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DOMINION ENERGY SOUTH CAROLINA, INC.

Cayce, South Carolina

Transmission Line Siting and Environmental Report

for the

Toolebeck – Aiken 230 kV Tie

and Segments of the

Graniteville #2 – Toolebeck 230 kV

and Toolebeck – South Augusta 230 kV Tie

and

Associated Facilities

Aiken County, South Carolina

January 2020

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1.0 Project Need and Description

1.1 Introduction and Project Overview

Dominion Energy South Carolina, Inc. ("DESC" or "Company") has prepared this report pursuant to The South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq. (2015). This report details the research and studies conducted regarding the environmental, land use, cultural resource, and visual effects of the facilities proposed herein. DESC, a wholly-owned subsidiary of Dominion Energy, Inc., supplies electrical energy to approximately 751,000 customers throughout its 17,000-square mile electric service area that includes all or portions of 24 counties in central, southern, and southwestern South Carolina.

Described in this report is one new 230 kilovolt ("kV") transmission line DESC proposes to build in Aiken County, South Carolina, and one existing 230 kV transmission line that DESC proposes to fold-in to an existing substation in Aiken County. The new 230 kV line, which will be a tie line connecting the DESC and South Carolina Public Service Authority ("Santee Cooper" or "SCPSA") electrical transmission systems will originate at DESC's existing Toolebeck 115 kV Switching Station and run to the Santee Cooper Interconnection Point approximately 0.7 miles east of Santee Cooper's existing Aiken Substation. This line will be owned and operated by DESC from the Toolebeck 115 kV Switching Station to the Santee Cooper Interconnection Point, a distance of approximately 7.2 miles, and will be called the Toolebeck – Aiken 230 kV Tie. From the Santee Cooper Interconnection Point, the line will continue for approximately 0.7 miles into Santee Cooper's Aiken Substation. This 0.7-mile segment of line will be built, owned, and operated by Santee Cooper.

The existing Graniteville #2 – South Augusta 230 kV Tie that connects the DESC and Southern Company electrical transmission systems will be folded into the Toolebeck 115 kV Switching Station in Aiken. This new fold-in will utilize the existing Urquhart – Toolebeck 115 kV corridor for approximately 10.5 miles and approximately 0.1 miles of new right-of-way. Once the Graniteville #2 – South Augusta 230 kV Tie line is folded in, the two lines created by the fold-in will be renamed to the Graniteville #2 – Toolebeck 230 kV and the Toolebeck – South Augusta 230 kV Tie.

Associated facilities that will be added to DESC's transmission system in conjunction with these lines will be the 230 kV side of the Toolebeck 115 kV Switching Station including the addition of three 230 kV line terminals, bus, and multiple 230 kV power circuit breakers. Currently, the switching station only has 115 kV capability, but with this new project 230 kV capability will be added. This will result in changing the name of the switching station to the Toolebeck

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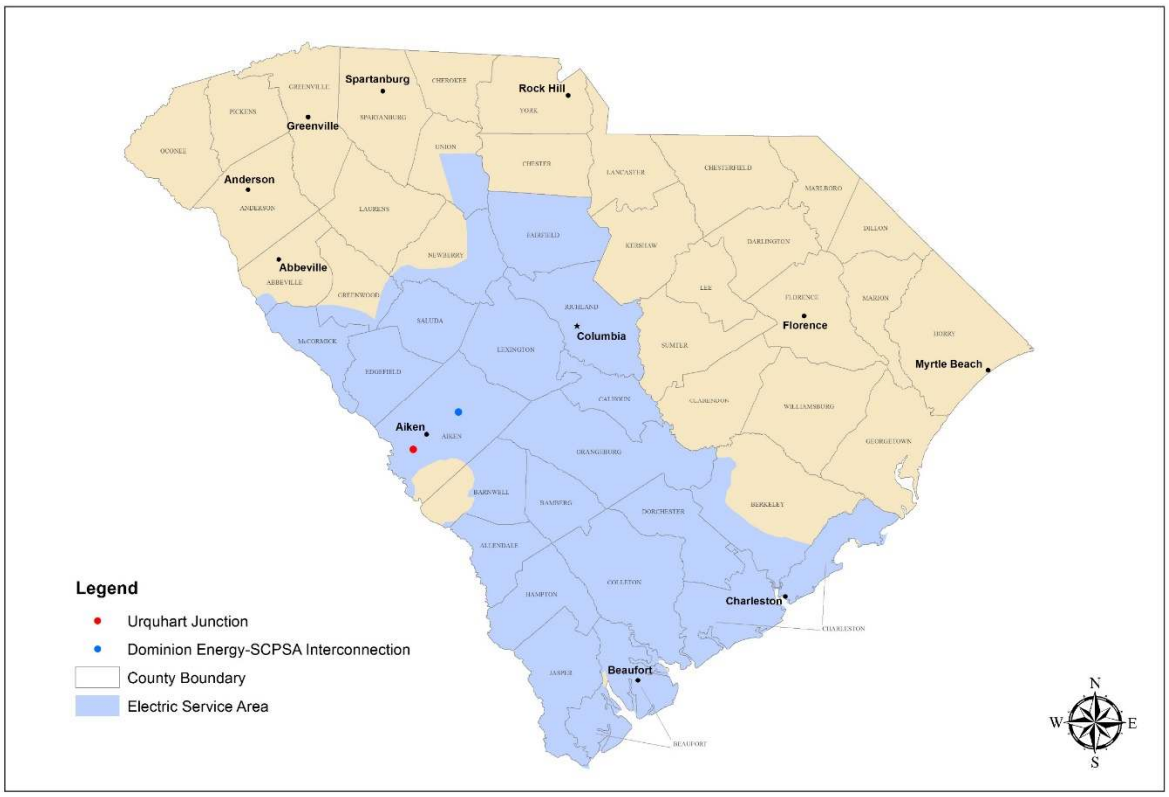
Transmission Substation. These associated facilities will be built entirely within property that DESC already owns and has cleared, graded, and fenced in anticipation for the future need and potential build-out of the 230 kV side of this station.

