be considered present.
**Parameter requires presence of two or more secondary indicators to be considered present.

Areas within the survey boundary having positive evidence of all three parameters were considered jurisdictional wetlands. Field investigators identified the boundary between the wetlands and uplands based on changes in the three parameters, topography, and professional judgment. The boundary was flagged with plastic surveyor tape and the location of each flag was recorded on a handheld global positioning system (GPS) device. Data points collected at each wetland consisted of a unique wetland identifier, the approximate location of the wetland in relation to proposed towers and/or stations, a description of any jurisdictional connections (or lack thereof) to other surface waters, and all data collected on each of the three parameters. Additionally, data points were collected within unique adjacent uplands to document the lack of jurisdictional features. Refer to Appendix B for the field data sheets used during the wetland delineations.

In addition to the delineated wetlands, three areas were originally identified during field survey as potential jurisdictional wetlands however; upon further assessment the areas meet only two of the three criteria described above as outlined in the 1987 U.S. Army Corps of Engineers (USACE) wetland delineation method (Environmental Laboratory 1987). These areas are dominated by FAC or wetter plants indicating the presence of hydrophytic vegetation and have at least one primary hydrologic indicator. Soil profiles of the areas do not meet the criteria for hydric soil field indicators as defined above. These upland points are referred to as "Upland A", "Upland N", and "Upland Q" (Appendix B).

2.1.2 Streams

During the field surveys, jurisdictional streams found within or immediately adjacent (i.e., 25 feet or less) to the subject property were assessed using the NRCS Stream Assessment Procedure adapted for South Carolina in 2005 (NRCS 1998). This protocol assesses the health of the stream based on a series of 11 qualitative and quantitative parameters. Although this methodology includes an optional macroinvertebrates component, this is beyond the scope of the current project and was not included in this survey. Table 4 lists stream visual assessment parameters and provides a brief description of each.

TABLE 4
STREAM VISUAL ASSESSMENT PROTOCOL PARAMETERS

Stream Parameter	Description
Channel condition	Overall condition of the channel (i.e., evidence of alteration, connection to the floodplain, downcutting, and/or widening).
Hydrologic alteration	Measure of overbanking flow (i.e., frequency of bankfull events and floodplain connectivity). Indicators include floodplain evidence of flooding, sediment deposits, or stream debris.
Riparian zone	Width of the natural vegetation zone from the edge of the active channel out onto the floodplain.
Bank stability	Measure of the bank erosion potential. Indicators include bank vegetation and root density, current bank failure, bank undercutting, and height and slope.
Water appearance	Measure of water quality based primarily on turbidity. Other indicators include presence/absence of algae and strong odors.
Nutrient enrichment	Measure of water quality based primarily on presence/absence of macrophytes and algae.
Barriers to fish movement	Although primarily an assessment of physical structures within the stream, this can also relate to seasonal water withdrawals that inhibit movement within the reach.
Instream fish cover	A good variety and abundance of available fish habitat within a stream can aid a fish community in recovering from disturbance. Habitat includes logs and woody debris, pools, riffles, and thick root mats.
Pools	These instream structures are important as resting and feeding sites. Generally located on the outside of meander bends.
Insect/invertebrate habitat	Measure of the stability and variety of stream substrate.
Canopy cover	Stream canopy cover assists in keeping water cool, thereby increasing the oxygen carrying capacity of the water.
Manure presence	This metric is not included if the livestock or human waste treatment plants are not present. Manure increases oxygen demand.
Salinity	This metric is not included unless elevated salinity from anthropogenic sources is known to occur in the stream.
Riffle embeddedness	Measure of the depth to which objects are buried by sediment. It relates directly to the suitability of the stream substrate as habitat for macroinvertebrates, fish spawning, and egg incubation.

Source: NRCS (1998)

Field investigators also surveyed stream channels for inclusion or exclusion as a jurisdictional feature. This was performed based on recent guidance from the USACE (USACE 2007; 2008). Resources identified during the survey were categorized as ephemeral, intermittent, or perennial based on the average score from the NRCS Stream Assessment and channel conditions at the time of survey. Streams with higher averages were considered perennial and streams with lower averages were considered ephemeral to intermittent. Ephemeral streams only flow in direct response to rainfall or snowmelt and in which discrete periods of low persist no more than 29 consecutive days per event (USACE 2002). Intermittent streams generally have defined natural watercourses that do not flow year around, but beyond periods of rainfall and

with greater frequency that similarly located ephemeral streams (USACE 2002). Perennial streams flow most of the year in a well-defined channel (USACE 2002). During the survey, investigators flagged jurisdictional streams with surveyors tape and the location of each flag was recorded on a GPS. Features classified as ephemeral were not flagged or recorded using GPS for this survey. Refer to Appendix B for data forms utilized for the project stream assessments.

In the recent Supreme Court decision of Rapanos v the United States (Rapanos), the Supreme Court addressed where the Federal government can apply the Clean Water Act, specifically by determining whether a wetland or tributary is a "water of the United States." The justices issued five separate opinions in Rapanos (one plurality opinion, two concurring opinions, and two dissenting opinions), with no single opinion commanding a majority of the Court. The result of the decision is that the USACE now requires an increased level of documentation (i.e., jurisdictional determination forms) in order to determine whether or not the agency can exert jurisdictional authority over a water body.

Per USACE guidance (personal communication with Mr. Les Parker, May 2009) Project waters were classified and documented according to them being "similarly situated in the landscape". In other words, streams and associated wetlands were divided by stream order, and a single form was used to document all the streams of that type (Appendix B). An exception was made for named streams; in this case each stream and any associated wetlands were documented on a separate form.

2.2 Rare, Threatened, and Endangered Species

Based on information gathered during a preliminary desktop analysis, field assessments were conducted within the east and west transmission line corridors focusing on prime habitats of potentially occurring RTE species. In these areas, transects no wider than 50 feet were walked parallel to the ROW. Sub-prime habitats were investigated using a spot-check methodology in which microhabitats within these communities were examined as they were encountered. Full transects were not walked in sub-prime habitats. Surveys were timed to coincide with USFWS pre-determined survey periods. For example, the approved survey period for dwarf-flowered heartleaf is during its flowering period from March to May (Suiter 2006); therefore, all fieldwork was conducted during this period. All potential RTE sites were located via GPS in the field for additional surveys if necessary. A review of the latest USFWS database of federal RTE species for Cherokee and Union counties indicated the dwarf-flowered heartleaf as the only federally protected RTE species known to potentially exist in the project area (USFWS 1990).

Dwarf-flowered Heartleaf (*Hexastylis naniflora*) [Federal Threatened/State Threatened]

The dwarf-flowered heartleaf is found in the upper piedmont regions of North and South Carolina (Radford et. al. 1968; USFWS 1990). In South Carolina, populations exist in Cherokee County, several populations of this plant are located in Greenville County, and a few populations are located in Spartanburg County (USFWS 1990). It is typically found in acidic, sandy loam soils (e.g., Pacolet and Madison soils series) along bluffs, stream slopes, and ravines, and is frequently found with mountain laurel (*Kalmia latifolia*). This evergreen species is very close taxonomically to several other members of the Hexastylis genus (i.e., *H. minor* and *H. heterophylla*), and the vegetative morphology of these three species is quite similar; however, *H. naniflora* has the smallest flowers of any Hexastylis genus in North America. *H. naniflora* also differs from all the other members of this group in having no flare in the calyx tube (NatureServe 2009).

In addition to recording the location of any potential individuals or populations, field investigators collected data on the size and shape of any flowers present, vegetation community composition including associate species, and population size estimates. Photographs were taken

of representative individuals to document diagnostic characteristics. If any populations were to be found within the ROW, investigators would walk 50 feet outside both edges of the project boundary to determine the approximate lateral extent of the population.

A review of state inventory lists and maps for protected species indicated that 29 state/federally listed species potentially exist in Cherokee and Union counties. In addition to the state and federal species in Cherokee and Union counties, the federally regulated species for York and Chester counties were reviewed due to the counties proximity to the project. The SCDNR RTE Species Inventory maps that were reviewed were the Blacksburg South, Kings Creek, Wilkinsville, Hickory Grove, Kelton, and Lockhart Quadrangles. The review of the inventory quadrangles indicated 10 State of Concern (SC) species with one of the species, Georgia aster (*Aster georgianus*) being a federal Candidate species. None of the known occurrences were within the Project area. Table 5 indicates the state and federally listed species and their preferred habitat.

TABLE 5
FEDERAL AND STATE-LISTED PROTECTED SPECIES OCCURRING IN UNION AND CHEROKEE COUNTIES, SC

Scientific Name	Federal Status	State Status	Habitat
Myotis austroriparius Southeastern myotis	SC	SC	Colonies typically found in caves but other roosting sites include hollow trees, mine shafts, and buildings. Maternal colonies are formed in April and the bats usually disperse during October (Jones and Manning 1989).
Aimophila aestivalis Bachman's sparrow	SC	N/A	Open pine or oak woods, palmetto scrub, and bushy pastures (Peterson 1980).
Ammodramus henslowii Henslow's sparrow	SC	N/A	Weedy fields in winter only(Peterson 1980).
Falco sparverius American kestrel	SC	N/A	Open country, farmland, cities, wood edges, and dead trees (Peterson 1980).
Lanius ludovicianus Loggerhead shrike	SC	N/A	Semi-open country with lookout posts, wires, isolated tree stands, and scrub-brush (Peterson 1980).
Allium cernuum Nodding onion	N/A	SC	Generally found in open woodlands or around outcrops of shale, mafic, or calcareous rocks, in the mountains at low elevations. Typically blooms from June to early August or August to October.
Aster georgianus Georgia Aster	N/A	SC	Populations can be found adjacent to roads, along woodland border, in dry rocky woods, and within utility ROW's, and other open areas where current land management mimics natural disturbance regimes. Flowering occurs from October to mid-November.
Carex scabrata Rough sedge	N/A	SC	Wet woods, spring thickets, especially seepage slopes, creek borders, ravine bottoms, or other wet spots in rich deciduous woods. Less common in wet clearing and swamps, in calcareous circumneutral or acidic soils. Fruiting occurs in June (mid May in the south)(EFloras 2009).
Helianthus laevigatus Smooth Sunflower	N/A	SC	Found in dry, rocky or shaly soils, on road banks, power line ROWs, and open woodlands. Generally flowers from September to October.
Hexastylis naniflora Dwarf-flowered heartleaf	FT	ST	Found in acidic sandy soils, on bluffs and ravines in deciduous forests usually March to June.
Hydrangea cinerea Ashy-hydrangea	N/A	SC	Rock forests and rocky outcrops, along road banks, mostly associated with mafic or calcareous rock. Flowering occurs May through June.
Menispermum canadense Canada moonseed	N/A	SC	Typically found in moist, nutrient rich forests especially floodplains or lower slopes from June to August.
Juglans cinerea Butternut	SC	N/A	Moist, nutrient rich forests.

Scientific Name	Federal Status	State Status	Habitat
Lotus purshianus var. helleri Prairie birdsfoot-trefoil	SC	N/A	Dry woodlands and openings, originally probably limited to prairie-like sites, generally on clayey soils. Now primarily seen on roadbanks, along railroads, and in powerline rights-of-way.
Smilax biltmoreana Biltmore green briar	SC	N/A	Dry to moist forests primarily in the Blue Ridge Escarpment region.
Xerophyllum asphodeloides Eastern turkeybeard	N/A	SC	Found in dry, strongly acidic soils along dry, ridges and slopes in the mountains such as, pine/heath woodland forests, heath balds, and xeric oak forests. Often associated with *Pinus rigida* or *P. pungens.* Flowering occurs between May and June or July and August.
Amorpha schwerinii Schwerin Indigobush	N/A	SC	Typically found in forest and woodlands, primarily rather xeric and rocky April through June and June-October.
Carex gracillima Graceful sedge	N/A	SC	Moist forests.
Carex prasina Drooping sedge	N/A	SC	Common in rich forests, usually rich with seepage.
Hackelia virginia Virginia stickseed	N/A	SC	Found in rich forests and woodlands. Flowering occurs from June to September
Hymenocallis coronaria Shoals Spider-Lily	NC	NC	Generally occurs on rocky river shoals usually associated with *Justicia Americana* or *Podostemum ceratophyllum.* Notable stands occur on the Catawba River (SC), Saluda River (SC), the Savannah River (GA) and the Cahaba River (AL). Flowering is from May to June or July to September.
Minuartia uniflora One-Flower Stitchwort	N/A	SC	Granite flat rocks and outcrops of Atlamaha grit with a flowering season of April through May.
Monotropsis odorata Sweet pinesap	N/A	RC	Typically found in dry to mesic upland woods under oaks and/or pines (*Pinus rigida* or *P. enchinata)*, especially slopes and bluffs with abundant heaths or *Rhododendrun maximum*. Flowering occurs from September to November and February to April.
Ophioglossum vulgatum Adder's Tongue	N/A	SC	Can be found in shaded secondary woods, rich wooded slopes, forested bottomlands, and floodplain woods, south of Wisconsin glaciations. Flowering is spring to early summer (EFloras 2009).
Rhododendron eastmanii May white	N/A	SC	Found on rich slopes flowering in early to mid May.
Sedum pusillum Granite Rock Stonecrop	NC	NC	Found in very thin soil generally less than of vernally wet depressions on granite flatrocks, often found in masses of moss *Hedwigia ciliata.* Flowers from March to April or April to May.

Scientific Name	Federal Status	State Status	Habitat
Silphium terebinthinaceum Prairie rosinweed	N/A	SC	Found in mafic glades, barrens, woodlands, and roadsides (NC, SC) and in calcareous glades, barrens, woodlands (VA).
Solidago rigida Prairie goldenrod	N/A	SC	Typically occurs in open woods, glades, thickets and prairies. Flowering season is August to September (EFloras 2009).
Verbena simplex Narrow-leaved vervain	N/A	SC	Found in glades, woodlands, forests and roadsides, and over mafic of calcareous rocks. Flowering season is May through September.
Chester and York Counties – Additional Federally Regulated Species			
Amphianthus pusillus Pool sprite	FT	ST	Aquatic species endemic to granitic flatrocks.
Haliaeetus leucocephalus Bald Eagle	BGEPA	SE	Breeding habitat most commonly includes areas close to (within 4km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds. (NatureServe 2009).
Helianthus schweinitzii Schweinitz's sunflower	FE	SE	Found in clayey in soils of woodlands an roadsides, formerly in areas with post oak-blackjack oak savannas, xeric oak-pine woodlands, or "Piedmont prairies," now primarily on mowed road or powerline rights-of-way. Flowers late August-October.
Lasmigona decorata *Carolina heelsplitter*	FE	SE	Found near stable, well-shaded stream banks, with relatively clean substrate comprised of sand, gravel, and cobble (NCWRC 2009).

Source: SCDNR (2009a)
FE - Federal Endangered
FT - Federal Threatened
PE - Proposed for Federal listing as Endangered
PT - Proposed for Federal listing as Threatened
C - Candidate for Federal listing
NC - Of Concern, National (unofficial - plants only)
RC - Of Concern, Regional (unofficial - plants only)
SE - State Endangered (official state list - animals only)
ST - State Threatened (official state list - animals only)
SC - Of Concern, State (no regulatory protection)
SX - State Extirpated
N/A – Not applicable

2.3 Site Description

The proposed Route K and Route O lines both originate at the Lee Nuclear Station in Cherokee County, South Carolina, and trend south to the tie-in points located in Union County, South Carolina. The project area is in the Piedmont physiographic region of South Carolina and located within the Broad River Basin. Land use within the Project vicinity is primarily active and inactive agricultural land, undeveloped land, and some small residential areas.

Typical habitats within the Project area include distinct vegetation community types such as bottomland hardwoods, oak-hickory forests, active and fallow pastures, small stream forests, planted pine plantation, and shallow freshwater swamps (Nelson 1986). Dominant vegetation found within this bottomland hardwood community within the project area includes black willow (*Salix nigra*), box elder (*Acer negundo*), buttonbush (*Cephalanthus occidentalis*), elderberry (*Sambucus canadensis*), sensitive fern (*Onoclea sensibilis*), and spotted lady's thumb (*Polygonum persicaria*). Dominant vegetation typical of the oak-hickory forests within the Project area includes southern red oak (*Quercus falcata*), white oak (*Q. alba*), hickory (Carya, spp.), tulip poplar (*Liriodendron tulipifera*), flowering dogwood (*Cornus florida*), basswood (*Tilia americana*), and poison ivy (*Toxicodendron radicans*). Dominant vegetation typical of the active and fallow pastures includes redtop (*Agrostis alba*), other various grasses, and bull thistle (*Cirsium vulgare*).