Throughout this report, the extended fold-in and new 230 kV lines will be referred to individually as the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie, and collectively as Project Lines.

Figure 1.1-1 shows DESC's electrical service area in South Carolina and the locations of the start of the fold-in from the Graniteville #2 – South Augusta 230 kV Tie ("Urquhart Junction") and the Santee Cooper Interconnection Point.

Figure 1.1-1: DESC Electric Service Area



The addition of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie and associated facilities to DESC's electrical transmission system is critical to the operational integrity of the system and necessary to ensure that DESC remains in compliance with North American Electric Reliability Corporation ("NERC") Transmission Planning Standards and the Company's own Long Range Planning Criteria. Failure to add the Project Lines will result in excessive electrical loading in the northern and central portions of the DESC system when Southern Company's new generation facilities at Plant Vogtle

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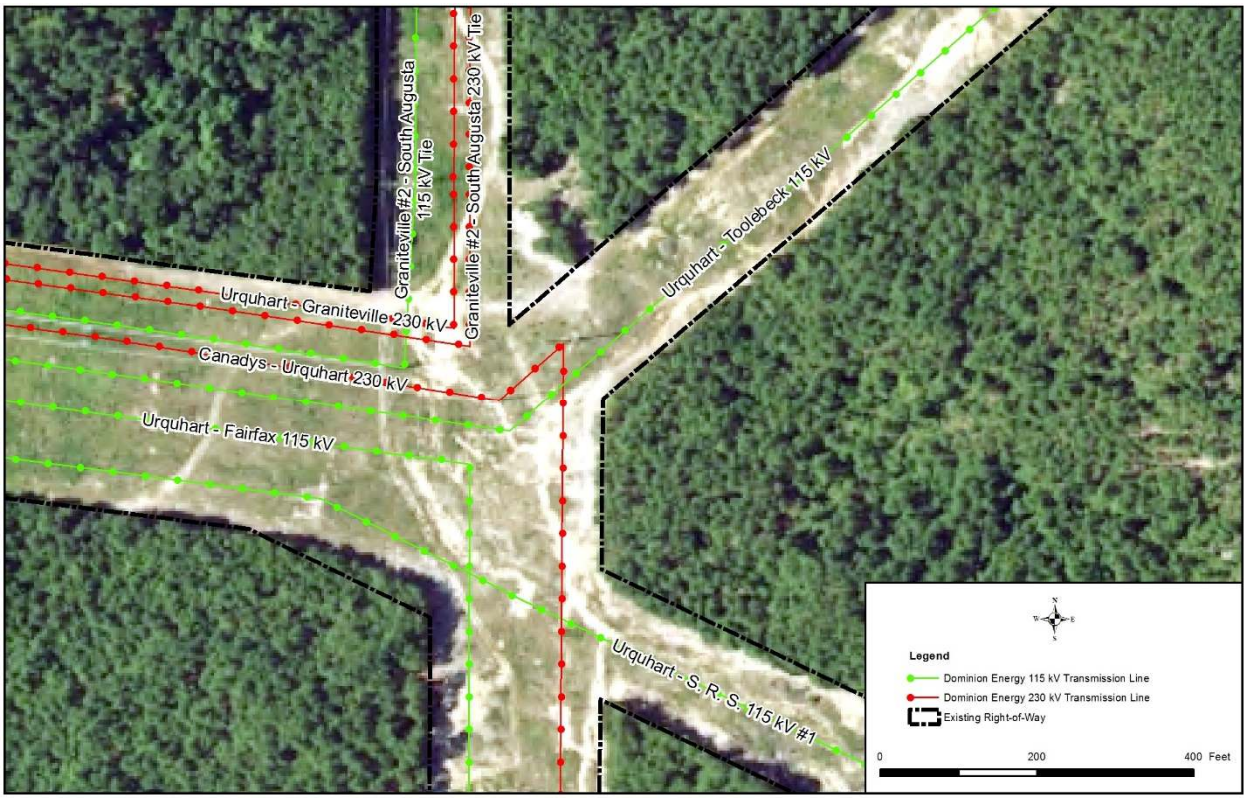
begin operating. The continued addition of new solar energy sources will compound this problem of excessive electrical loading, which is currently mitigated by DESC's strategic use of the Urquhart Generating Station. The addition of the Project Lines will establish additional electrical paths between DESC and the Santee Cooper electrical transmission system and thus will distribute the flow of power more reliably and evenly while preventing overloading on DESC's system.

1.2 Project Location

An area known as Urquhart Junction, shown in Figure 1.2-1, located approximately ten miles southwest of Aiken and six miles east of the Savannah River, is the convergence point where multiple 230 kV and 115 kV lines intersect on the DESC system. DESC's existing Graniteville #2 – South Augusta 230 kV Tie passes through the Urquhart Junction and is the starting point of this project.

Figure 1.2-1: Urquhart Junction



Beginning at Urquhart Junction, the Graniteville #2 – South Augusta 230 kV Tie will be folded into the Toolebeck Transmission Substation and this tie will be renamed the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie. These two newly designated 230 kV lines will run for approximately 0.1 miles due east across new right-of-way at Urquhart

Junction and then enter another existing DESC corridor where the Urquhart – Toolebeck 115 kV line is presently located and will run northeast for an additional 10.5 miles within the unoccupied portion of DESC's existing Urquhart – Toolebeck 115 kV corridor to Toolebeck Transmission Substation. The two new 230 kV lines (Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie) will parallel the existing Urquhart – Toolebeck 115 kV line from Urquhart Junction and all will terminate at the Toolebeck Transmission Substation.