The planted pine plantation habitat is especially abundant within the Project area. These planted pine areas are characterized by moderate to high-density pine stands comprised of commercial species such as loblolly pine (*Pinus taeda*), as well as recently cut-over areas that are in early successional growth. Dominant species in these areas include pioneer species such as sweet gum (*Liquidambar styraciflua*), black locust (*Robinia pseudoacacia*), tulip poplar, sourwood (*Oxydendrum arboreum*), saw-tooth blackberry (*Rubus argutus*), asters (Aster, spp.), and American pokeweed (*Phytolacca americana*). Dominant vegetation within the small stream forests is similar to the bottomland hardwood forests, but the habitat itself is heterogeneous and contains upland elements (Nelson 1986). Vegetation within shallow freshwater swamps is dominated by black willow and other obligate species; however, the habitat is distinct from that

of the bottomland hardwoods by the presence of standing water and the large number of standing snags. Wildlife habitat in this area is varied and supports a large number of species including multiple game species. The Worth Mountain Wildlife Management Area, in adjacent York County, South Carolina, is managed for and allows the hunting of Whitetail Deer (*Odocoileus virginianus*), Wild Turkey (*Meleagris gallopavo*), Mourning Dove (*Zenaida macroura*), Northern Bobwhite (*Colinus virginianus*), Raccoon (*Procyon lotor*), Gray Squirrel (*Sciurus carolinensis*), and Red Fox (*Vulpes vulpes*) (SCDNR 2009b).

Section 3
Results and Conclusions

3.1 Results

The following sections provide a description of the wetland and stream resources identified during this survey. Wetlands are classified alphabetically (e.g., Wetland A, Wetland B) and streams are categorized similarly, preceded by an 'S' (e.g., Stream SA, Stream SB). Table 6 at the end of this section lists all wetland and stream resources identified during this survey.

3.1.1 Wetlands

3.1.1.1 East Route

Wetland B is a palustrine emergent wetland (PEM) with palustrine scrub-shrub (PSS) elements located south of Abingdon Creek (Cowardin 1979) (Section 3.1.2.1 and Figure E4). This wetland was likely created by clearing activities associated with adjacent logging roads. The area of this wetland within the project boundary is approximately 0.03 acre. At the time of the survey, the wetland was inundated with approximately 3 inches of water. Other hydrologic indicators include soil saturation at the surface. Observed hydrophytic vegetation included pussy willow (*Salix discolor*), broadleaf cattail (*Typha latifolia*), common rush (*Juncus effusus*), and sedges (*Carex sp.*). Hydric soil indicators from Wetland B have low chroma matrices and distinct redoximorphic features. Conditions observed within Wetland B meet all three wetland parameters.

Wetland C is a PFO (palustrine forested) wetland that flows into Stream SAV (Cowardin 1979) (Section 3.1.2.1 and Figure E5). The area of this wetland within the project boundary is approximately 0.1 acre. Dominant hydrophytic vegetation that was observed at the location includes sweet gum, red maple (*Acer rubrum*), American elm (*Ulmus Americana*), and Christmas fern (*Polystichum acrostichoides*). At the time of the survey, observed hydrologic indicators included inundation of 1 inch, saturation at the surface, and drainage patterns within the wetland. Wetland C hydric soils have low chroma matrices and distinct redoximorphic features within close proximity to the surface of the ground.

Wetland E is a PFO wetland that ties into Stream SBA (Cowardin 1979) (Section 3.1.2.1 and Figure E5). The area of this wetland within the project boundary is approximately 0.01 acre. Hydrophytic vegetation that was observed at the time of the survey includes American hornbeam (*Carpinus caroliniana*), Southern arrow-wood (*Viburnum dentatum*), sticky willy (*Galium aparine*), and sedges (*Carex sp.*). Hydrologic indicators include inundation of approximately 1 inch, soil saturation at the surface, drift lines, and drainage patterns. Hydric soils within the wetland were low chroma matrices. Conditions observed within Wetland E meet all three wetland parameters.

Wetland F is a PFO wetland that is located between Streams SBQ and SBP (Cowardin 1979) (Section 3.1.2.1 and Figure E5). The area of this wetland within the project boundary is approximately 0.38 acre. Dominant hydrophytic vegetation found within Wetland F includes American sycamore (*Platanus occidentalis*), jack in the pulpit (*Arisaema triphyllum*), spotted lady's thumb, and giant cane (*Arundinaria gigantea*). At the time of the survey, Wetland F was inundated between 1 and 2 inches and the soil was saturated at the surface. The wetland has a direct hydrologic connection to Stream SBP. Hydric soil within the wetland had a low chroma matrix and distinct redoximorphic features. Conditions observed within Wetland F meet all three wetland parameters.

3.1.1.2 West Route

Wetland G is a PFO wetland located near Stream SBS (Cowardin 1979) (Section 3.1.2.2 and Figure W7). The area of this wetland within the project boundary is approximately 0.12 acre. During the time of the survey, dominant hydrophytic vegetation present included American elm, black willow, sycamore, and black elderberry (*Sambucus nigra*). Wetland hydrologic indicators included inundation of 2 to 3 inches, soil saturation within the upper 12 inches, drift lines, and drainage patterns within the wetland. Wetland G is located adjacent to Stream SBS and may have a hydrologic connection during periods of extreme high flow. Hydric soils have a sulfidic odor (hydrogen sulfide) that is only created in an anaerobic environment (Environmental Laboratory 1987).

Wetland H is a PFO wetland with PEM characteristics that drains into Stream SCC (Cowardin 1979) (Section 3.1.2.2 and Figure W6). The area of this wetland within the project boundary is approximately 0.14 acre. Hydrophytic vegetation observed at the location includes black willow, American elm, box elder, elderberry, and sedges. During the time of the survey, Wetland H was inundated with 10 to 12 inches of water and saturated within the upper 12 inches. Other hydrologic indicators present include drift lines, drainage patterns, and a direct hydrologic connection with Stream SCC. Hydric soil indicators include a low chroma matrix or less and distinct redoximorphic features.

Wetland I is a PFO wetland and open water impoundment that flows into Stream SCH (reference Section 3.1.2.2 and Figure W6) (Cowardin 1979). The area of this wetland within the project boundary is approximately 0.37 acre. Dominant hydrophytic vegetation observed at the location includes hazel alder (*Alnus serrulata*), black willow, common rush, and shallow sedge (*Carex lurida).* At the time of the survey, the wetland was inundated but an accurate depth could not be determined. The wetland drains into Stream SCH, forming a direct hydrologic connection. Hydric soils taken from the banks of the impoundment showed a low chroma matrix from 0 to 3 inches.

Wetland J is a fringe PFO wetland located south of Highway 105 (Cowardin 1979) (Figure W6). The area of this wetland within the project boundary is approximately 1.06 acre. Dominant hydrophytic vegetation observed at the location includes black willow, black elderberry, and dotted smartweed (*Polygonum punctatum*). At the time of the survey, the wetland was inundated between 1 and 5 inches and the soil was saturated within the upper 12 inches. Soil indicators showed a chroma matrix of 4 between 0 and 4 inches and 1 between 4 and 18 inches and distinct redoximorphic features. Conditions observed within Wetland J meet all three wetland parameters.

Wetland K is a PSS roadside drainage that flows into Stream SCI (Cowardin 1979) (Section 3.1.2.2 and Figure W6). The area of this wetland within the project boundary is approximately 0.9 acre. Dominant hydrophytic vegetation observed at this location includes black willow,

common rush, and black elderberry. Hydrologic indicators that were observed are inundation between 2 to 3 inches, saturated soil within the upper 12 inches, and drainage patterns within the wetland. Wetland K also has a direct hydrologic connection to Stream SCI. Hydric soil indicators showed low chroma matrices of 2, and had distinct and faint redoximorphic features.

Wetland L is a PFO wetland with PEM characteristics located adjacent to SCJ (Cowardin 1979) (Figure W5). The area of this wetland within the project boundary is approximately 0.17 acre. Observed hydrophytic vegetation includes common rush, jewelweed (*Impatiens capensis*), and Nepalese browntop (*Microstegium vimineum*). At time of the survey, the wetland was saturated within the upper 12 inches and drainage patterns were observed. Additionally a direct hydrologic connection exists between Wetland L and Stream SCJ. Hydric soil indicators present are low chroma matrices and faint redoximorphic features. Conditions observed within Wetland L meet all three wetland parameters.

Wetland M is a PFO wetland with PEM characteristics located north of Highway 211 (Cowardin 1979) (Figure W4). The area of this wetland within the project boundary is approximately 0.14 acre. Dominant hydrophytic vegetation observed at the site includes shallow sedge, American sycamore, and sensitive fern. Hydrologic indicators present at the time of the survey include inundation of 0 to 2 inches, soil saturation within the upper 12 inches, drainage patterns within the wetland, and a hydrologic connection to Stream SCO. Hydric soil indicators observed were low chroma matrices and faint redoximorphic features. Conditions observed within Wetland M meet all three wetland parameters.

Wetland P is a PSS wetland that lies adjacent to Stream SCW (Cowardin 1979) (Section 3.1.2.2 and Figure W4). The area of this wetland within the project boundary is approximately 11.95 acres. Dominant hydric vegetation present is black willow, common rush, and shallow sedge. At the time of the survey, the wetland was inundated between 1 and 6 inches. Hydric soil indicators that were observed include iron-manganese concretions at 2 inches below ground surface that are formed within hydric soils (Environmental Laboratory 1987). Conditions observed within Wetland P meet all three wetland parameters.

Wetland S is a fringe PFO wetland that abuts Stream SDE (Cowardin 1979) (Section 3.1.2.2 and Figure W4. The area of this wetland within the project boundary is approximately 0.18 acre. Dominant hydrophytic vegetation at this site includes hazel alder, common rush, and species of sedge. Hydrologic indicators present at the time of the survey were inundation between 2 and 4 inches. Hydric soils within the wetland had low chroma matrix values and faint redoximorphic features. Conditions observed within Wetland S meet all three wetland parameters.

Wetland T is a PEM wetland located south of the Pacolet River (Cowardin 1979) (Section 3.1.2.2 and Figure W3). The area of this wetland within the project boundary is approximately 1.24 acres. The dominant hydrophytic vegetation includes sycamore, shallow sedge, and Virginia iris (*Iris virginica*). Hydrological indicators include inundation of 0.5 to 1.5 inches. Soils within the wetland had low chroma matrix values and distinct redoximorphic features. Conditions observed within Wetland T meet all three wetland parameters.

Wetland U is a PEM/PFO wetland that drains into Stream SDI (Cowardin 1979) (Section 3.1.2.2 and Figure W2). The area of this wetland within the project boundary is approximately 0.01 acre. Dominant hydrophytic vegetation observed in this area includes sweet gum, sensitive fern, and smallspike false nettle (*Boehmeria cylindrica*). At the time of the survey, the area was inundated with 3 inches of water. Wetland U also has a direct hydrologic connection with Stream SDI. Soils taken within the wetland showed low chroma colors. Conditions observed within Wetland U meet all three wetland parameters.

Wetland X is a PFO wetland located southeast of State Highway S (Cowardin 1979) (Section 3.1.2.2 and Figure W2). The area of this wetland within the project boundary is approximately 0.04 acre. Dominant hydrophytic vegetation within the boundary is black elderberry, purpleleaf willowherb (*Epilobium coloratum*), swamp smartweed (*Polygonum hydropiperoides*), and whitegrass (*Leersia virginica*). Hydrological indicators observed were inundation of 3 to 4 inches. Hydric soil indicators included low chroma colors. Conditions observed within Wetland X meet all three wetland parameters.

3.1.2 Streams

3.1.2.1 East Route

Stream SA is a first order ephemeral to intermittent, severely incised channel that is 15 to 20 feet wide at the top of bank. The gradual to predominately vertical soil banks are 10 to 12 feet deep and the channel substrate is sand and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SB is a first order ephemeral to intermittent channel that is 8 to 10 feet wide at the top of bank. The gradual to vertical soil banks are 3 to 5 feet deep and the channel substrate is sand and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SC is a first order ephemeral to intermittent, severely incised channel that is 15 to 20 feet wide at the top of bank. The gradual to predominately vertical soil banks are 8 to 12 feet deep and the channel substrate is sand and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SD is a bed and bank, first to second order intermittent channel that is 8 to 10 feet wide at the top of bank. The gradual to vertical soil banks are 7 to 8 feet deep and the channel substrate is bedrock, sand, and silts (Figure E1).

Stream SE is a bed and bank, second order or greater, perennial channel that is 20 to 25 feet wide at the top of bank. The gradual soil and bedrock banks are 4 to 6 feet deep and the channel substrate is bedrock, gravel, cobble, and sand (Figure E1).

Stream SF is a bed and bank, second order or greater, intermittent to perennial channel that is 7 to 8 feet wide at the top of bank. The gradual to vertical soil banks are 4 to 5 feet deep and the channel substrate is bedrock, sand, and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SG is a bed and bank, first order, ephemeral to intermittent channel that is 3 to 4 feet wide at the top of bank. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is sand, and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SH is a bed and bank, first order, intermittent channel that is 2 to 3 feet wide at the top of bank. The gradual to vertical soil banks are 3 feet deep and the channel substrate is sand and silt (Figure E1).

Stream SI is a bed and bank, first order intermittent channel that is 12 to 15 feet wide at the top of bank. The vertical soil banks are 8 to 10 feet deep and the channel substrate is sand and silt (Figure E1).

Stream SJ is a bed and bank, first order, ephemeral to intermittent channel that is 10 feet wide at the top of bank. The gradual to vertical soil banks are 6-10 feet deep and the channel substrate is sand and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SK is a first order ephemeral to intermittent channel that is 12 to 20 feet wide at the top of bank. The gradual to predominantly vertical soil banks are 10 to 12 feet deep and the channel substrate is sand and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SL is a bed and bank, second order or greater, intermittent to perennial channel that is 8 to 12 feet wide at the top of bank. The gradual to vertical soil banks are 4 to 5 feet deep and the channel substrate is bedrock, gravel, sand, and silt (Figure E1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SM is a bed and bank, first order, intermittent channel that is 8 to 15 feet wide at the top of bank. The vertical soil banks are 6 to 7 feet deep and the channel substrate is gravel, sand and silt (Figure E1).

Stream SN is a bed and bank, second order or greater, perennial channel that is 15 to 18 feet wide at the top of bank. The vertical soil and bedrock banks are 4 to 7 feet deep and the channel substrate is bedrock, gravel, and sand (Figure E1).

Stream SO is a bed and bank, first order, intermittent channel that is 10 to 12 feet wide at the top of bank. The vertical soil and bedrock banks are 5 to 6 feet deep and the channel substrate is gravel and sand (Figure E1).

Stream SP is a bed and bank first order, intermittent channel that is 2 to 3 feet wide at the top of the bank. The gradual to vertical soil banks are between 0.5 and 1 foot deep and the channel substrate is sand and silt (Figure E2).

Stream SQ is a second order or greater perennial channel (Pacolet River) that is 30 to 40 feet wide at the top of bank. The predominantly vertical soil banks are approximately 6-10 feet deep and the channel substrate is a mixture of gravel, cobble, and silt (Figure E2).

Stream SR is a first order intermittent channel that is 6 to 8 feet wide at the top of bank. The gradual to predominantly vertical soil banks are 4 to 6 feet deep and the channel substrate is gravel and silt (Figure E3).

Stream SS is a bed and bank, second order or greater, perennial channel (Thicketty Creek) that is 100 feet wide at the top of bank. The gradual to vertical soil banks are 10 to 12 feet deep and the channel substrate is bedrock, sand, and silts (Figure E3).

Stream ST is a bed and bank, second order or greater, perennial channel that is 25 to 30 feet wide at the top of bank. The gradual to vertical soil and bedrock banks are 6 to 8 feet deep and the channel substrate is gravel, sand, and silt (Figure E3).