The new Toolebeck – Aiken 230 kV Tie will be constructed starting at a termination structure in the Toolebeck Transmission Substation and will run for approximately 7.2 miles northeast to the Santee Cooper Interconnection Point. The existing H-frame wooden structures for the Edmund Switching Station – Owens Corning 115 kV line in this section of DESC's existing right-of-way corridor will be removed, and both the new 230 kV line and old 115 kV line will be constructed single-pole, double-circuit on the unoccupied side of the existing corridor. DESC will own the final double-circuit structure that is the interconnection point between Santee Cooper and DESC. From the Santee Cooper Interconnection Point, the 115 kV line will continue northeast in the corridor rejoining the existing wooden H-frame structures towards Edmund Switching Station. Santee Cooper will construct and own the approximate 0.7 miles of new 230 kV line from the interconnection point to the Aiken Substation.

Figure 1.2-2 shows the overall route corridor between Urquhart Junction and the Santee Cooper Interconnection Point within which the Project Lines will be built. The "route corridor" shown in Figure 1.2-2 represents a 2,000' wide linear corridor (1,000' on each side of the proposed Project Lines) within which various data presented in this report were collected. The "study corridor" represents a 2.5-mile-wide linear corridor (1.25 miles on each side of the proposed Project Lines) within which cultural resource data were collected.

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Figure 1.2-2: Overall Project Location

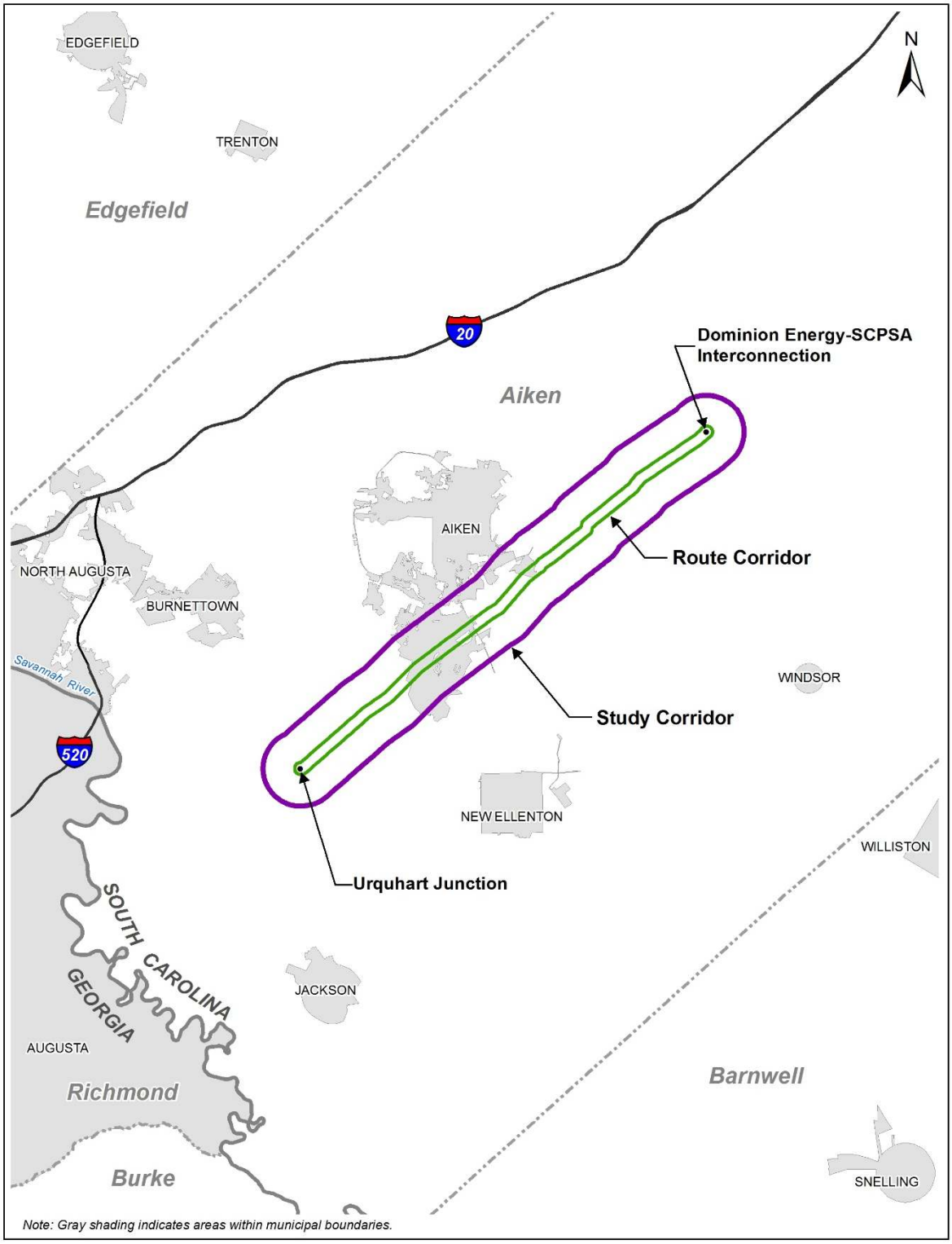

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Figure 1.2-3 through Figure 1.2-6 show the proposed new right-of-way locations at Urquhart Junction, Toolebeck Transmission Substation, and the Santee Cooper Interconnection Point.