Stream SU is a bed and bank, first order, ephemeral to intermittent channel that is 8 to 10 feet wide at the top of bank. The gradual to vertical soil banks are 3 feet deep and the channel substrate is gravel, sand, and silt (Figure E3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SV is a bed and bank, first order, intermittent to perennial channel that is 6-12 feet wide at the top of bank. The gradual to vertical soil banks are 2-6 feet deep and the channel substrate is silt, sand, and gravel (Figure E2).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SW is a bed and bank, first order, intermittent to perennial channel that is 7 to 9 feet wide at the top of bank. The gradual to vertical soil banks are 4 to 5 feet deep and the channel substrate is bedrock, sand, and silt (Figure E2). This stream empties in to a open water pond which is also crossed by the proposed ROW (4.06 acres).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SX is a bed and bank, first to second order, intermittent to perennial channel that is 4 to 8 feet wide at the top of bank. The gradual to vertical soil banks are 4 feet deep and the channel substrate is cobble, gravel, and sand (Figure E2).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SY is a bed and bank, second order or greater, perennial channel that is 4 to 15 feet wide at the top of bank. The gradual to vertical soil banks are 4 feet deep and the channel substrate is bedrock, sand and silt (Figure E2).

Stream SZ is a first order ephemeral to intermittent channel that is 4 to 5 feet wide at the top of bank. The gradual soil banks are 1 to 2 feet deep and the channel substrate is gravel, sand and silt (Figure E2).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAA is a bed and bank, second order or greater, perennial channel that is 12 to 15 feet wide at the top of bank. The gradual to vertical soil banks are 5 feet deep and the channel substrate is bedrock, gravel, and sand (Figure E3).

Stream SAB is a first order intermittent channel that is 5 to 6 feet wide at the top of bank. The vertical to undercut soil banks are 3 to 5 feet deep and the channel substrate is bedrock and gravel (Figure E3).

Stream SAC is a first order ephemeral to intermittent channel that is 3 to 4 feet wide at the top of bank. The gradual soil banks are 1 foot deep and the channel substrate is gravel, sand and silt (Figure E3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAD is a first order ephemeral to intermittent channel that is 3 to 4 feet wide at the top of bank. The gradual to vertical soil banks are 1 to 2 feet deep and the channel substrate is silt and sand (Figure E4).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAE is a bed and bank, second order or greater, perennial channel (Abingdon Creek) that is 25 to 30 feet wide at the top of bank. The vertical soil and bedrock banks are 7 to 10 feet deep and the channel substrate is gravel, cobble, and sand (Figure E4).

Stream SAF is a first order ephemeral to intermittent channel that is 1 to 4 feet wide at the top of bank. The gradual to vertical soil banks are 1 to 3 feet deep and the channel substrate is silt and gravel (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAG is a bed and bank, second order or greater, perennial channel that is 6 to 10 feet wide at the top of bank. The gradual to vertical soil banks are 1 to 5 feet deep and the channel substrate is gravel and cobble (Figure E4).

Stream SAH is a first order ephemeral to intermittent channel that is 2-4 feet wide at the top of bank. The gradual to vertical soil banks are 1 to 2 feet deep and the channel substrate is silt, sand and gravel (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAI is a first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top of bank. The vertical soil banks are 6 to 7 feet deep and the channel substrate is sand and gravel (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAJ is a bed and bank, second order or greater, perennial channel that is 10 to 15 feet wide at the top of the bank. The gradual to vertical soil banks are 3 to 6 feet deep and the channel substrate is gravel, cobble, and bedrock (Figure E4).

Stream SAK is a bed and bank, first to second order intermittent to perennial channel that is 6 to 7 feet wide at the top of the bank. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is gravel, cobble, and bedrock (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAL is a bed and bank, first to second order intermittent to perennial channel that is 6 to 7 feet wide at the top. The gradual to vertical soil banks are 4 feet deep and the channel substrate is sand, gravel, and bedrock (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAM is a first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top. The vertical soil and bedrock banks are 7 to 8 feet deep and the channel substrate is sand, gravel, boulder, and bedrock (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAN is a first order ephemeral to intermittent channel that is 8 feet wide at the top. The steep to vertical soil banks are 7 to 8 feet deep and the channel substrate is sand, gravel, and bedrock (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAO is a first order ephemeral to intermittent channel that is 8 to 10 feet wide at the top. The gradual soil and bedrock banks are 6 feet deep and the channel substrate is gravel and cobble (Figure E4).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAP is a bed and bank, first order ephemeral to intermittent channel that is 6 feet wide at the top. The gradual to vertical soil banks are 4 feet deep and the channel substrate is silt and sand (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAQ is a bed and bank, first order ephemeral to intermittent channel that is 15 feet wide at the top. The gradual to vertical soil banks are 7 to 8 feet deep and the channel substrate is gravel, cobble, and bedrock (Figure E3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAR is a bed and bank, first order ephemeral to intermittent channel that is 8 to 15 feet wide at the top. The vertical soil and bedrock banks are 16 feet deep and the channel substrate is bedrock and gravel (Figure E3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAS is a bed and bank first order intermittent channel that is 10 feet wide at the top. The gradual to vertical soil banks are 5 feet deep and the channel substrate is gravel and cobble (Figure E3).

Stream SAT is a bed and bank, first to second order intermittent to perennial channel that is 11 feet wide at the top. The gradual to vertical soil banks are 7 to 8 feet deep and the channel substrate is gravel and cobble (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAU is a bed and bank, first order intermittent to perennial channel that is 3 to 4 feet wide at the top. The vertical soil banks are 1 to 3 feet deep and the channel substrate is silt, gravel, and cobble (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAV is a bed and bank, first order ephemeral to intermittent channel that is 6 to 7 feet wide at the top. The undercut soil banks are 4 to 5 deep and the channel substrate is silt and gravel (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAW is a bed and bank, first order ephemeral to intermittent channel that is 3 to 4 feet wide at the top. The undercut soil banks are 2 to 3 feet deep and the channel substrate is soil (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAX is a first order ephemeral to intermittent channel that is 1 to 3 feet at the top. The gradual soil banks are 1 to 2 feet deep and the channel substrate is soil (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAY is a bed and bank, first order ephemeral to intermittent channel that is 4 to 5 feet wide at the top. The gradual soil banks are 1 to 2 feet deep and the channel substrate is soil (Figure E4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SAZ is a bed and bank, first to second order intermittent to perennial channel that is 10 feet wide at the top. The gradual to vertical and undercut soil banks are 5 to 6 feet deep and channel substrate is gravel and bedrock (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBA is a bed and bank, first to second order intermittent to perennial channel that is 12 feet wide at the top. The gradual to vertical soil and bedrock banks are 4 feet deep and the channel substrate is cobble, bedrock, and boulders (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBB is a bed and bank, first order ephemeral to intermittent channel that is 12 feet wide at the top. The vertical to undercut soil banks are 6 to 7 feet deep and the channel substrate is sand, gravel, and cobble (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBC is a bed and bank, first order ephemeral to intermittent channel that is 12 to 15 feet wide at the top. The vertical to undercut soil banks are 7 to 9 feet deep and the channel substrate is soil (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBD is a bed and bank, first to second order perennial channel that is 15 to 18 feet wide at the top. The gradual to vertical soil banks are 4 to 5 feet deep and the channel substrate is gravel, cobble, and sand (Figure E5).

Stream SBE is a bed and bank, first to second order intermittent to perennial channel that is 5 to 6 feet wide at the top. The vertical to undercut soil banks are 2 to 3 feet deep and the channel substrate is gravel and bedrock (Figure E5).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBF is a bed and bank, first order ephemeral to intermittent channel that is 4 to 7 feet wide at the top. The vertical to undercut soil banks are 4 to 5 feet deep and the channel substrate is gravel and bedrock (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBG is a bed and bank, first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top. The gradual to vertical soil banks are 3 to 4 feet deep and the channel substrate is sand and bedrock (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBH is a bed and bank, second order or greater perennial channel that is 12 to 15 feet wide at the top. The gradual to vertical soil and bedrock banks are 6 to 7 feet deep and the channel substrate is gravel, bedrock, and cobble (Figure E5).

Stream SBI is a bed and bank, first order ephemeral to intermittent channel that is 10 feet wide at the top. The gradual to vertical soil banks are 7 to 8 feet deep and the channel substrate is gravel and cobble (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBJ is a bed and bank, first order ephemeral to intermittent channel that is 20 feet wide at the top. The gradual to vertical soil banks are 9 to 10 feet deep and channel substrate is soil (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBK is a bed and bank, first to second order intermittent to perennial channel that is 7 to 8 feet wide at the top. The gradual to vertical soil banks are 3 to 4 feet deep and the channel substrate is bedrock, gravel, and sand (Figure E6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBL is a bed and bank, first to second order perennial channel that is 5 to 6 feet at the top. The gradual soil and bedrock banks are 2 to 3 feet deep and the channel substrate is sand and bedrock (Figure E6).

Stream SBM is a bed and bank, first order ephemeral to intermittent channel that is 5 to 6 feet wide at the top. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is gravel and silt (Figure E6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBN is a bed and bank, first order ephemeral to intermittent channel that is 5 to 6 feet wide at the top. The gradual to vertical soil banks are 3 to 4 feet deep and the channel substrate is silt and gravel (Figure E6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBO is a bed and bank, first to second order intermittent to perennial channel that is 8 to 10 feet wide at the top. The gradual to vertical soil banks are 3 to 4 feet deep and the channel substrate is gravel and cobble (Figure E6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBP is a bed and bank, second order or greater perennial channel (Quinton Branch) that is 20 feet wide at the top. The gradual to vertical soil and bedrock banks are 4 to 5 feet deep and the channel substrate is gravel, bedrock, and cobble (Figure E6).

Stream SBQ is a bed and bank, first to second order perennial channel (Quinton Branch) that is 15 feet wide at the top. The gradual to vertical soil and bedrock banks are 4 to 5 feet deep and the channel substrate is bedrock, gravel, and sand (Figure E5).

Stream SBR is a bed and bank, first order ephemeral to intermittent channel that is 5 feet wide at the top. The gradual to vertical soil and bedrock banks are 2 to 3 feet deep and the channel substrate is bedrock and cobble (Figure E5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

3.1.2.2 West Route

Stream SBS is a bed and bank, second order or greater perennial channel (Service Branch) that is 20 feet wide at the top. The gradual to vertical soil banks are 4 to 5 feet deep and the channel substrate is bedrock, gravel, and cobble (Figure W7).

Stream SBT is a bed and bank, first order ephemeral to intermittent channel that is 6 to 7 feet wide at the top. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is gravel and cobble (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBU is a bed and bank, first order ephemeral to intermittent channel that is 7 to 8 feet wide at the top. The gradual to vertical soil banks are 5 to 6 feet deep and the channel substrate is soil (Figure W7).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBV is a bed and bank, first to second order intermittent to perennial channel that is 7 feet wide at the top. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is cobble and bedrock (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBX is a bed and bank, first to second order, intermittent to perennial channel that is 8 to 10 feet wide at the top. The gradual to vertical soil banks are 3 to 4 deep and the channel substrate is bedrock and cobble (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SBY is a bed and bank, second order or greater, perennial channel that is 15 to 20 feet wide at the top. The vertical soil banks are 5 feet deep and the channel substrate is sand, gravel, and bedrock (Figure W6).

Stream SBZ is a bed and bank, second order or greater perennial channel that is 25 to 30 feet wide at the top (Abingdon Creek). The vertical soil banks are 8 to 10 feet deep and the channel substrate is gravel, cobble, and bedrock (Figure W7).

Stream SCA is a bed and bank, first to second order, intermittent to perennial channel that is 10 feet wide at the top. The gradual to vertical soil banks are 6 to 7 feet deep and the channel substrate is gravel and cobble (Figure W7).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCB is a bed and bank, second order or greater perennial channel (Gilkey Creek) that is 35 to 40 feet wide at the top. The vertical soil banks are 10 feet deep and the channel substrate is sand and silt (Figure W6).

Stream SCC is a first order ephemeral to intermittent channel that is 3 to 4 feet wide at the top. The gradual to vertical soil banks are 2 to 3 feet deep and the channel substrate is sand and gravel (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCD is a first order ephemeral to intermittent channel that is 3 to 4 feet wide at the top. The gradual soil banks are 1 foot deep and the channel substrate is silt, sand, and gravel (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCE is a bed and bank, first order, ephemeral to intermittent channel that is 8 to 10 feet wide at the top. The vertical soil banks are 5 to 6 feet deep and the channel substrate is gravel and cobble (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCF is a first order ephemeral to intermittent channel that is 8 to 10 feet wide at the top. The vertical to gradual soil banks are 6 to 7 feet deep and the channel substrate is gravel, cobble, and bedrock (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCG is a first order ephemeral to intermittent channel that is 5 feet wide at the top. The gradual soil banks are 1 to 2 feet deep and the channel substrate is sand and silt (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCH is a first order ephemeral to intermittent channel that is 5 to 6 feet wide at the top. The gradual soil banks are 2 feet deep and the channel substrate is silt and sand (Figure W6).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCI is a bed and bank, first order ephemeral to intermittent channel that is 4 to 5 feet wide at the top. The vertical soil banks are 3 feet deep and the channel substrate is gravel and cobble (Figure W6).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCJ is a first order ephemeral to intermittent channel that is 12 to 15 feet wide at the top. The gradual to vertical soil banks are 7 feet deep and the channel substrate is silt, sand, and gravel (Figure W5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCK is a bed and bank, first order ephemeral to intermittent channel that is 6 feet wide at the top. The vertical to gradual soil banks are 2 to 3 feet deep and the channel substrate is sand and cobble (Figure W5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCL is a first order ephemeral to intermittent channel that is 6 to 10 feet wide at the top. The vertical soil banks are 6 to 7 feet deep and the channel substrate is sand, gravel, and cobble (Figure W5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCM is a bed and bank, first to second order intermittent to perennial channel that is 8 to 12 feet wide at the top. The gradual to vertical soil banks are 3 to 4 feet deep and the channel substrate is sand and gravel (Figure W5).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCN is a bed and bank, first order ephemeral to intermittent channel that is 10 to 14 feet wide at the top. The gradual to vertical soil banks are 6 to 7 feet deep and the channel substrate is sand and gravel (Figure W5).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCO is a bed and bank, first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top. The vertical soil banks are 3 to 4 feet deep and the channel substrate is silt and sand (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCP is a bed and bank, first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top. The gradual to vertical soil banks are 6 feet deep and the channel substrate is sand, silt, and gravel (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCQ is a bed and bank, first order ephemeral to intermittent channel that is 5 to 6 feet wide at the top. The gradual soil banks are 2 to 3 feet deep and the channel substrate is sand and gravel (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCR is a bed and bank, first order ephemeral to intermittent channel that is 6 to 7 feet wide at the top. The gradual to vertical soil banks are 4 feet deep and the channel substrate is sand and gravel (Figure W4).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCS is a bed and bank, first order ephemeral to intermittent channel that is 10 to 12 feet wide at the top. The gradual soil banks are 6 feet deep and the channel substrate is sand and silt (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCT is a first order ephemeral to intermittent channel that is 4 to 5 feet wide at the top. The gradual soil banks are 4 feet deep and the channel substrate is silt, bedrock, and gravel (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCU is a first order ephemeral to intermittent channel that is 4 feet wide at the top. The gradual soil banks are 1 to 2 feet deep and the channel substrate is sand and gravel (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCV is a first order intermittent channel that is 3 feet wide at the top. The gradual soil banks are approximately 1 foot deep and the channel substrate is silt and clay (Figure W4).

Stream SCW is a bed and bank, second order or greater perennial channel (Thicketty Creek) that is 40 feet wide at the top. The soil banks have a grade of vertical to gradual (Figure W4).

Stream SCX is a bed and bank, first order ephemeral to intermittent channel that is 12 feet at the top. The steep soil banks are 4 feet deep and the channel substrate is sand, bedrock, and gravel (Figure W3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SCY, is a bed and bank, second order or greater perennial channel (Pacolet River). See resource SQ for bank and channel information (Figure W3).

Stream SCZ is a bed and bank, first to second order intermittent to perennial channel that is 8 to 10 feet wide at the top. The vertical soil banks are 4 feet deep and the channel substrate is sand (Figure W3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDA is a bed and bank, first order ephemeral to intermittent channel that is 10 to 12 feet wide at the top. The steep soil banks are 6 feet deep and the channel substrate is sand and gravel (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDB is a bed and bank, first to second order intermittent to perennial channel that is 8 to 10 feet wide at the top. The gradual to vertical soil slopes are 3 to 4 feet deep and the channel substrate is sand and bedrock (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDC is a bed and bank, first to second order ephemeral to intermittent channel that is 10 to 12 feet wide at the top. The steep soil banks are 4 to 5 feet deep and the channel substrate is silt and sand (Figure W4).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDD is a bed and bank, first to second order intermittent to perennial channel that is 15 to 20 feet wide at the top. The gradual to vertical soil banks are 8 to 10 feet deep and the channel substrate is sand and gravel (Figure W3).

Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDE is a bed and bank, first order ephemeral to intermittent channel that is 8 feet wide at the top. The gradual to vertical soil banks are 2 to 4 feet deep and the channel substrate is sand and silt (Figure W3).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDF is a bed and bank, first to second order perennial channel (Gault Creek) that is 8 to 10 feet wide at the top. The gradual to vertical soil banks are 1 to 7 feet deep and the channel substrate is sand, gravel, and bedrock (Figure W3).

Stream SDG is a bed and bank, first order ephemeral to intermittent channel that is 6 to 8 feet wide at the top. The gradual soil banks are 2 to 3 feet deep and the channel substrate is silt and sand (Figure W2).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDH is a bed and bank, second order or greater perennial channel that is 1 to 7 wide at the top. The gradual soil banks are 3 to 4 feet deep and the channel substrate is sand and bedrock (Figure W2).

Stream SDI is a bed and bank, first to second order ephemeral to intermittent channel (Reedy Branch) that is 8 to 12 feet wide at the top. The gradual soil banks are 3 to 4 feet deep and the channel substrate is sand and silt (Figure W2).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDJ is a bed and bank, second order or greater perennial channel (Fanning Creek) that is 5 to 20 feet wide at the top. The gradual soil and bedrock banks are 2 to 3 feet deep and the channel substrate is silt, sand, boulder, and bedrock (Figure W1).

Stream SDK is a bed and bank, first to second order ephemeral to intermittent channel that is 7 to 10 feet wide at the top. The gradual soil and bedrock banks are 4 to 5 feet deep and the channel substrate is sand and gravel (Figure W1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDL is a first order ephemeral to intermittent channel that is 2 feet wide at the top. The gradual soil banks are 1 foot deep and the channel substrate is silt and sand (Figure W1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

Stream SDM is a first order ephemeral to intermittent channel that is 2 to 3 feet wide at the top. The gradual soil banks are 1 foot deep and the channel substrate is silt and sand (Figure W1).
Note: Stream classification is borderline and will require USACE jurisdictional determination to define specific classification.

TABLE 6
SURVEY RESULTS

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
East Route								
Wetland	B	PSS/PEM	0.03 ac	N/A	N/A	N/A	N/A	N/A
Wetland	C	PFO	0.1 ac	N/A	N/A	N/A	N/A	N/A
Wetland	E	PFO	0.01 ac	N/A	N/A	N/A	N/A	N/A
Wetland	F	PFO	0.38 ac	N/A	N/A	N/A	N/A	N/A
West Route								
Wetland	G	PFO	0.12 ac	N/A	N/A	N/A	N/A	N/A
Wetland	H	PFO/PEM	0.14 ac	N/A	N/A	N/A	N/A	N/A
Wetland	I	PFO/ Open Water	0.37 ac	N/A	N/A	N/A	N/A	N/A
Wetland	J	PFO	1.06 ac	N/A	N/A	N/A	N/A	N/A
Wetland	K	PSS	0.9 ac	N/A	N/A	N/A	N/A	N/A
Wetland	L	PFO/PEM	0.17 ac	N/A	N/A	N/A	N/A	N/A
Wetland	M	PFO/PEM	0.14 ac	N/A	N/A	N/A	N/A	N/A
Wetland	P	PSS	11.95 ac	N/A	N/A	N/A	N/A	N/A
Wetland	S	PFO	0.18 ac	N/A	N/A	N/A	N/A	N/A
Wetland	T	PEM	1.24 ac	N/A	N/A	N/A	N/A	N/A
Wetland	U	PEM/PFO	0.01 ac	N/A	N/A	N/A	N/A	N/A
Wetland	X	PFO	0.04 ac	N/A	N/A	N/A	N/A	N/A
East Route								
Stream	SA	UT to Broad River: ephemeral to intermittent	83 lf	15-20	10-12	Sa, Si	Soil	G-V
Stream	SB	UT to Broad River: ephemeral to intermittent	22lf	8-10	3-5	Sa, Si	Soil	G-V
Stream	SC	UT to Pacolet River: ephemeral to intermittent	114 lf	15-20	8-12	Sa, Si	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SD	UT to Pacolet River: intermittent	342 lf	8-10	7-8	Sa, Si, Br	Soil	G-V
Stream	SE	UT to Pacolet River: perennial	212 lf	20-25	4-6	Sa, Gr, Cb, Br	Soil, Br	G
Stream	SF	UT to Pacolet River: intermittent to perennial	236 lf	7-8	4-5	Si, Sa, Br	Soil	G-V
Stream	SG	UT to Pacolet River: ephemeral to intermittent	82 lf	3-4	2-3	Si,Sa	Soil	G-V
Stream	SH	UT to Pacolet River: intermittent	115 lf	2-3	3	Si,Sa	Soil	G-V
Stream	SI	UT to Pacolet River: Intermittent	221 lf	12-15	8-10	Sa, Si	Soil	V
Stream	SJ	UT to Pacolet River: Ephemeral to Intermittent	45 lf	10	6-10	Si,Sa	Soil	G-V
Stream	SK	UT to Pacolet River: Ephemeral to Intermittent	41 lf	12-20	10-12	Si,Sa	Soil	G-V
Stream	SL	UT to Pacolet River: Intermittent to Perennial	308 lf	8-12	4-5	Sa,Si,Gr,Br	Soil	G-V
Stream	SM	UT to Pacolet River: Intermittent	668 lf	8-15	6-7	Sa,Si,Gr	Soil	V
Stream	SN	UT to Pacolet River: Perennial	282 lf	15-18	4-7	Sa,Br,Gr	Soil,Br	V
Stream	SO	UT to Pacolet River: Intermittent	458 lf	10-12	5-6	Sa,Gr	Soil,Br	V
Stream	SP	UT to Pacolet River: Intermittent	335 lf	2-3	0.5-1	Sa,Si	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SQ	Pacolet River: Perennial	237 lf	30-40	6-10	Gr, Cb, Si	Soil	V
Stream	SR	UT to Thicketty Creek: Intermittent	822 lf	6-8	4-6	Si,Gr	Soil	G-V
Stream	SS	Thicketty Creek: Perennial	270 lf	100	10-12	Br,Si,Sa	Soil	G-V
Stream	ST	UT to Thicketty: Creek Perennial	245 lf	25-30	6-8	Sa,Si,Gr	Soil	G-V
Stream	SU	UT to Thicketty: Creek ephemeral to intermittent	81 lf	8-10	3	Gr,Si,Sa	Soil	G-V
Stream	SV	UT to Broad River: Intermittent to Perennial	402 lf	6-12	2-6	Si,Sa,Gr	Soil	G-V
Stream	SW	UT to Broad River: intermittent to Perennial to open water	113 lf and 4.06 ac open water	7-9	4-5	Si,Sa,Br	Soil	G-V
Stream	SX	UT to Broad River: Intermittent to Perennial	321 lf	4-8	4	Sa,Gr,Cb	Soil	G-V
Stream	SY	UT to Pacolet River: Perennial	1514 lf	4-15	4	Si,Sa,Br	Soil	G-V
Stream	SZ	UT to Pacolet River: Ephemeral to Intermittent	69 lf	4-5	1-2	Si,Sa,Gr	Soil	G
Stream	SAA	UT to Thicketty Creek: Perennial	309 lf	12-15	5	Sa,Gr,Br	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SAB	UT to Thicketty Creek: Intermittent	84 lf	5-6	3-5	Br,Gr	Soil	V-U
Stream	SAC	UT to Thicketty Creek: Ephemeral to Intermittent	215 lf	3-4	1	Sa,Si,Gr	Soil	G
Stream	SAD	UT to Abingdon Creek: Ephemeral to Intermittent	1060 lf	3-4	1-2	Si,Sa	Soil	G-V
Stream	SAE	Abingdon Creek: Perennial	511 lf	25-30	7-10	Gr, Cb, Sa	Soil	V
Stream	SAF	UT to Broad River: Ephemeral to Intermittent	498 lf	1-4	1-3	Si,Gr	Soil	G-V
Stream	SAG	UT to Broad River: Perennial	480 lf	6-10	1-5	Gr,Cb	Soil	G-V
Stream	SAH	UT to Broad River: Ephemeral to Intermittent	72 lf	2-4	1-2	Si,Sa,Gr	Soil	G-V
Stream	SAI	UT to Broad River: Ephemeral to Intermittent	1081 lf	6-8	6-7	Sa,Gr	Soil	V
Stream	SAJ	UT to Broad River: Perennial	426 lf	10-15	3-6	Gr,Cb,Br	Soil	G-V
Stream	SAK	UT to Broad River: intermittent to Perennial	413 lf	6-7	2-3	Gr,C,Br	Soil	G-V
Stream	SAL	UT to Broad River: intermittent to Perennial	355 lf	6-7	4	Sa,Gr,Br	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SAM	UT to Broad River: Ephemeral to Intermittent	296 lf	6-8	7-8	Sa,Gr,B,Br	Soil,Br	V
Stream	SAN	UT to Broad River: Ephemeral to Intermittent	111 lf	8	7-8	Sa,Gr,Br	Soil	S-V
Stream	SAO	UT to Broad River: Ephemeral to Intermittent	369 lf	8-10	6	Gr,C	Soil,Br	G
Stream	SAP	UT to Thicketty Creek: Ephemeral to Intermittent	214 lf	6	4	Si,Sa	Soil	G-V
Stream	SAQ	UT to Thicketty Creek: Ephemeral to Intermittent	487 lf	15	7-8	Gr,C,Br	Soil	G-V
Stream	SAR	UT to Thicketty Creek: Ephemeral to Intermittent	312 lf	8-15	16	Br,Gr	Soil,Br	V
Stream	SAS	UT to Thicketty Creek: Intermittent	208 lf	10	5	Gr,C	Soils	G-V
Stream	SAT	UT to Broad River: Intermittent to Perennial	421 lf	11	7-8	Gr,C	Soil	G-V
Stream	SAU	UT to Broad River: Intermittent to Perennial	409 lf	3-4	1-3	Si, Gr,C	Soil	V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SAV	UT to Broad River: Ephemeral to Intermittent	132 lf	6-7	4-5	Si,Gr	Soil	U
Stream	SAW	UT to Broad River: Ephemeral to Intermittent	348 lf	3-4	2-3	Soil	Soil	U
Stream	SAX	UT to Abingdon Creek: Ephemeral to Intermittent	407 lf	1-3	1-2	Soil	Soil	G
Stream	SAY	UT to Abingdon Creek: Ephemeral to Intermittent	341 lf	4-5	1-2	Soil	Soil	G
Stream	SAZ	UT to Broad River: Intermittent to Perennial	469 lf	10	5-6	Gr,Br	Soil	G,V,U
Stream	SBA	UT to Broad River: Intermittent to Perennial	454 lf	12	4	C,B,Br	Soil,Br	G-V
Stream	SBB	UT to Broad River: ephemeral to intermittent	374 lf	12	6-7	Sa,Gr,C	Soil	V-U
Stream	SBC	UT to Broad River: ephemeral to intermittent	110 lf	12-15	7-9	Soil	Soil	V-U
Stream	SBD	UT to Broad River: Perennial	383 lf	15-18	4-5	Gr,C,Sa	Soil	G-V
Stream	SBE	UT to Broad River: Intermittent to Perennial	359 lf	5-6	2-3	Gr,Br	Soil	V-U

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SBF	UT to Broad River: Ephemeral to Intermittent	62 lf	4-7	4-5	Gr,Br	Soil	V-U
Stream	SBG	UT to Broad River: Ephemeral to Intermittent	376 lf	6-8	3-4	Sa,Br	Soil	G-V
Stream	SBH	UT to Broad River: Perennial	503 lf	12-15	6-7	Gr,Br,C	Soil,Br	G-V
Stream	SBI	UT to Broad River: Ephemeral to Intermittent	526 lf	10	7-8	Gr,C	Soil	G-V
Stream	SBJ	UT to Broad River: Ephemeral to Intermittent	379 lf	20	9-10	Soil	Soil	G-V
Stream	SBK	UT to Broad River: Intermittent to Perennial	599 lf	7-8	3-4	Br,Gr,Sa	Soil	G-V
Stream	SBL	UT to Broad River: Perennial	319 lf	5-6	2-3	Sa,Br	Soil,Br	G
Stream	SBM	UT to Broad River: ephemeral to intermittent	275 lf	5-6	2-3	Gr,Si	Soil	G-V
Stream	SBN	UT to Broad River: ephemeral to intermittent	478 lf	5-6	3-4	Si,Gr	Soil	G-V
Stream	SBO	UT to Broad River: Intermittent to Perennial	413 lf	8-10	3-4	Gr,C	Soil	G-V
Stream	SBP	Quinton Branch: Perennial	1602 lf	20	4-5	Gr,Br,C	Soil,Br	G-V
Stream	SBQ	Quinton Branch: Perennial	218 lf	15	4-5	Br,Gr,Sa	Soil,Br	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SBR	UT to Quinton Branch: Ephemeral to Intermittent	365 lf	5	2-3	Br,C	Soil,Br	G-V
			West Route					
Stream	SBS	Service Branch: Perennial	330 lf	20	4-5	Br,Gr,C	Soil	G-V
Stream	SBT	UT to Abingdon Creek : Ephemeral to Intermittent	567 lf	6-7	2-3	Gr,C	Soil	G-V
Stream	SBU	UT to Service Branch: Ephemeral to Intermittent	227 lf	7-8	5-6	Soil	Soil	G-V
Stream	SBV	UT to Abingdon Creek: Intermittent to Perennial	363 lf	7	2-3	C,Br	Soil	G-V
Stream	SBX	UT to Abingdon Creek: Intermittent to Perennial	318 lf	8-10	3-4	Br,C	Soil	G-V
Stream	SBY	UT to Abingdon Creek: Perennial	883 lf	15-20	5	Sa,Gr,Br	Soil	V
Stream	SBZ	Abingdon Creek: Perennial	331 lf	25-30	8-10	Gr,C,Br	Soil	V
Stream	SCA	UT to Abingdon Creek: Intermittent to Perennial	388 lf	10	6-7	Gr,C	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SCB	Gilkey Creek: Perennial	380 lf	35-40	10	Sa,Si	Soil	V
Stream	SCC	UT to Gilkey Creek: Ephemeral to Intermittent	448 lf	3-4	2-3	Sa,Gr	Soil	G-V
Stream	SCD	UT to Gilkey Creek: Ephemeral to Intermittent	115 lf	3-4	1	Si,Sa,Gr	Soil	G
Stream	SCE	UT to Gilkey Creek: Ephemeral to Intermittent	443 lf	8-10	5-6	Gr,C	Soil	V
Stream	SCF	UT to Gilkey Creek: Ephemeral to Intermittent	61 lf	8-10	6-7	Gr,C,Br	Soil	V-G
Stream	SCG	UT to Gilkey Creek: Ephemeral to Intermittent	417 lf	5	1-2	Sa,Si	Soil	G
Stream	SCH	UT to Gilkey Creek: Ephemeral to Intermittent	187 lf	5-6	2	Si,Sa	Soil	G
Stream	SCI	UT to Rocky Branch: Ephemeral to Intermittent	196 lf	4-5	3	Gr,C	Soil	V
Stream	SCJ	UT to Gilkey Creek: Ephemeral to Intermittent	409 lf	12-15	7	Si,Sa,Gr	Soil	G-V
Stream	SCK	UT to Thicketty Creek: Ephemeral to Intermittent	103 lf	6	2-3	Sa,C	Soil	V-G