Figure 1.2-3: Overall Existing and New Right-of-Way Locations

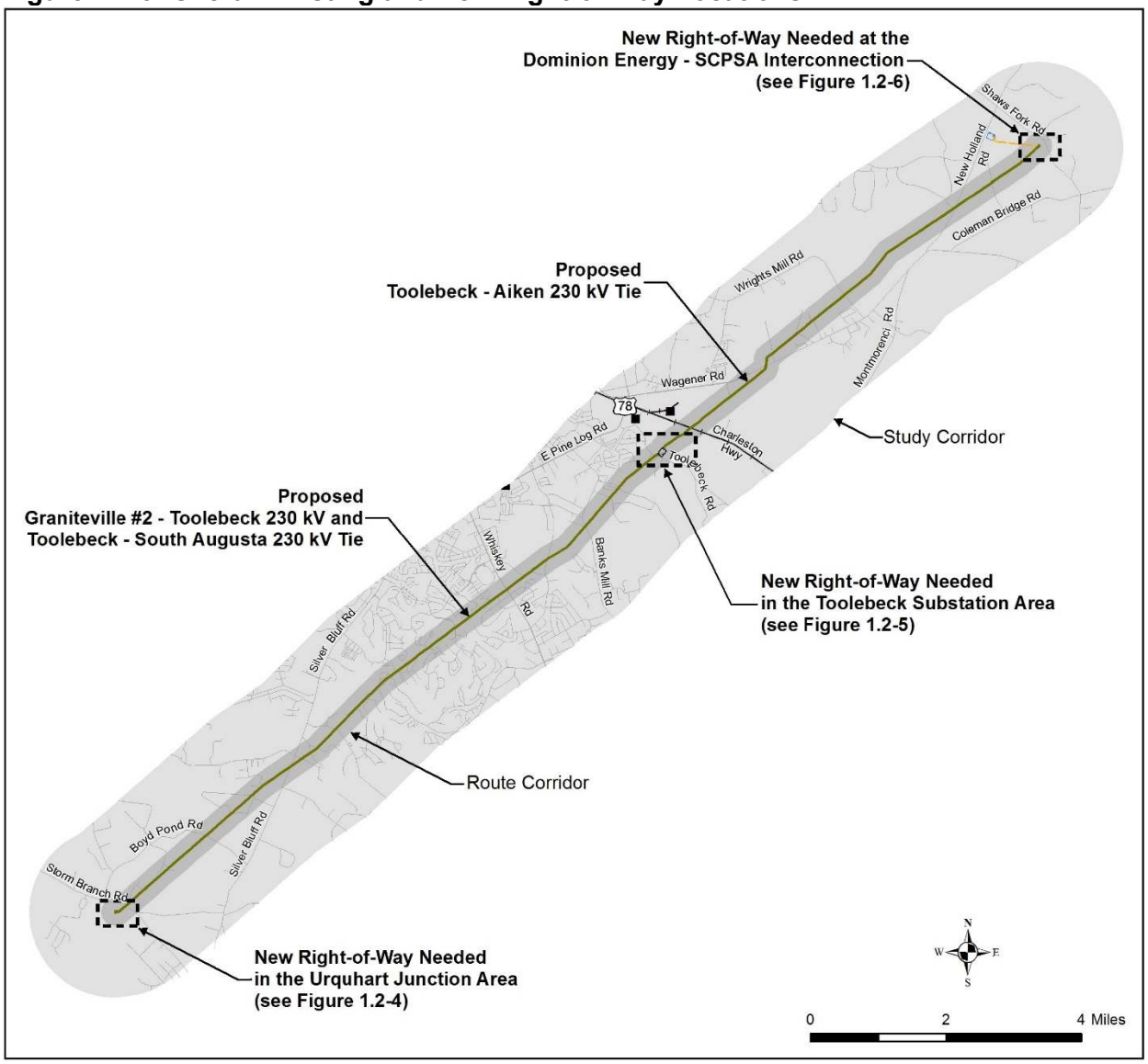


Figure 1.2-4: New Right-of-Way at Urquhart Junction

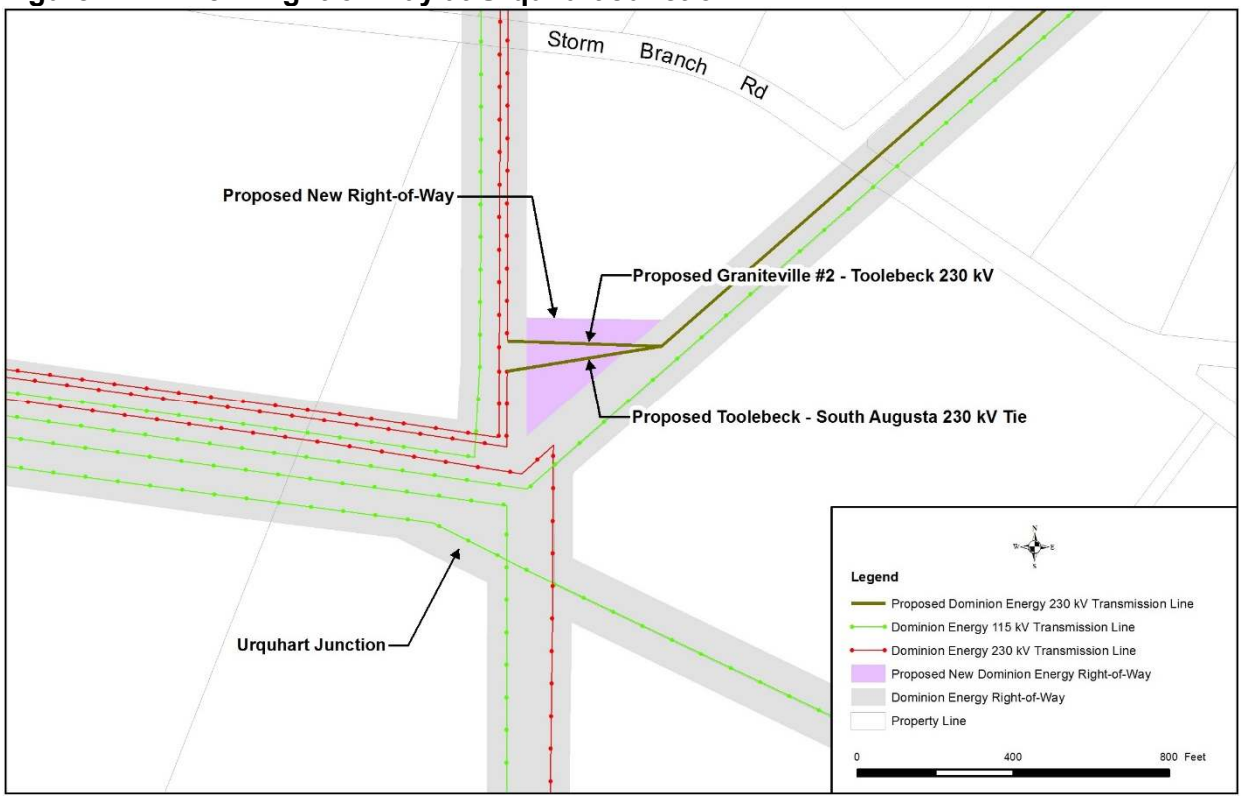


Figure 1.2-5: New Right-of-Way at Toolebeck Transmission Substation

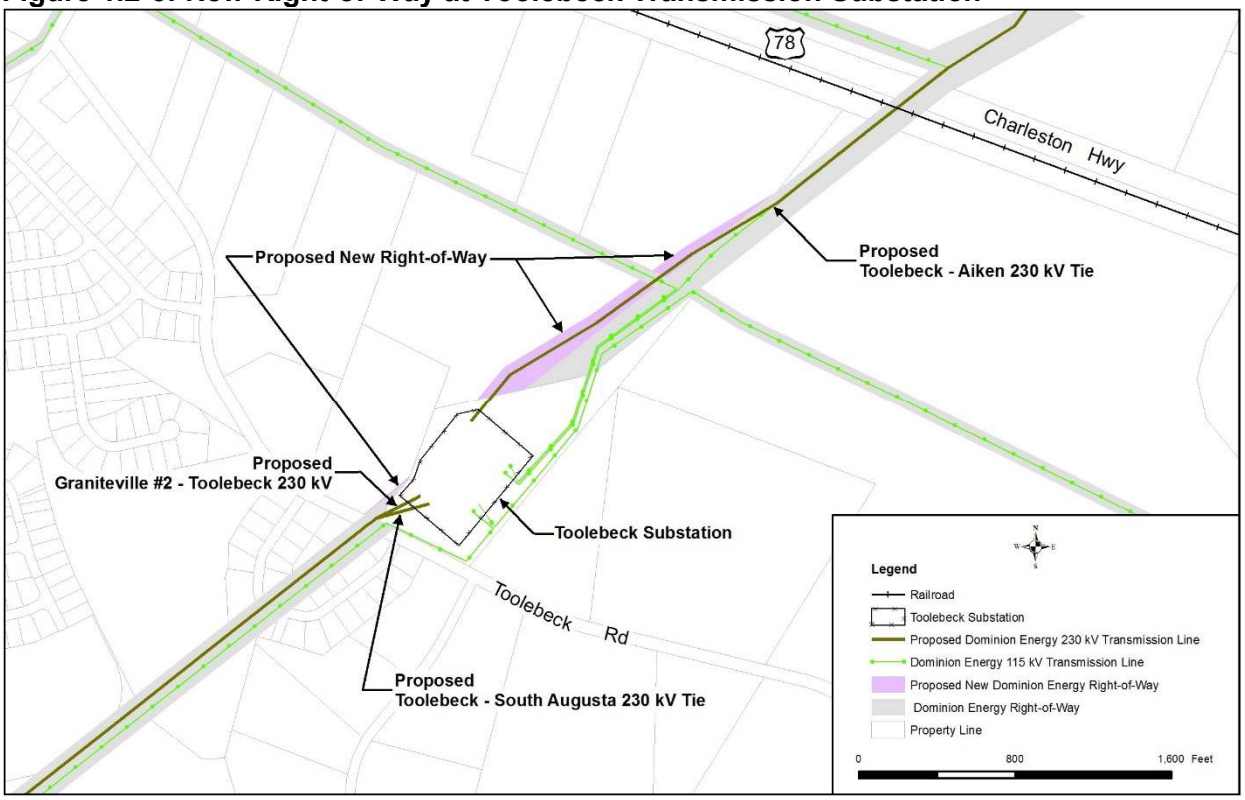
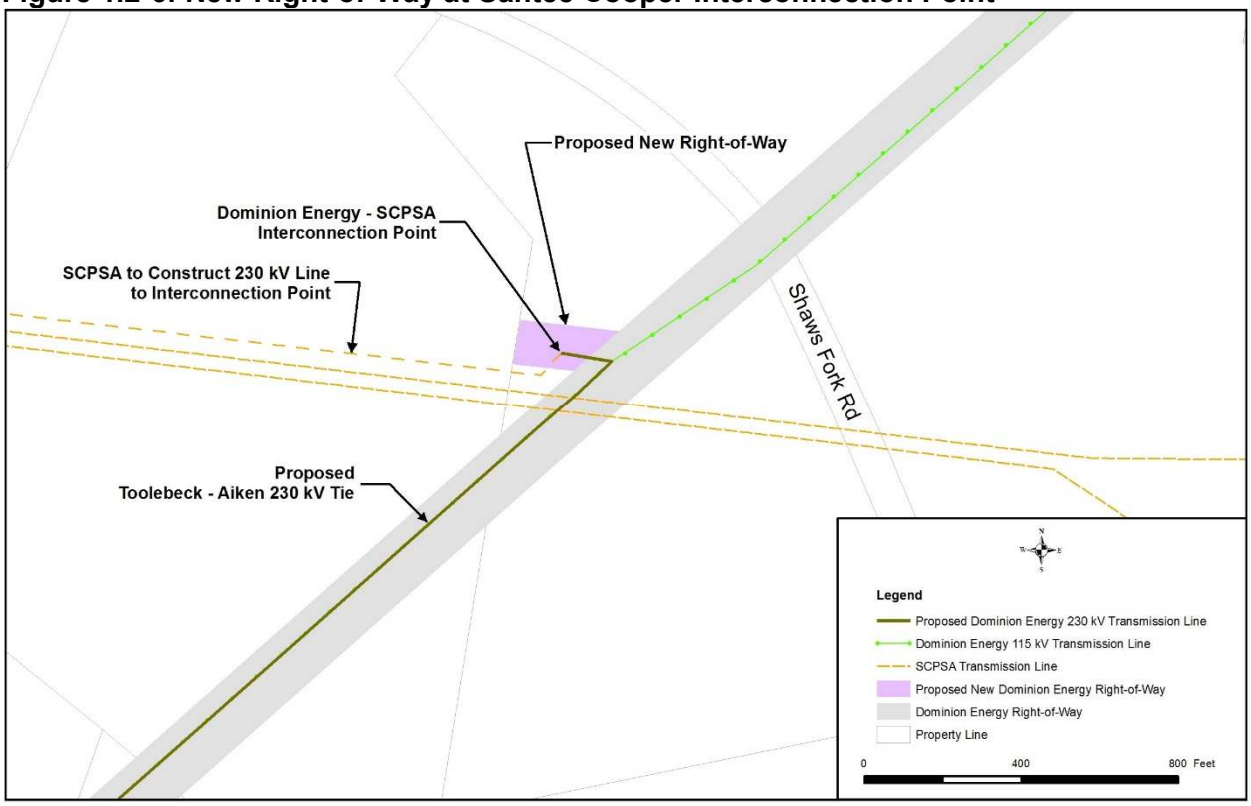