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SCL	UT to Thicketty Creek: Ephemeral to Intermittent	441 lf	6-10	6-7	Sa,Gr,C	Soil	V
Stream	SCM	UT to Thicketty Creek: Intermittent to Perennial	540 lf	8-12	3-4	Sa,Gr	Soil	G-V
Stream	SCN	UT to Thicketty Creek: Ephemeral to Intermittent	421 lf	10-14	6-7	Sa,Gr	Soil	G-V
Stream	SCO	UT to Thicketty Creek: Ephemeral to Intermittent	423 lf	6-8	3-4	Si,Sa	Soil	V
Stream	SCP	UT to Thicketty Creek: Ephemeral to Intermittent	263 lf	6-8	6	Sa,Si,Gr	Soil	G-V
Stream	SCQ	UT to Thicketty Creek: Ephemeral to Intermittent	309 lf	5-6	2-3	Sa,Gr	Soil	G
Stream	SCR	UT to Thicketty Creek: Ephemeral to Intermittent	311 lf	6-7	4	Sa,Gr	Soil	G-V
Stream	SCS	UT to Thicketty Creek: Ephemeral to Intermittent	71 lf	10-12	6	Sa,Si	Soil	G
Stream	SCT	UT to Thicketty Creek: Ephemeral to Intermittent	452 lf	4-5	4	Si,Br,Gr	Soil	G

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SCU	UT to Thicketty Creek: Ephemeral to Intermittent	214 lf	4	1-2	Sa,Gr	Soil	G
Stream	SCV	UT to Thicketty Creek: Intermittent	107 lf	3	1	Si,Clay	Soil	G
Stream	SCW	Thicketty Creek: Perennial	377 lf	40	N/A	N/A	Soil	V-G
Stream	SCX	UT to Pacolet River: Ephemeral to Intermittent	147 lf	12	4	Sa,Br,Gr	Soil	Steep
Stream	SCY	Pacolet River: Perennial	204 lf	N/A	N/A	N/A	N/A	N/A
Stream	SCZ	UT to Mill Creek: Intermittent to Perennial	288 lf	8-10	4	Sa	Soil	V
Stream	SDA	UT to Mill Creek: Ephemeral to Intermittent	282 lf	10-12	6	Sa,Gr	Soil	Steep
Stream	SDB	UT to Mill Creek: Intermittent to Perennial	218 lf	8-10	3-4	Sa,Br	Soil	G-V
Stream	SDC	UT to Mill Creek: Ephemeral to Intermittent	342 lf	10-12	4-5	Si,Sa	Soil	Steep
Stream	SDD	UT to Pacolet River: Intermittent to Perennial	375 lf	15-20	8-10	Sa,Gr	Soil	G-V
Stream	SDE	UT to Gault Creek: Ephemeral to Intermittent	421 lf	8	2-4	Sa, SI	Soil	G-V

Resource	Designation	Description*	Area within Project boundary **	Bank Width (ft)	Bank Depth (ft)	Channel *** Substrate	Bank Substrate	Bank Grade****
Stream	SDF	Gault Creek: Perennial	215 lf	8-10	1-7	Sa,Gr,Br	Soil	G-V
Stream	SDG	UT to Gault Creek Ephemeral to Intermittent	452 lf	6-8	2-3	Si, Sa,	Soil	G
Stream	SDH	UT to Gault Creek: Perennial	342 lf	1-7	3-4	Sa, Br	Soil	G
Stream	SDI	Reedy Branch: Ephemeral to Intermittent	287 lf	8-12	3-4	Sa, Si	Soil	G
Stream	SDJ	Fanning Creek: Perennial	215 lf	5-20	2-3	Si, Sa, B, Br	Soil, Br	G
Stream	SDK	UT to Fanning Creek: Ephemeral to Intermittent	305 lf	7-10	4-5	Sa, Gr	Soil, Br	G
Stream	SDL	UT to Fanning Creek: Ephemeral to Intermittent	148 lf	2	1	Si, Sa	Soil	G
Stream	SDM	UT to Fanning Creek: Ephemeral to Intermittent	260 lf	2-3	1	Si,Sa	Soil	G

* UT = Unnamed Tributary; PEM = Palustrine Emergent Wetland; PSS = Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland
** Area within project includes small amounts immediately adjacent to the project boundary; lf = linear feet; ac = acres
*** Br = Bedrock; B = Boulder; Cb = Cobble; Cl = Clay; Gr = Gravel; Sa = Sand; Si = Silt
**** V = Vertical; G = Gradual; S = Steep; U = Undercut

3.1.3 Rare, Threatened, and Endangered Species

The dwarf-flowered heartleaf is the only species listed as having federal protection status under the Endangered Species Act for Cherokee and Union counties, South Carolina. During field surveys, no federally protected species were identified within the Project boundary; however, some potential habitat for the dwarf-flowered heartleaf does exist within the ROW

Although no known populations are located within the Project boundary, individual plants having similar characteristics were documented within dwarf-flowered heartleaf habitat. Upon examination of the size and shape of the flower, it was determined that the specimens were another member of the Hexastylis genus such as *H. minor* or *H. heterophylla*. Documentation of these species is located in Appendix A.

In addition to the dwarf-flowered heartleaf, there are 33 species noted to be species of concern for both the SCDENR and the USFWS. Table 7 describes the 33 species that could potentially occur within the Project area as noted in state and federal databases. Four of the species are regulated by both state and federal agencies. The Bald Eagle (*Haliaeetus leucocephalus*), Carolina Heelsplitter (*Lasmigona decorata*), Pool sprite (*Amphianthus pusillus*), and Schweinitz's sunflower (*Helianthus schweinitzii*) are all known to occur in the adjacent Chester and York counties. Of the four, the only species potentially found within the Project area is the Schweinitz's sunflower, which does not bloom until late August through October. Additional surveys for this sunflower may be necessary during its flowering period.

Of the remaining 29 species, several have the potential to be found within the Project ROW (see Table 7). All of those species are noted as species of concern by state and federal agencies. The status of these species does not allow for any regulatory protection; however, if any of these unregulated species are discovered during the additional surveys for the Schweinitz's sunflower, they will be noted in an addendum report.

TABLE 7
FEDERAL AND STATE-LISTED PROTECTED SPECIES POTENTIALLY OCCURRING WITHIN THE PROJECT BOUNDARY

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
Myotis Austroriparius Southeastern myotis	SC	SC	Colonies typically found in caves but other roosting sites include hollow trees, mine shafts, and buildings. Maternal colonies are formed in April and the bats usually disperse during October (Jones and Manning 1989).	No	No cave-like structures that could be used for hibernation were observed. Several abandoned structures were observed onsite that may provide potential roosting sites only.
Aimophila aestivalis Bachman's sparrow	SC	N/A	Open pine or oak woods, palmetto scrub, and bushy pastures (Peterson 1980).	No	No potential habitat for this species exists within the Project boundary.
Ammodramus henslowii Henslow's sparrow	SC	N/A	Weedy fields in SC during winter (Peterson 1980).	Yes	Potential habitat for this species exists within the Project boundary, however this species is not known to breed in the Upstate of SC.
Falco sparverius American kestrel	SC	N/A	Open country, farmland, cities, wood edges, and dead trees (Peterson 1980).	Yes	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species.
Lanius ludovicianus Loggerhead shrike	SC	N/A	Semi-open country with lookout posts, wires, isolated tree stands, and scrub-brush (Peterson 1980).	Yes	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species.
Allium cernuum Nodding onion	N/A	SC	Generally found in open woodlands or around outcrops of shale, mafic, or calcareous rocks, in the mountains at low elevations. Typically blooms from June to early August or August to October.	No	Some outcrops were observed near the southern end of the western route. However, this species is not regulated by state or federal agencies.

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
Aster georgianus Georgia Aster	N/A	SC	Populations can be found adjacent to roads, along woodland border, in dry rocky woods, and within utility ROW's, and other open areas where current land management mimics natural disturbance regimes. Flowering occurs from October to mid-November.	Yes	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species. However, this species is not regulated by state or federal agencies.
Carex scabrata Rough sedge	N/A	SC	Wet woods, spring thickets, especially seepage slopes, creek borders, ravine bottoms, or other wet spots in rich deciduous woods. Less common in wet clearing and swamps, in calcareous circumneutral or acidic soils. Fruiting occurs in June (mid May in the south)(EFloras 2009).	Yes	Abundant potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Helianthus laevigatus Smooth Sunflower	N/A	SC	Found in dry, rocky or shale soils, on road banks, power line ROWs, and open woodlands. Generally flowers from September to October.	Yes	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species. However, this species is not regulated by state or federal agencies.
Hexastylis naniflora Dwarf-flowered heartleaf	FT	ST	Found in acidic sandy soils, on bluffs and ravines in deciduous forests usually March to June.	Yes, but extensive field surveys revealed no individuals or populations.	Known populations are located near Thicketty Creek, but no populations or individuals were observed during the field survey.
Hydrangea cinerea Ashy-hydrangea	N/A	SC	Rock forests and rocky outcrops, along road banks, mostly associated with mafic or calcareous rock. Flowering	Yes	Potential habitat for this species exists within the Project boundary. However, this species is not regulated by

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
			occurs May through June.		state or federal agencies.
Menispermum canadense Canada moonseed	N/A	SC	Typically found in moist, nutrient rich forests especially floodplains or lower slopes from June to August.	Yes	Potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Juglans cinerea Butternut	SC	N/A	Moist, nutrient rich forests.	Yes	Potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Lotus purshianus var. helleri Prairie birdsfoot-trefoil	SC	N/A	Dry woodlands and openings, originally probably limited to prairie-like sites, generally on clayey soils. Now primarily seen on roadbanks, along railroads, and in powerline rights-of-way.	Potentially	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species. However, this species is not regulated by state or federal agencies.
Smilax biltmoreana Biltmore green briar	SC	N/A	Dry to moist forests primarily in the Blue Ridge Escarpment region.	Potentially	Potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Xerophyllum asphodeloides Eastern turkeybeard	N/A	SC	Found in dry, strongly acidic soils along dry, ridges and slopes in the mountains such as, pine/heath woodland forests, heath balds, and xeric oak forests. Often associated with *Pinus rigida* or *P. pungens.* Flowering occurs between May and June or July and August.	No	Minimal habitat for species exists within the Project boundary.
Amorpha schwerinii Schwerin Indigobush	N/A	SC	Typically found in forest and woodlands, primarily rather xeric and rocky April through June and June-October.	Potentially	Minimal habitat for species exists within the Project boundary.

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
Carex gracillima Graceful sedge	N/A	SC	Moist forests.	Yes	Abundant potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Carex prasina Drooping sedge	N/A	SC	Common in rich forests, usually rich with seepage.	Yes	Abundant potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Hackelia virginia Virginia stickseed	N/A	SC	Found in rich forests and woodlands. Flowering occurs from June to September	Yes	Abundant potential habitat for this species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Hymenocallis coronaria Shoals Spider-Lily	NC	NC	Generally occurs on rocky river shoals usually associated with *Justicia Americana* or *Podostemum ceratophyllum.* Notable stands occur on the Saluda River (SC), the Savannah River (GA) and the Cahaba River (AL).Flowering is from May to June or July to September.	No	This species is limited to populations in the Broad River.
Minuartia uniflora One-Flower Stitchwort	N/A	SC	Granite flat rocks and outcrops of Atlamaha grit with a flowering season of April through May.	No	Although some outcrops were found in the southern end of the western route, these areas were very steep.
Monotropsis odorata Sweet pinesap	N/A	RC	Typically found in dry to mesic upland woods under oaks and/or pines (*Pinus rigida* or *P. enchinata)*, especially slopes and bluffs with abundant heaths or *Rhododendrun maximum.* Flowering occurs from September to November and	Potentially	Some potential habitat for species exists within the Project boundary.

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
			February to April.		
Ophioglossum vulgatum Adder's Tongue	N/A	SC	Can be found in shaded secondary woods, rich wooded slopes, forested bottomlands, and floodplain woods. Flowering is spring to early summer (EFloras 2009).	Yes	Some potential habitat for species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Rhododendron eastmanii May white	N/A	SC	Found on rich slopes flowering in early to mid May.	Potentially	Some potential habitat for species exists within the Project boundary
Sedum pusillum Granite Rock Stonecrop	NC	NC	Found in very thin soil generally less than of vernally wet depressions on granite flatrocks, often found in masses of moss *Hedwigia ciliata*. Flowers from March to April or April to May.	No	Although some outcrops were found in the southern end of the western route, these areas were very steep.
Silphium terebinthinaceum Prairie rosinweed	N/A	SC	Found in mafic glades, barrens, woodlands, and roadsides (NC, SC) and in calcareous glades, barrens, woodlands (VA).	Potentially	Some potential habitat for species exists within the Project boundary. However, this species is not regulated by state or federal agencies.
Solidago rigida Prairie goldenrod	N/A	SC	Typically occurs in open woods, glades, thickets and prairies. Flowering season is August to September (EFloras 2009).	Potentially	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species. However, this species is not regulated by state or federal agencies.
Verbena simplex Narrow-leaved vervain	N/A	SC	Found in glades, woodlands, forests and roadsides, and over mafic of calcareous rocks. Flowering season is May through September.	Yes	Some potential habitat for species exists within the Project boundary. However, this species is not regulated by state or federal agencies.

Scientific Name	Federal Status	State Status	Habitat	Potentially Occurring Within Project Boundary	Comments
Chester and York Counties, Additional Federally Regulated Species					
Haliaeetus leucocephalus Bald Eagle	BGEPA	SE	Breeding habitat most commonly includes areas close to (within 4km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources (NatureServe 2009).	No	No nesting super canopy trees close to the Broad River were observed. No nesting sites were observed during the survey.
Lasmigona decorata Carolina heelsplitter	FE	SE	Found near stable, well-shaded stream banks, with relatively clean substrate comprised of sand, gravel, and cobble (NCWRC 2009).	No	This species is known from the Catawba River drainage.
Amphianthus pusillus Pool sprite	FT	ST	Aquatic species endemic to granitic flatrocks.	No	Although some outcrops were found in the southern end of the western route, these areas were very steep and do not pool water.
Helianthus schweinitzii Schweinitz's sunflower	FE	SE	Found in clayey soils of woodlands and roadsides, formerly in areas with post oak-blackjack oak savannas, xeric oak-pine woodlands, or "Piedmont prairies," now primarily on mowed road or powerline rights-of-way. Flowers late August-October.	Potentially	Potential habitat for this species exists within the Project boundary. Project activities will likely create potential habitat for this species.

Source: SCDNR (2009a)
FE - Federal Endangered
FT - Federal Threatened
PE - Proposed for Federal listing as Endangered
PT - Proposed for Federal listing as Threatened
C - Candidate for Federal listing
NC - Of Concern, National (unofficial - plants only)
RC - Of Concern, Regional (unofficial - plants only)
SE - State Endangered (official state list - animals only)

ST - State Threatened (official state list - animals only)
SC - Of Concern, State (no regulatory protection)
SX - State Extirpated
N/A – Not applicable
BGEPA – Bald/Golden Eagle Protection Act

3.2 Conclusions and Surveyor Instructions

In April and May of 2009, HDR|DTA personnel conducted an environmental assessment of the approximately 31 miles of the proposed K and O Transmission lines in Cherokee and Union counties, South Carolina in association with jurisdictional waters of the U.S, and federally protected species. Investigators identified 135 potentially jurisdictional features including 118 streams and 17 wetlands. This delineation should be considered approximate until it can be field-verified (i.e., jurisdictional determination) by USACE personnel.

No protected species were identified within the project boundary; however, some potential habitat for the federally listed dwarf-flowered heartleaf does exist within the ROW. The areas of favorable or potential habitat were recorded and no dwarf-flowered heartleaf were documented. Each resource was assigned a unique identifier that was written onto sequentially numbered pink surveyor tape. The tape was hung on the boundary of each wetland and along the approximate centerline of each stream. Additionally, tape was used around streams and marked with the approximate jurisdictional width of the stream.

Section 4
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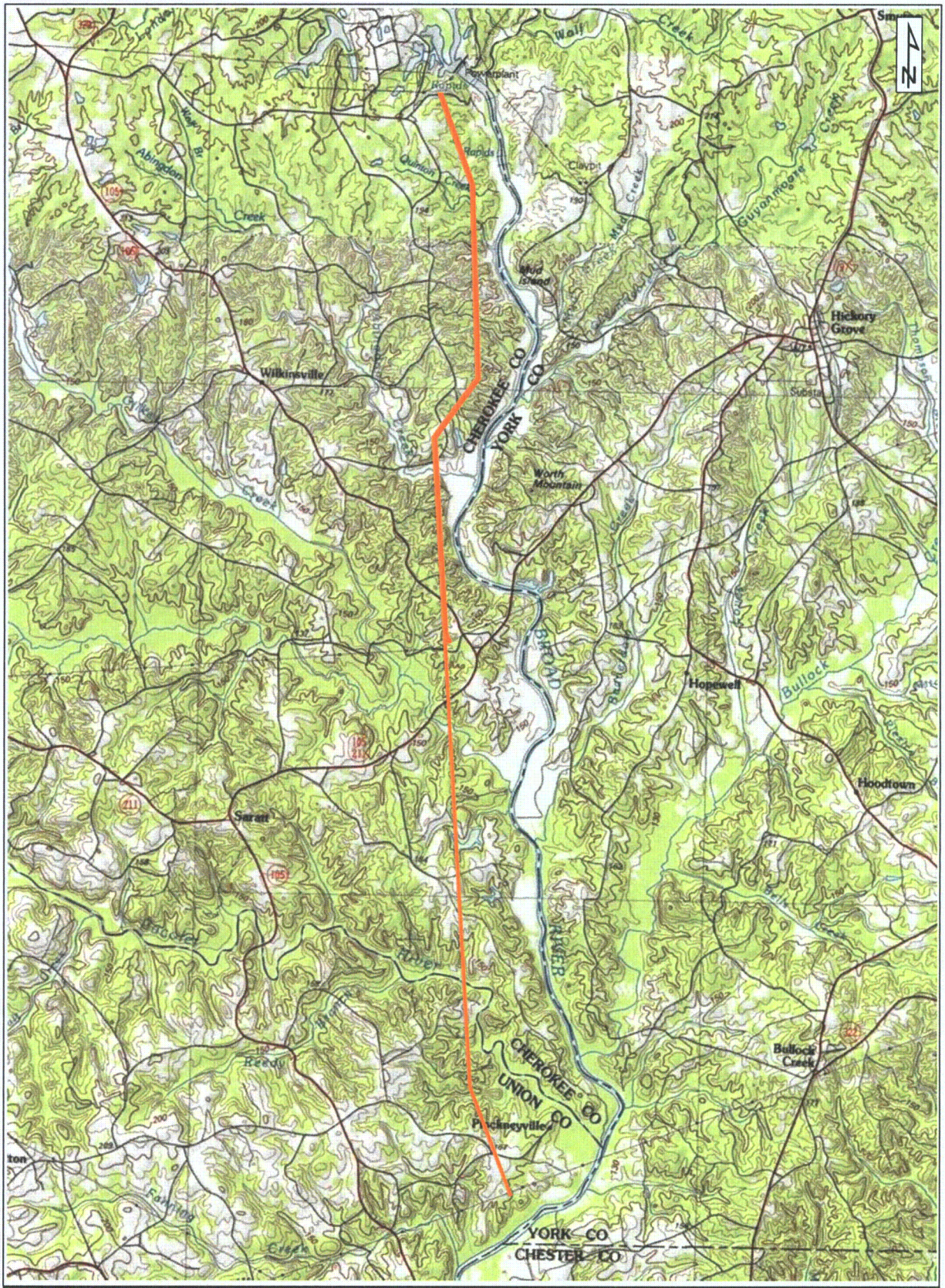
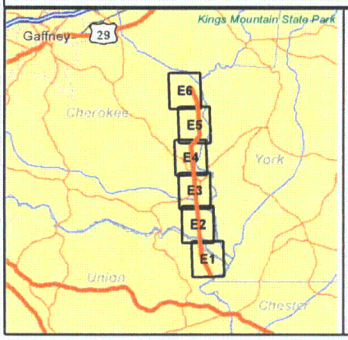
APPENDICES

APPENDIX A
FIGURES AND PHOTOGRAPHS





Legend

Right-of-Way Limits

0 6,000 12,000 18,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Overview Location Map with William S. Lee III Nuclear Station Transmission Line – East Line (Route O)

South Carolina

07/09/2009

Source: Field Reconnaissance 2009, ESRI 9.2 Base Data, 2007.

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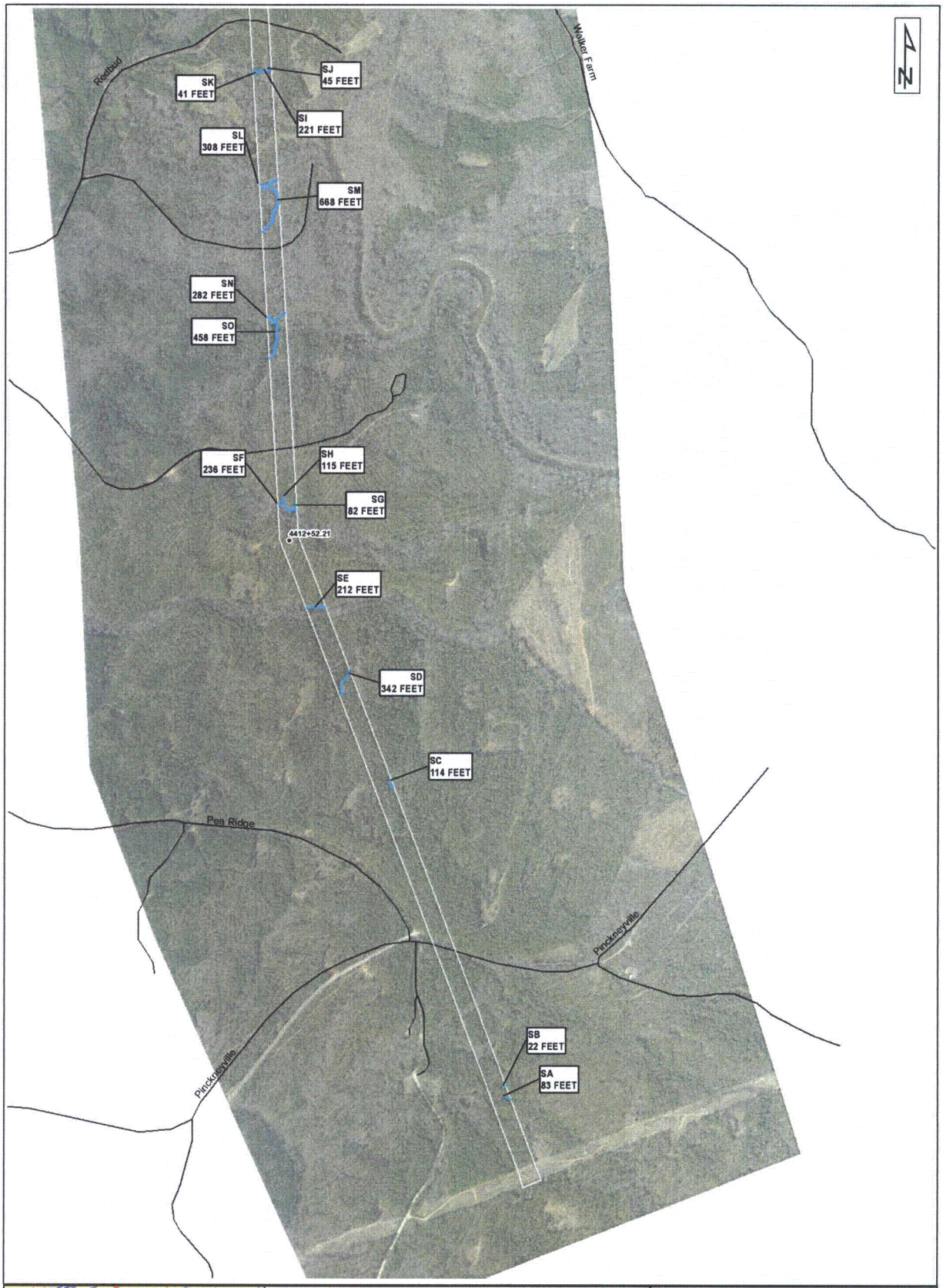

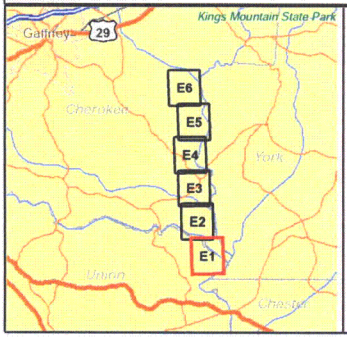

Legend

- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E1
East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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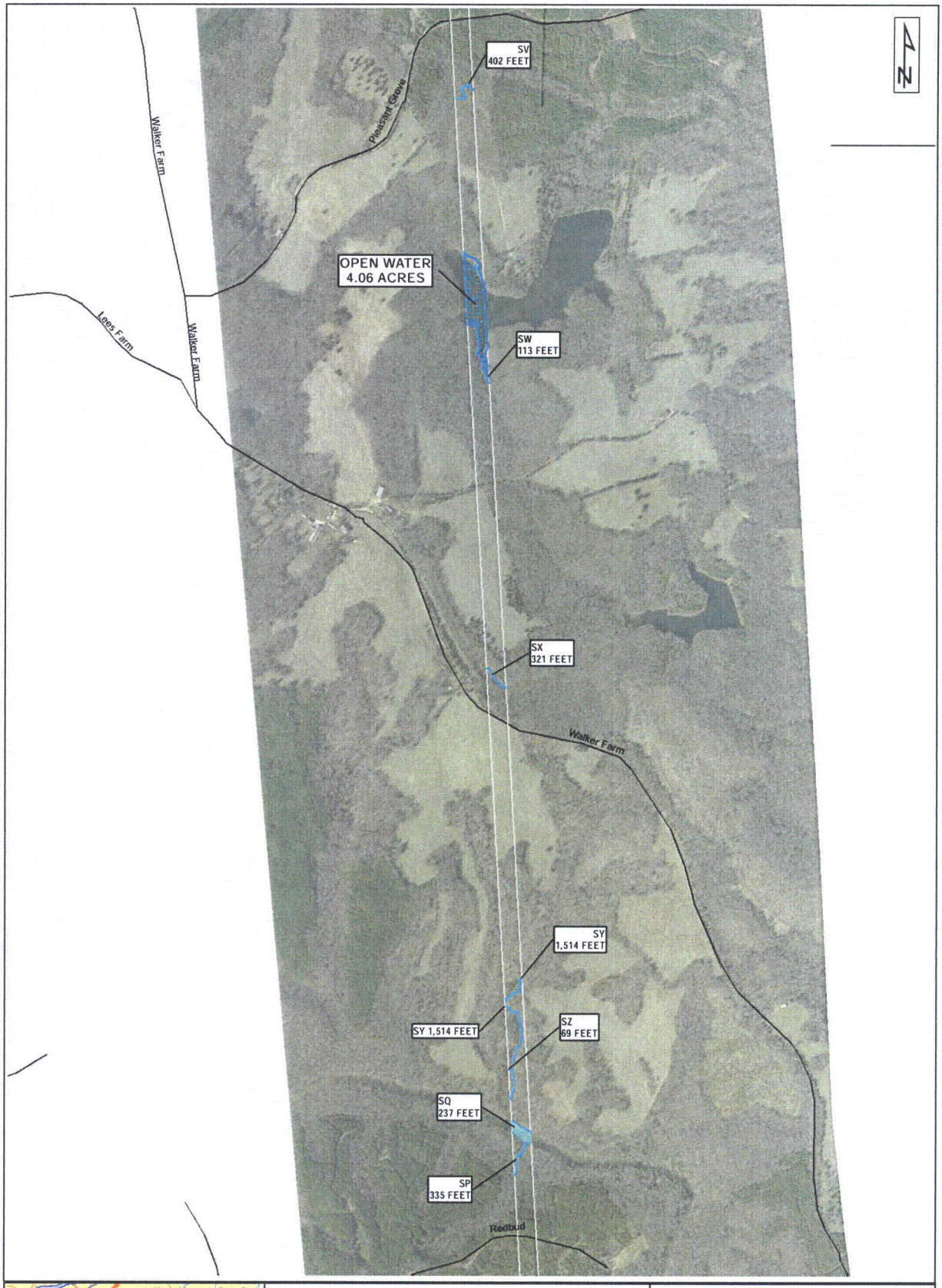

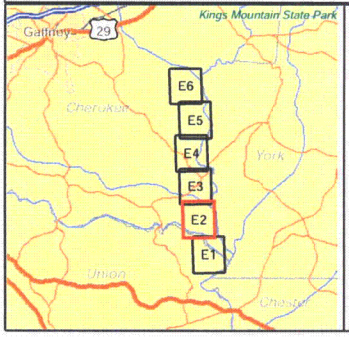

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- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E2

East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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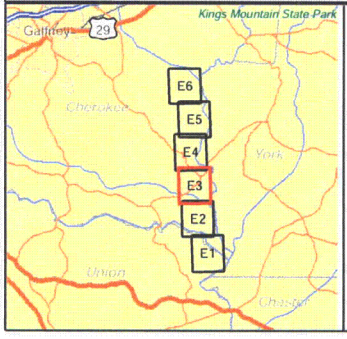

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- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E3
East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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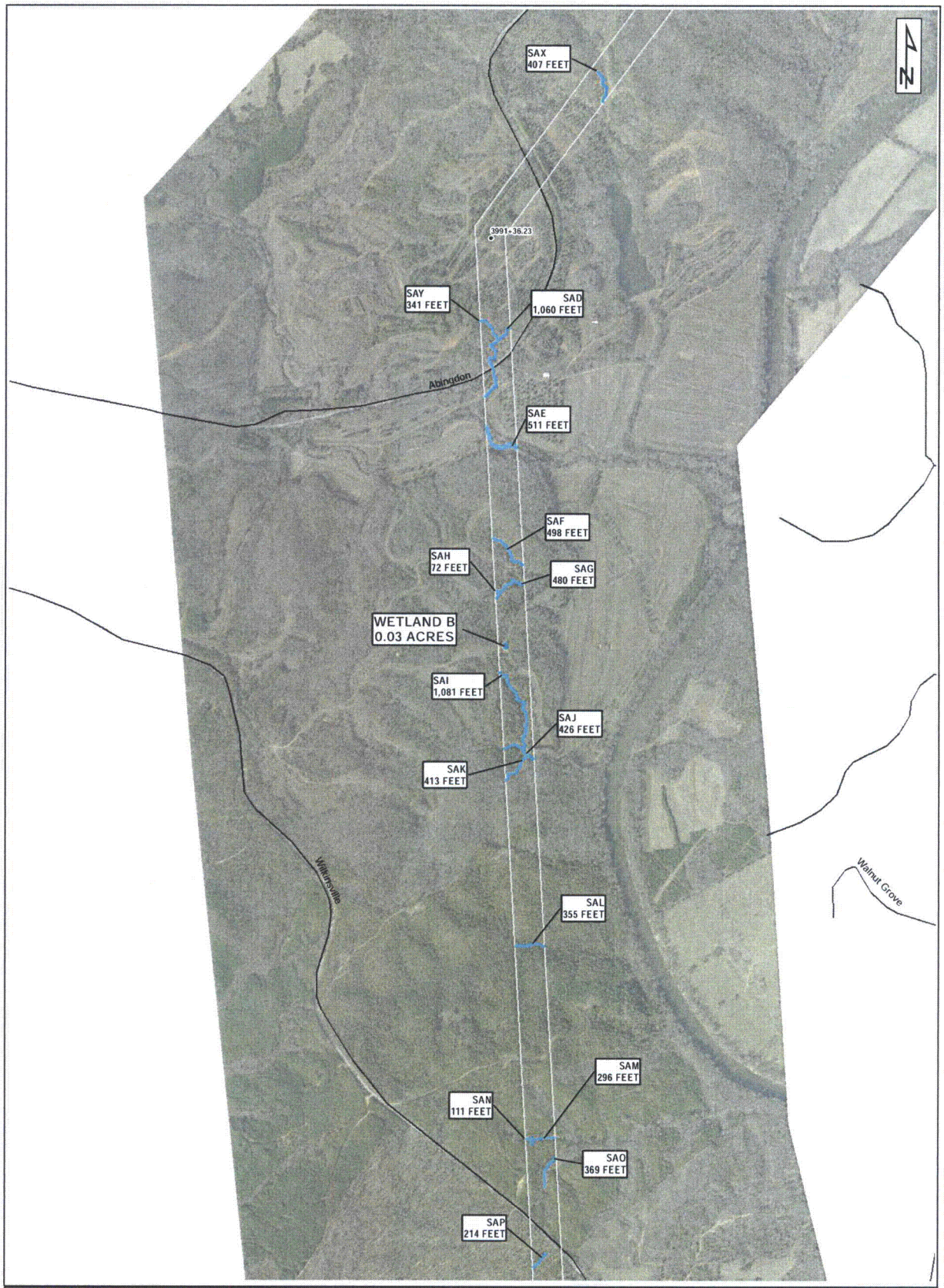