Figure 1.2-6: New Right-of-Way at Santee Cooper Interconnection Point



1.3 Project Schedule

The Town Creek – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie, and associated facilities are scheduled to be in service by March 1, 2022.

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2.0 Transmission Line Route Selection

2.1 Utilization of Existing DESC Right-Of-Way

DESC determined that the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie can be built almost entirely within existing DESC right-of-way that runs between Urquhart Junction and the Santee Cooper Interconnection Point east of the City of Aiken. Additional right-of-way will be required in three locations along the route; approximately 1.2 acres between two of the intersecting corridors at Urquhart Junction, approximately 3.2 acres adjacent to the Toolebeck Substation where the new Toolebeck – Aiken 230 kV Tie will leave the substation and merge with the existing transmission line corridor, and approximately 0.5 acres at the Santee Cooper Interconnection Point. Other DESC 115 kV transmission lines occupy one side of the existing 150-foot right-of-way corridor between Urquhart Junction and the Santee Cooper Interconnection Point. There are three separate 115 kV transmission lines that each only occupy a segment of the entire 17.8 miles between Urquhart Junction and the Santee Cooper Interconnection Point. Figures 3.1-4 through 3.1-7 show the configuration of the proposed Project Lines in relation to existing DESC transmission lines in each of four right-of-way segments the Project Lines will be built within.

The utilization of primarily existing right-of-way for new transmission lines provides many significant benefits when compared to new “greenfield” line routes including, but not limited to, the following:

1. Avoids additional utility easement severances of private property parcels;
2. Increases the utilization of existing DESC transmission line right-of-way assets;
3. Consolidates multiple transmission lines into a single corridor;
4. Significantly minimizes potential for environmental, land use, cultural resource and scenic impacts;
5. Eliminates cost associated with acquisition of significant sections of new right-of-way;
6. Minimizes long-term right-of-way maintenance costs;
7. Increases service reliability by significantly reducing or eliminating the potential for line damage due to trees falling into the right-of-way from adjacent forested areas on at least one side of the proposed line or lines;

8. Significantly reduces right-of-way preparation cost (to the point of virtual elimination in many cases); and,
9. Minimizes construction schedule durations.

Except for approximately 4.9 acres of new right-of-way at Urquhart Junction, Toolebeck Transmission Substation, and the interconnection point, existing DESC transmission line right-of-way sufficient to accommodate the future Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie is available. Because of that availability, DESC did not consider alternate routes for the construction of the proposed Project Lines. Any alternate "greenfield" route would require the acquisition of significant new right-of-way, increase project cost, increase project duration, pose greater potential for adverse environmental effects, significantly increase land use impacts, and increase the potential for adverse effects to cultural and scenic resources in the area. For these reasons, DESC concluded it would not be justifiable to conduct a line route siting study and select a new "greenfield" route for the Project Lines. Rather, DESC investigated the existing right-of-way and new right-of-way segments, including expansive areas surrounding them, to identify and quantify any likely direct and indirect effects to the resources of South Carolina (environmental resources, land use, cultural resources and scenic resources) that could potentially result from construction of the Project Lines. Included in Chapter 5 of this report is a complete summary of the findings of various investigations and studies DESC conducted along the existing right-of-way and proposed new right-of-way segments within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be located.

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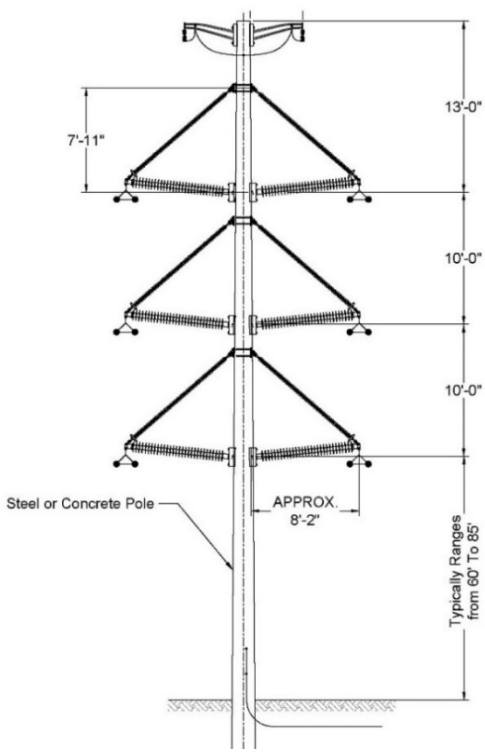
3.0 Description of the Project Lines

3.1 Transmission Lines' Description

The Lines will utilize DESC's standard double-circuit 230 kV line tangent and angle structures. The tangent structures consist of single shaft, tubular steel poles[1] with 230 kV braced-post insulators (back to back insulator configuration on double-circuit structures). These structures provide construction efficiency and reliability. They have a clean, simple profile that provides aesthetic benefits; the compact design of the braced-post insulator assemblies allows efficient use of right-of-way space; and they are proven to be economical over their serviceable life when compared with other possible structure types. DESC will utilize bundled 1272 ACSR conductor for the proposed new 230 kV lines and single 1272 ACSR where the rebuilt 115 kV is being double-circuited with the new 230 kV line.