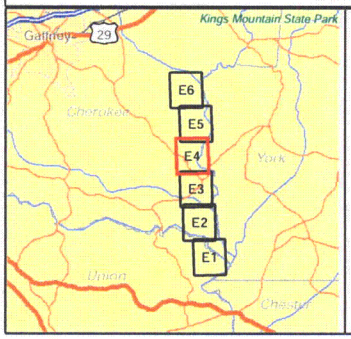

Legend

- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E4
East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC. 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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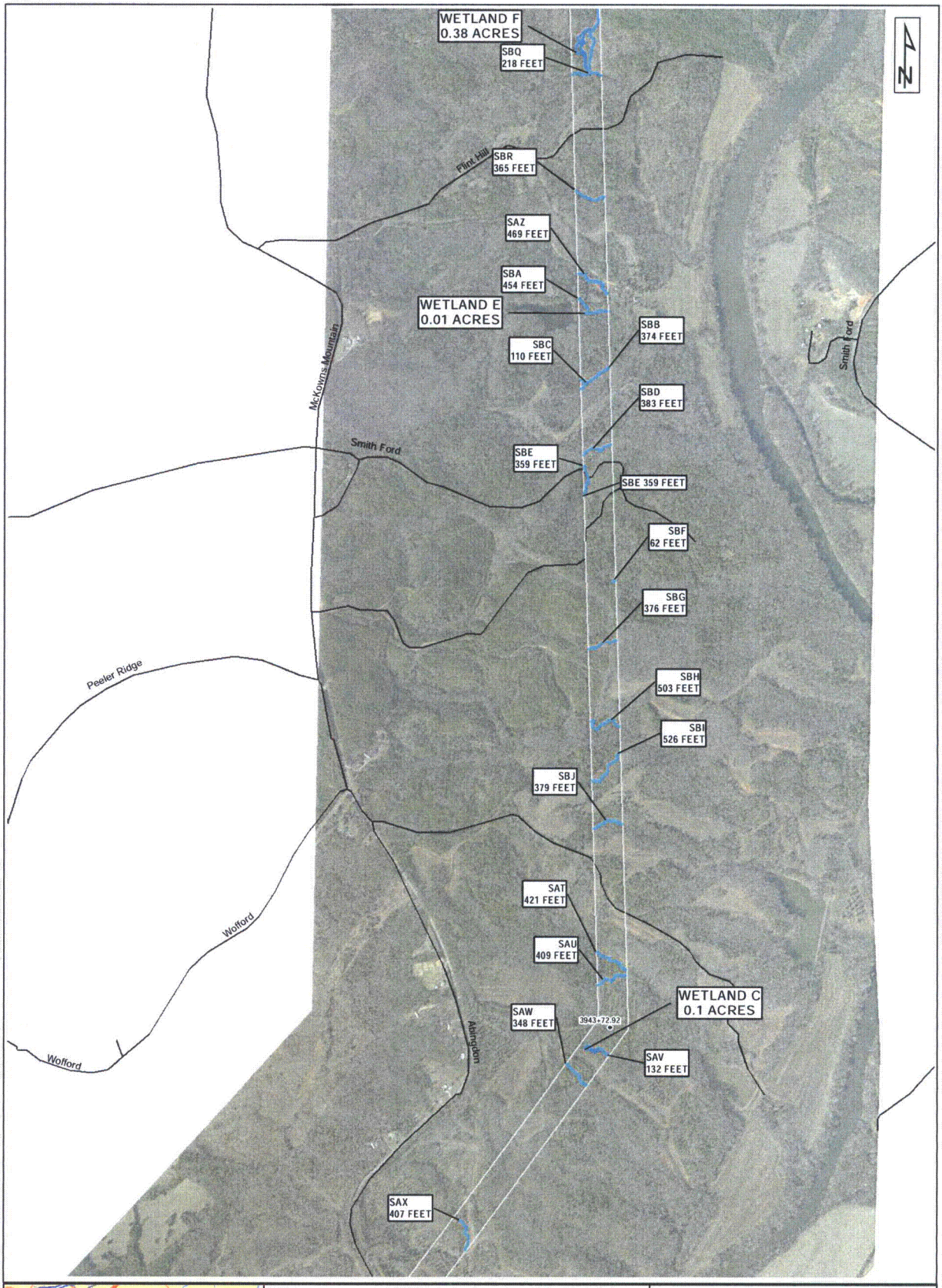

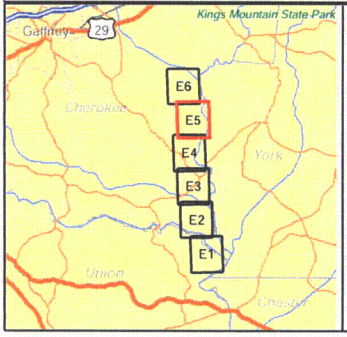

Legend

- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E5
East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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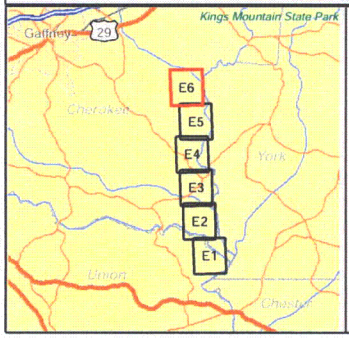

Legend

- Point of Intersection
- Road
- Stream Bank
- Stream
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure E6
East Line (Route O)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC; 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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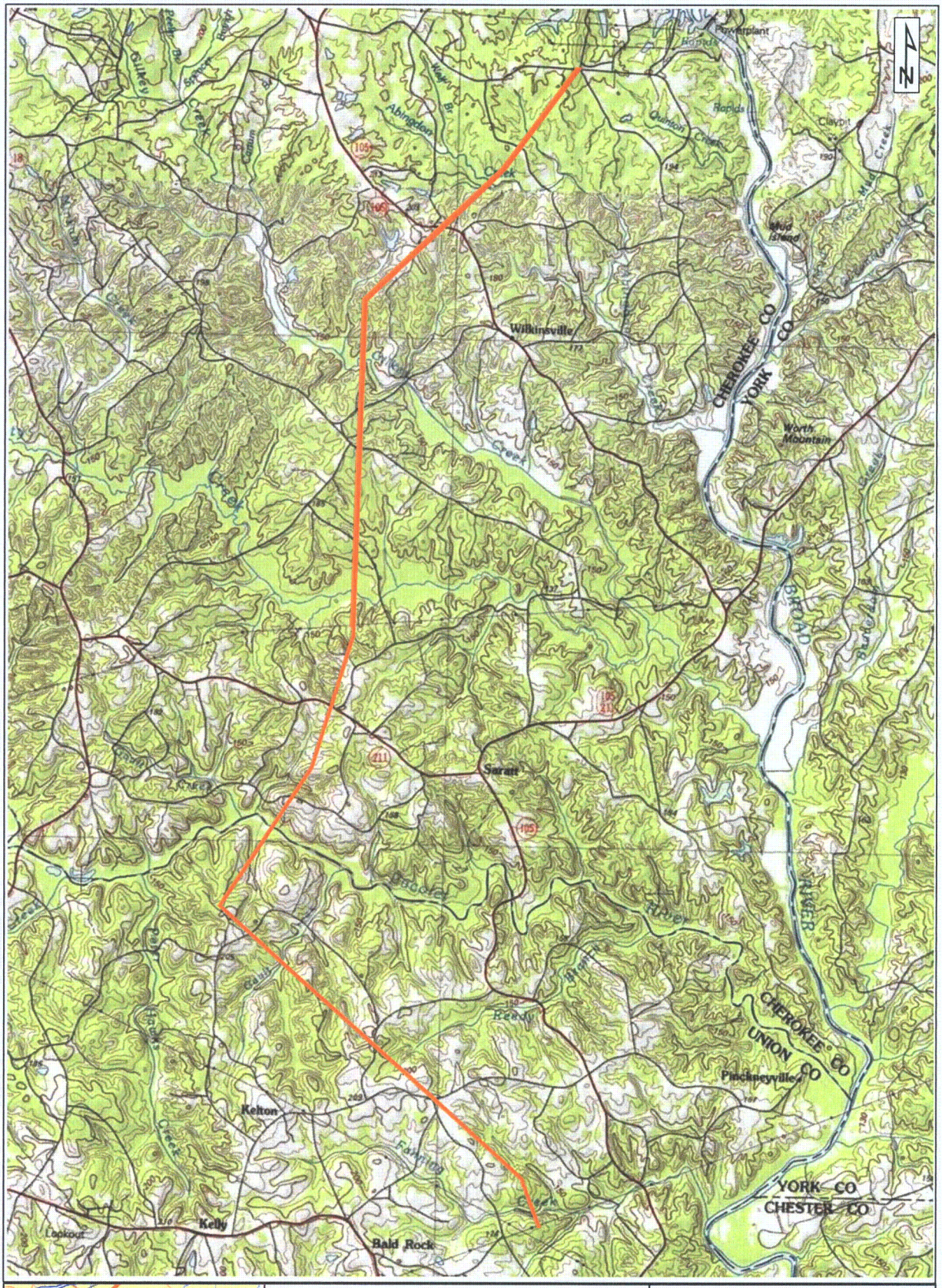

Legend

Right-of-Way Limits

0 6,000 12,000 18,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Overview Location Map
with William S. Lee III Nuclear Station
Transmission Line – West Line (Route K)

South Carolina

07/09/2009

Source: Field Reconnaissance 2009, ESRI 9.2 Base Data, 2007.

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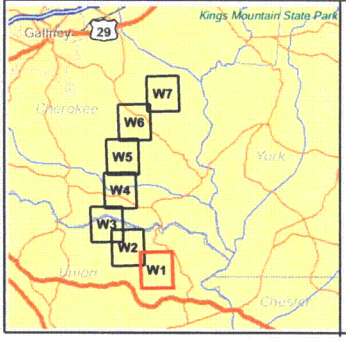

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W1

West Line (Route K)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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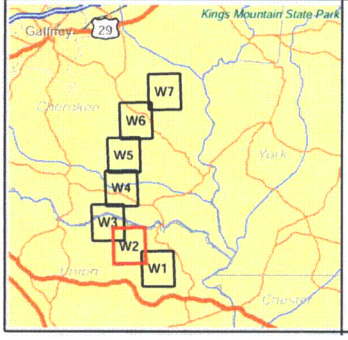

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W2

West Line (Route K)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC, 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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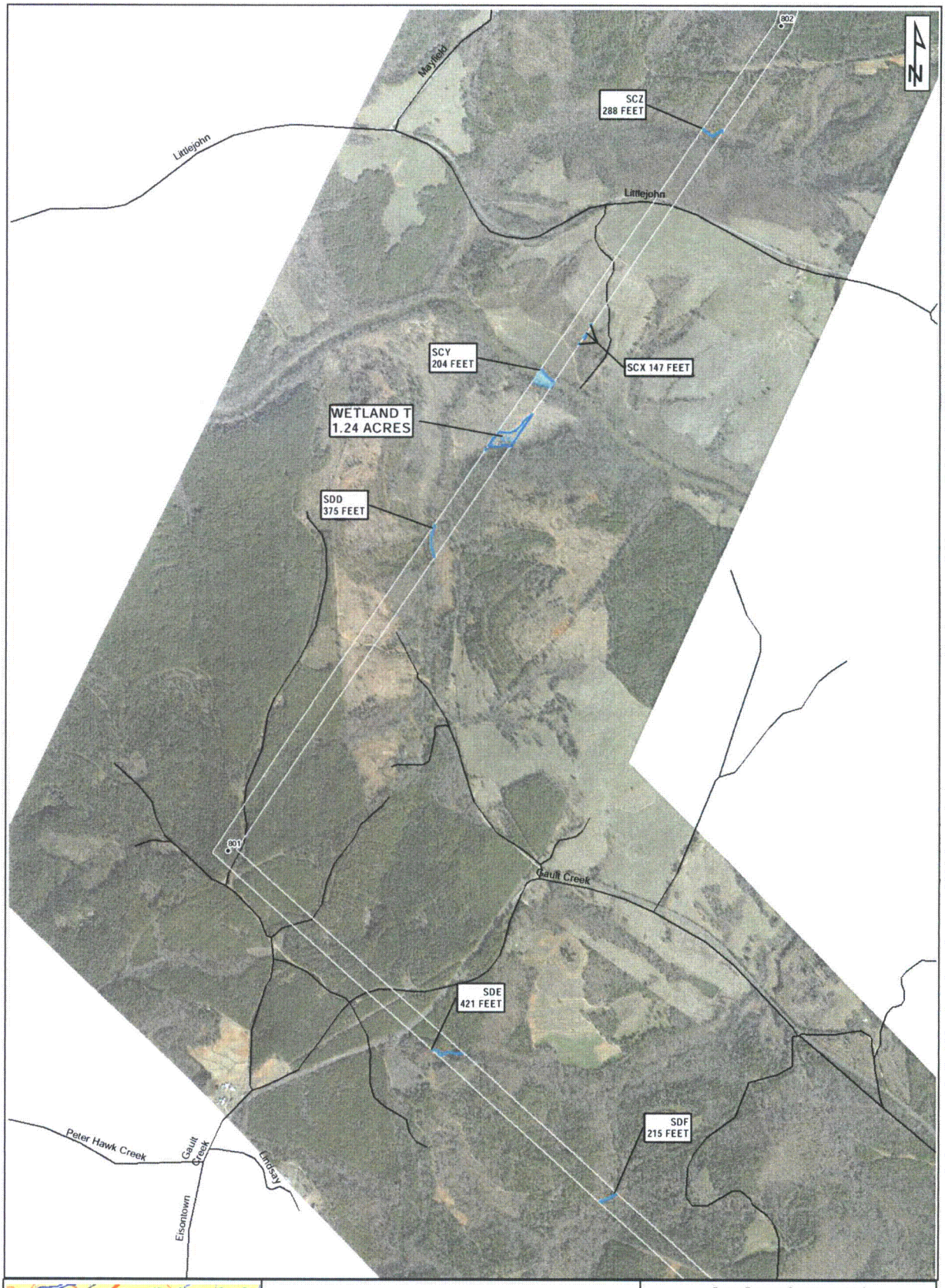