Figure 3.1-1 illustrates DESC's standard double-circuit 230 kV tangent structure.

Figure 3.1-1 Standard DESC Double-Circuit 230 kV Tangent Structure Configuration
(not to scale)

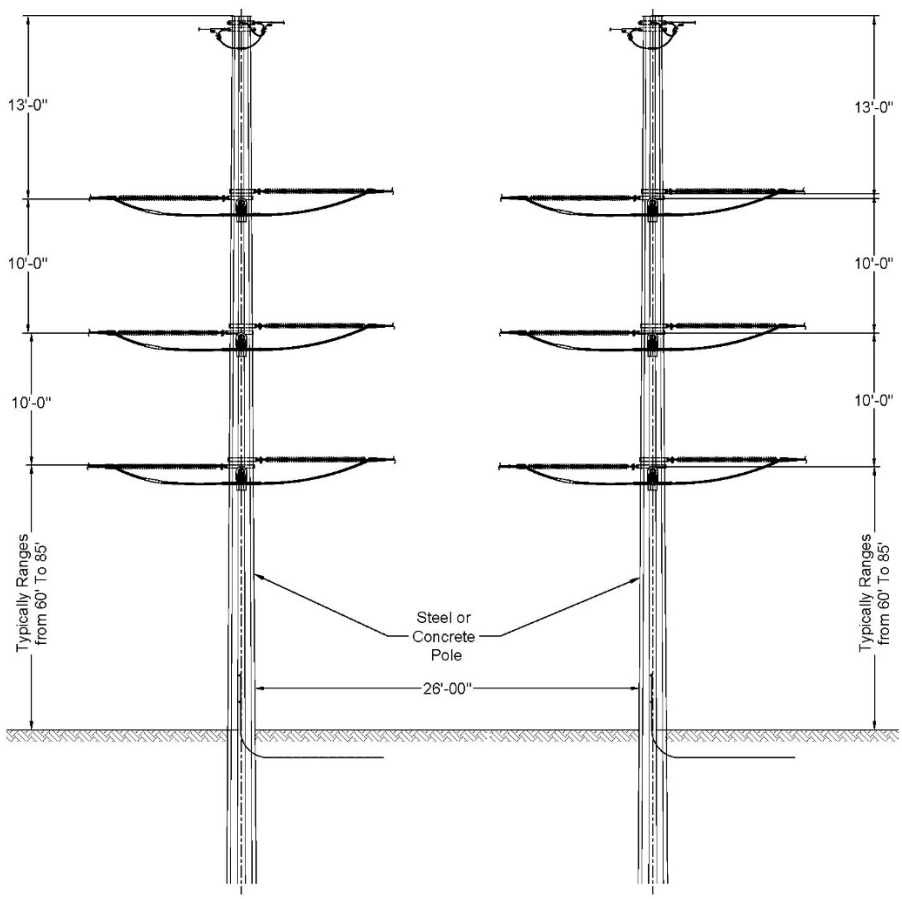


Angle structures will be DESC's standard two-pole, dead-end angle structures or two-pole, swinging angle structures. Each type consists of two single shaft, tubular steel poles, and each

[1] Although tubular steel poles will likely be used for tangent and angle structures on the Project Lines, similarly sized cylindrical concrete poles are occasionally used by DESC.

pole supports one circuit at the line angle point. Figure 3.1-2 illustrates DESC's standard dead-end angle structure, which has a profile similar to DESC's standard swinging angle structure (differing, primarily, in the configuration of insulators).

Figure 3.1-2 Standard DESC Double-Circuit Dead-End Angle Structure Configuration
(not to scale)



The height of the Project Lines' tangent and angle structures will typically range from approximately 95 feet to approximately 120 feet; however, exceptions to the typical height range may be necessary where crossing existing utility lines, roads, water bodies and/or where the Project Lines will connect to the substation terminals. Structure spacing will typically range from 400 feet to 1,000 feet.

Figure 3.1-3 shows the four segments of the existing right-of-way between Urquhart Junction and the Santee Cooper Interconnection Point within which the Project Lines will be built. The figure references the appropriate cross-sectional view for each of the segments, which are illustrated in Figures 3.1-4 through 3.1-7. The cross-sectional views display the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie position within each of the right-of-way segments with regard to right-of-way edges and other

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existing transmission lines. All cross-sections represent views from Urquhart Junction toward the Santee Cooper Interconnection Point. Dimensions shown in the cross-sections are for illustration purposes and may vary slightly when final line engineering is completed.

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Figure 3.1-3 Toolebeck – Aiken 230 kV Tie, Graniteville #2 - Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie Route Segments (all segment lengths shown are approximate)