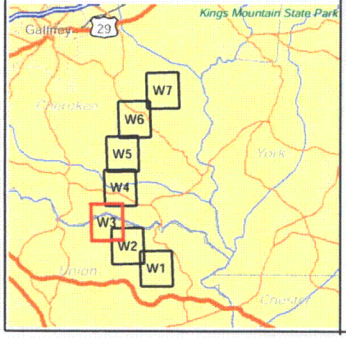

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W3

West Line (Route K)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC; 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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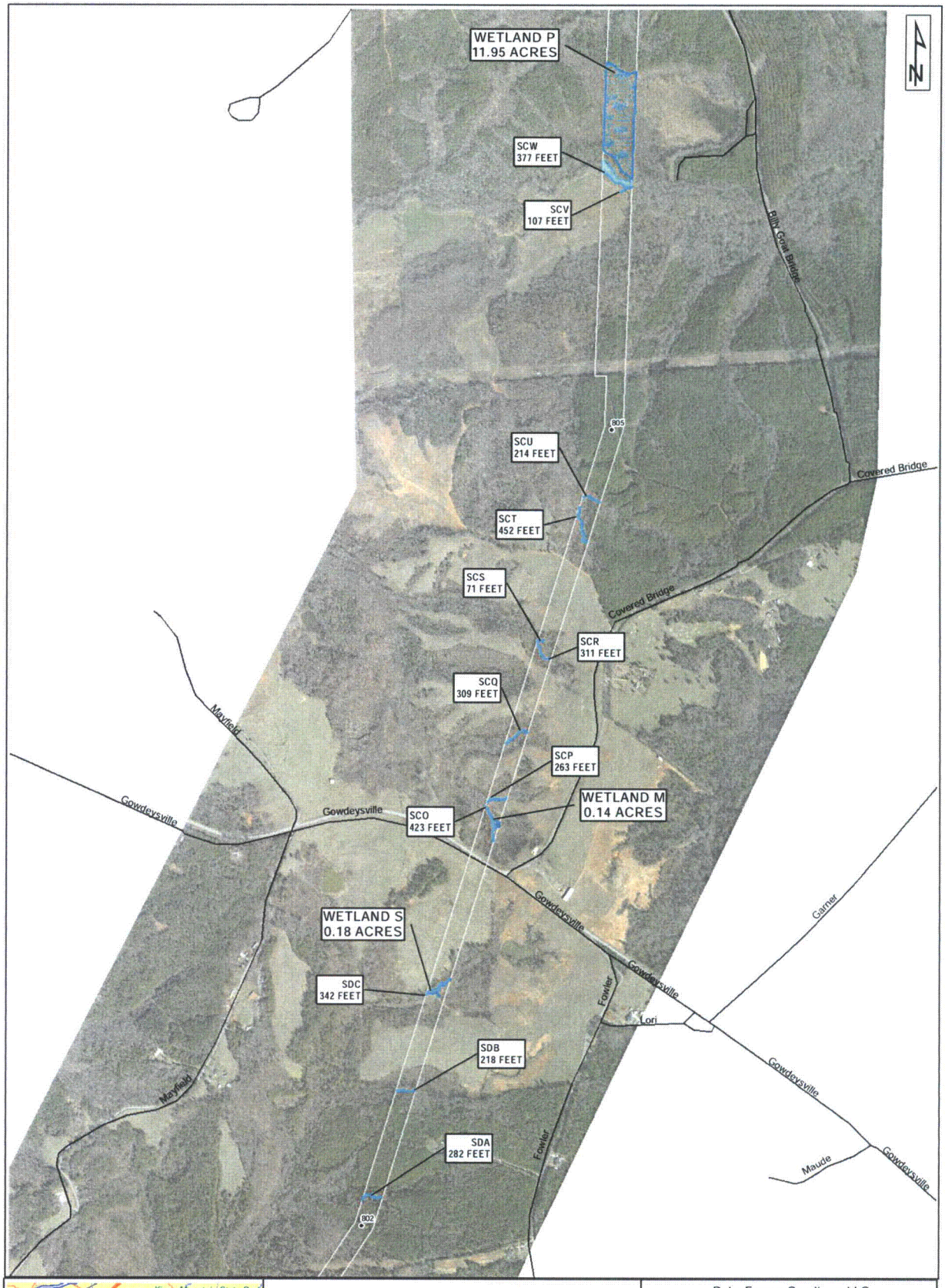

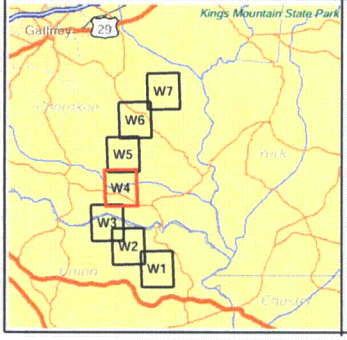

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W4

West Line (Route K)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC; 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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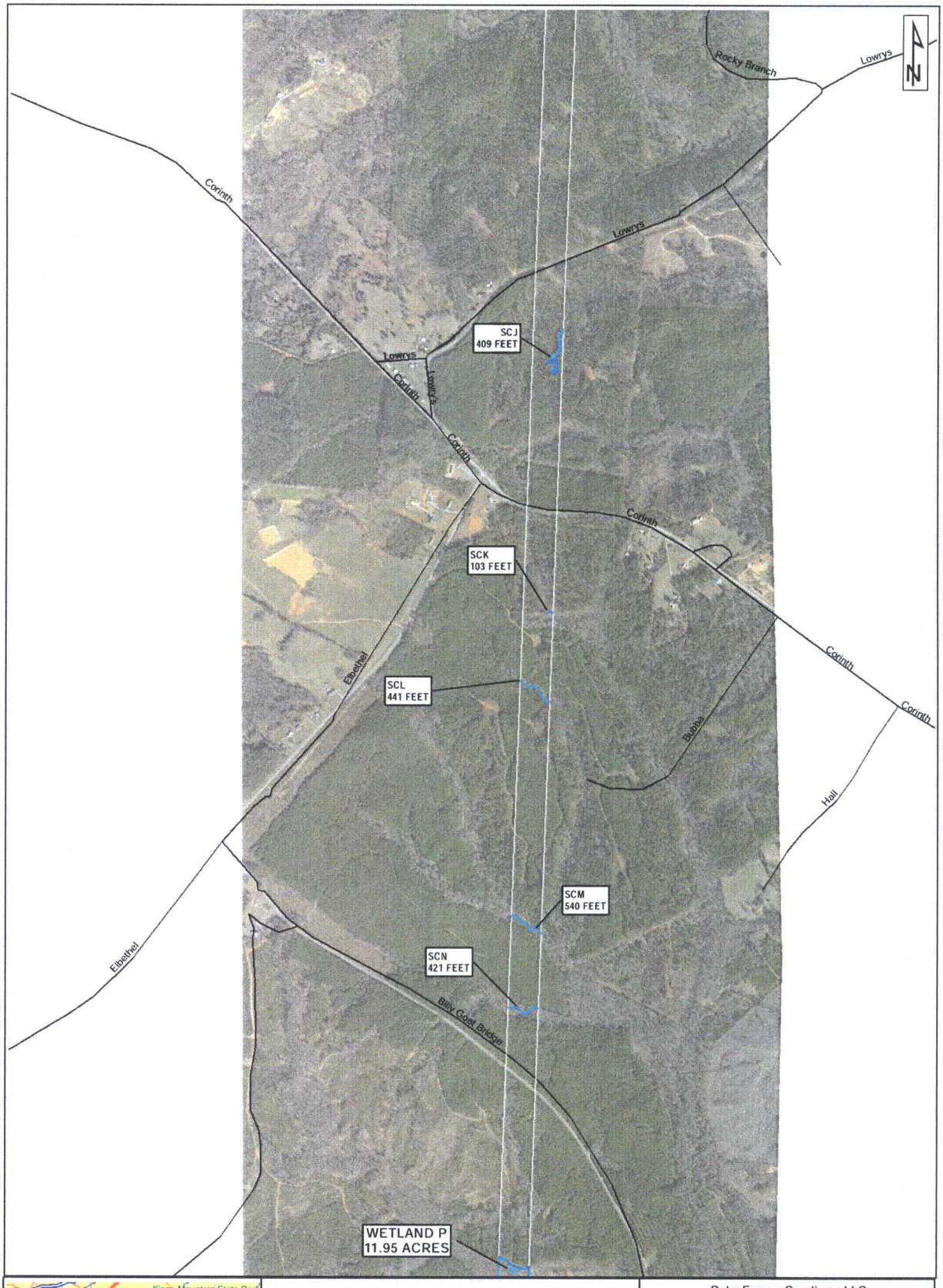

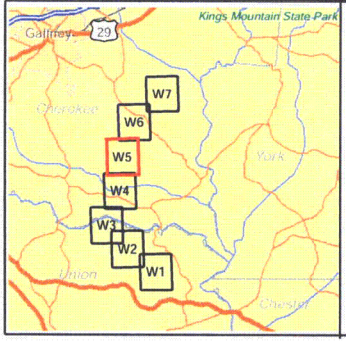

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W5

West Line (Route K)
Streams and Wetlands Associated with William S. Lee III Nuclear Station Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC; 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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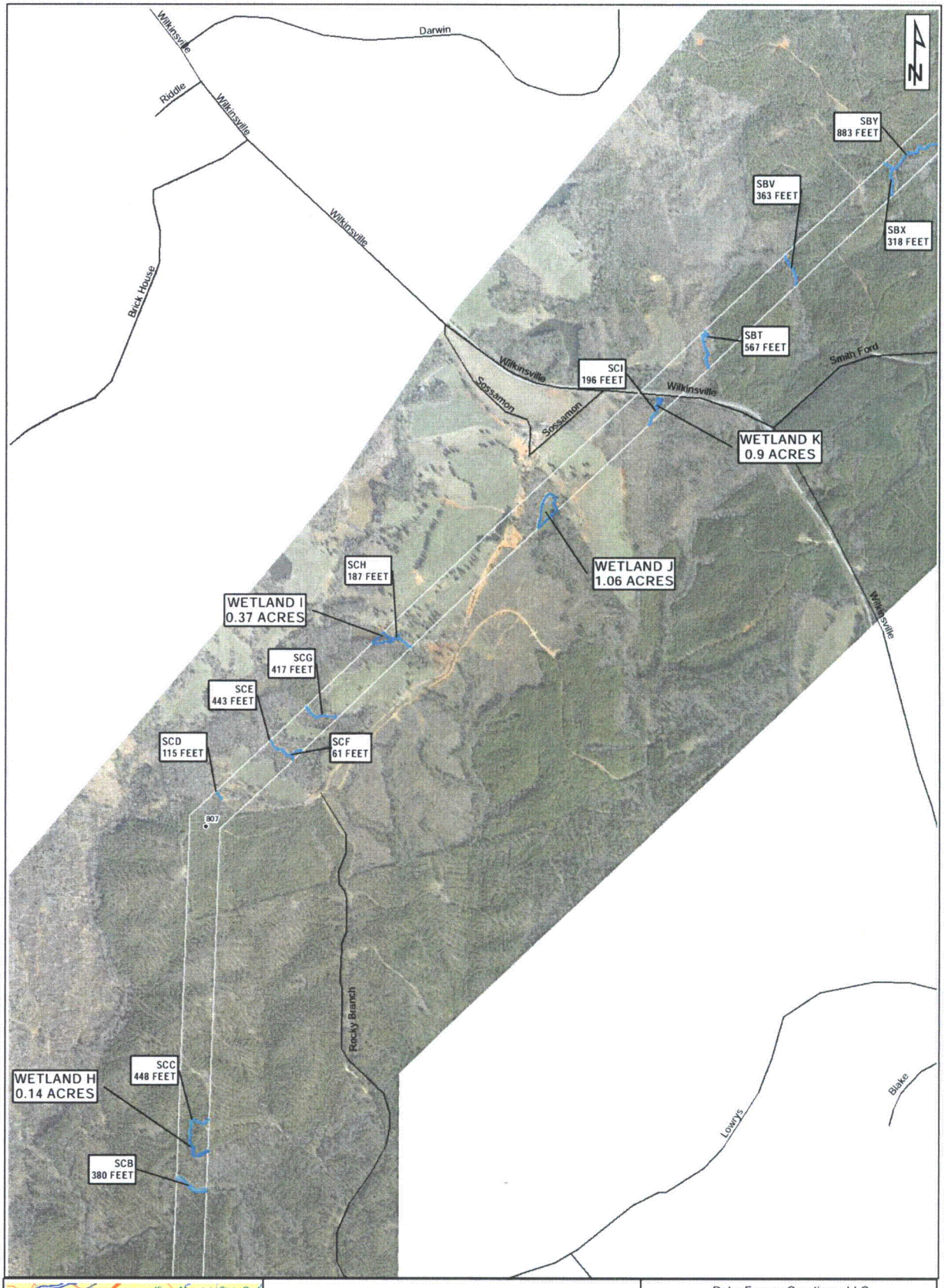

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W6

West Line (Route K)
Streams and Wetlands Associated
with William S. Lee III Nuclear Station
Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC. 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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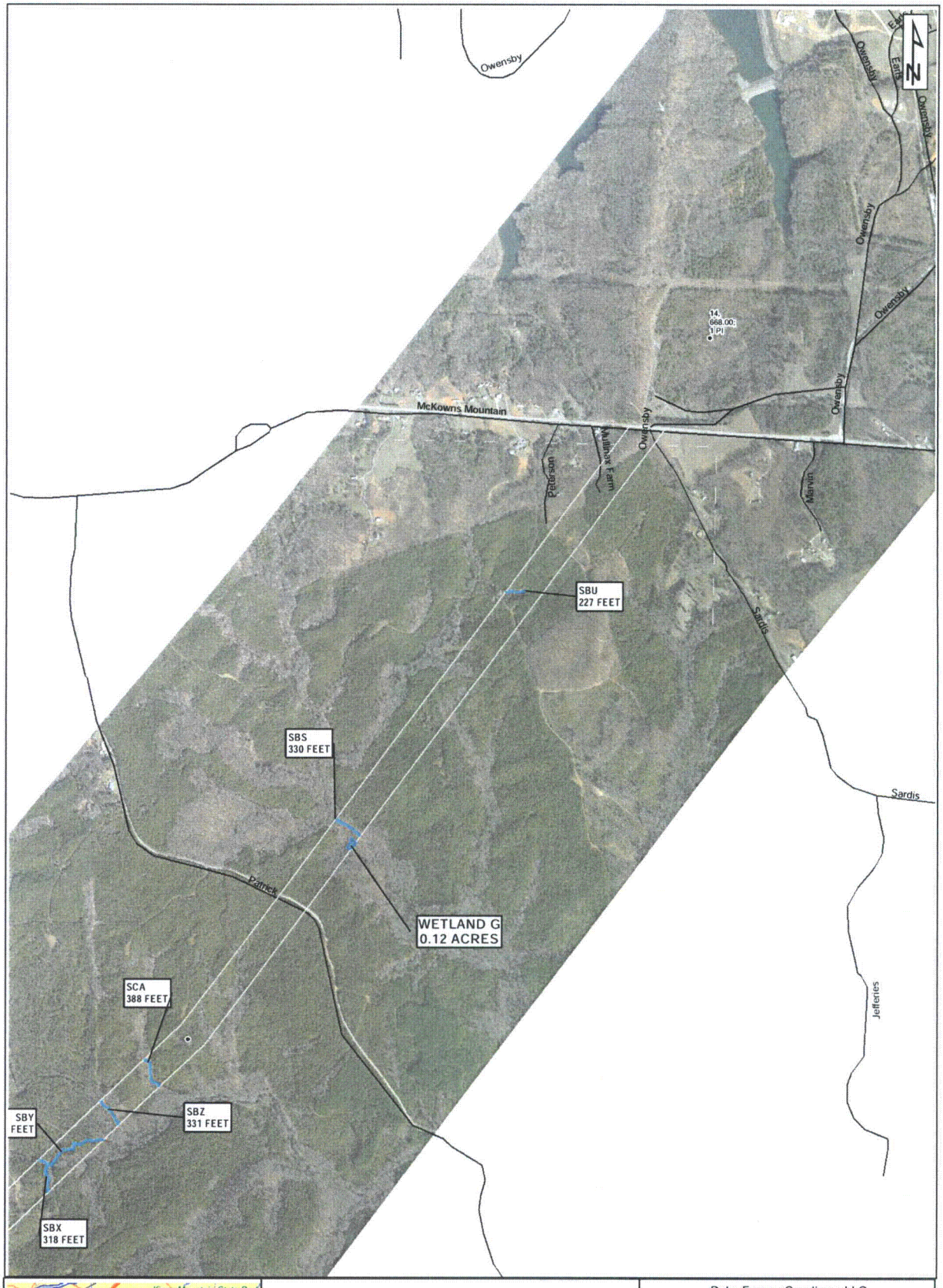

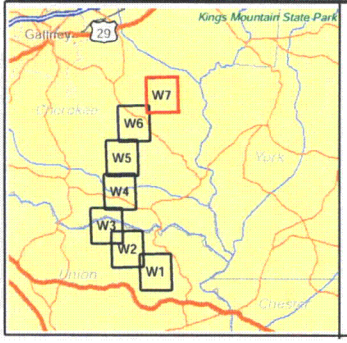

Legend

- Point of Intersection
- Road
- Stream
- Stream Bank
- Wetland
- Right-of-Way Limits

NOTE: Streams, Stream Banks (Feet Lengths) & Wetlands (Acres) are calculated within the transmission right-of-way.

0 1,000 2,000 3,000 Feet

Duke Energy Carolinas, LLC

WILLIAM STATES LEE III 230KV TO 525 KV TRANSMISSION LINE ECOLOGICAL REPORT

Figure W7

West Line (Route K)
Streams and Wetlands Associated
with William S. Lee III Nuclear Station
Transmission Line

Cherokee & Union South Carolina

07/09/2009

Source: Field Reconnaissance 2009; Duke Energy Carolinas, LLC. 2008 Aerials; ESRI 9.2 Base Data, 2007 & Cherokee and Union County Roads data, 2008.

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