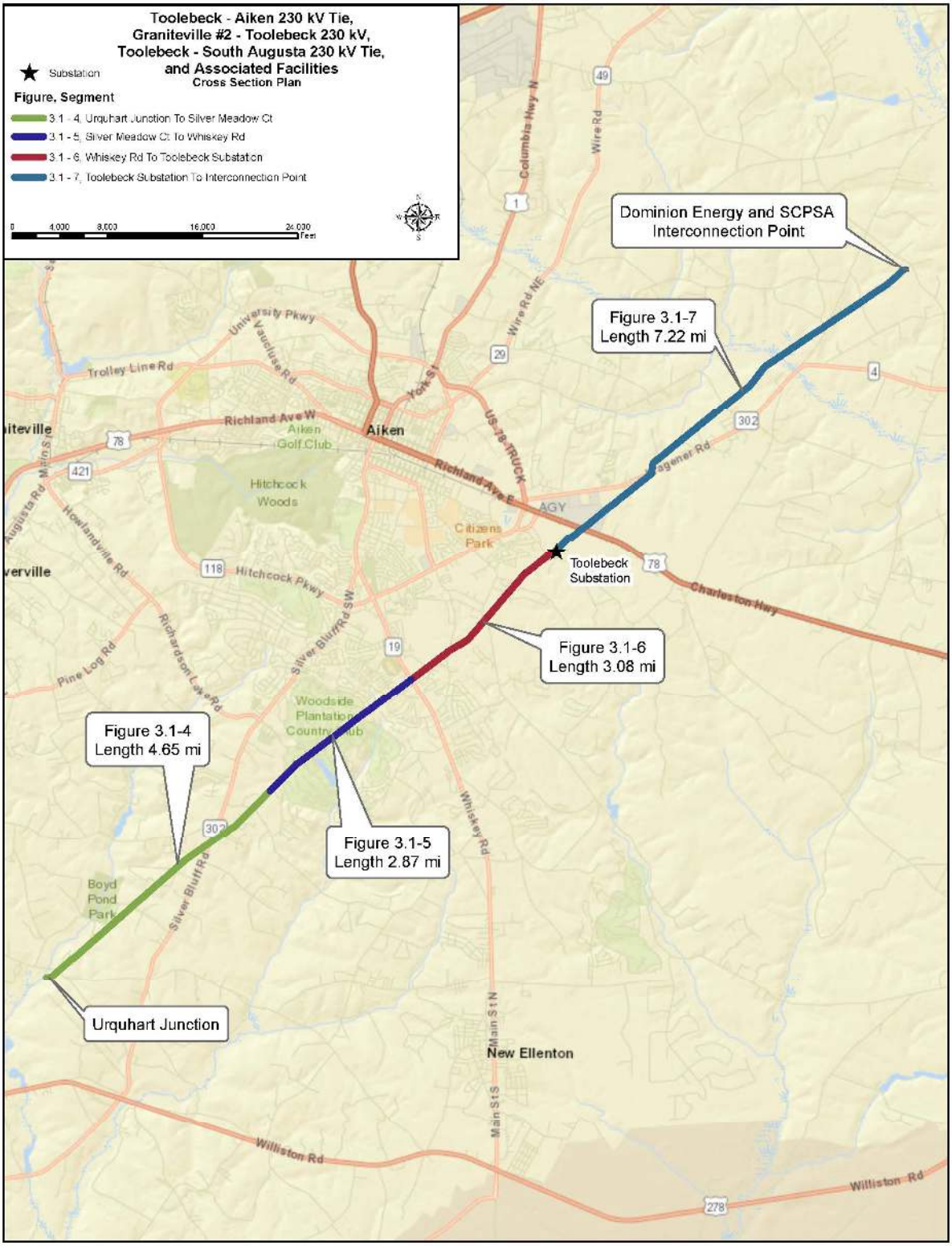


Figure 3.1-4 Urquhart Junction to Spencer Drive

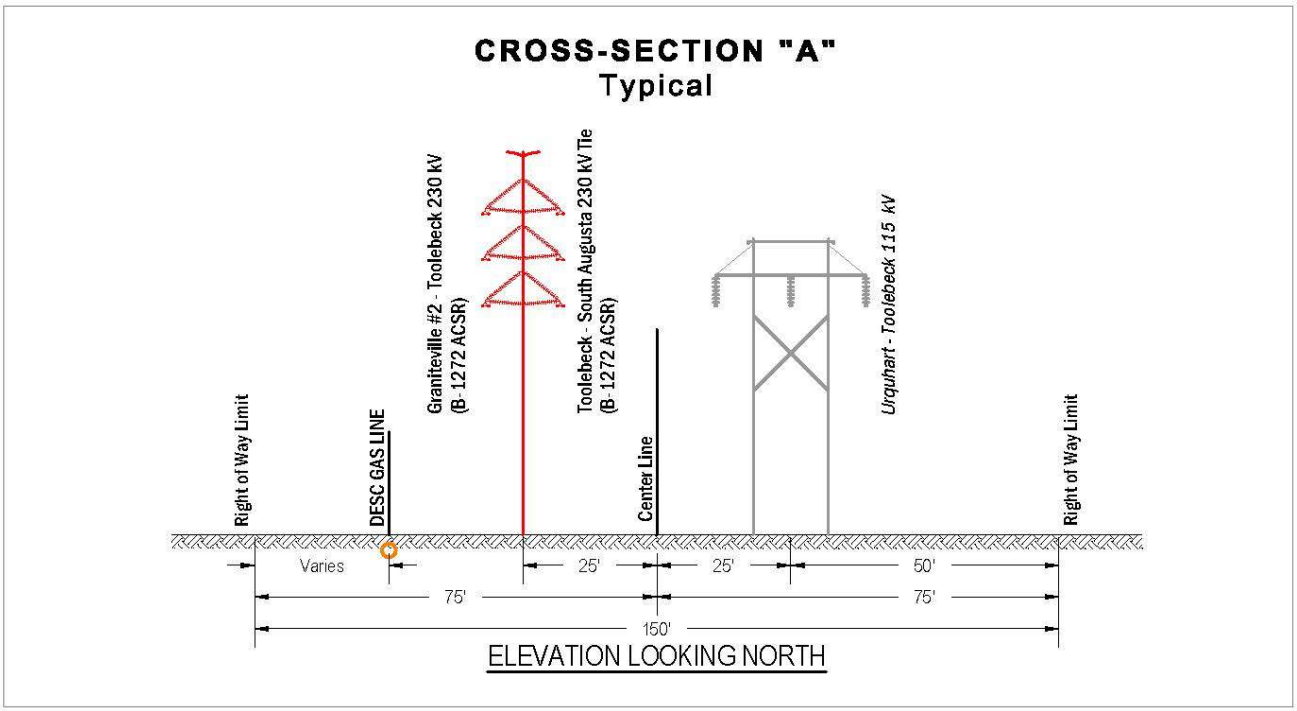


Figure 3.1-5 Spencer Drive to Whiskey Road

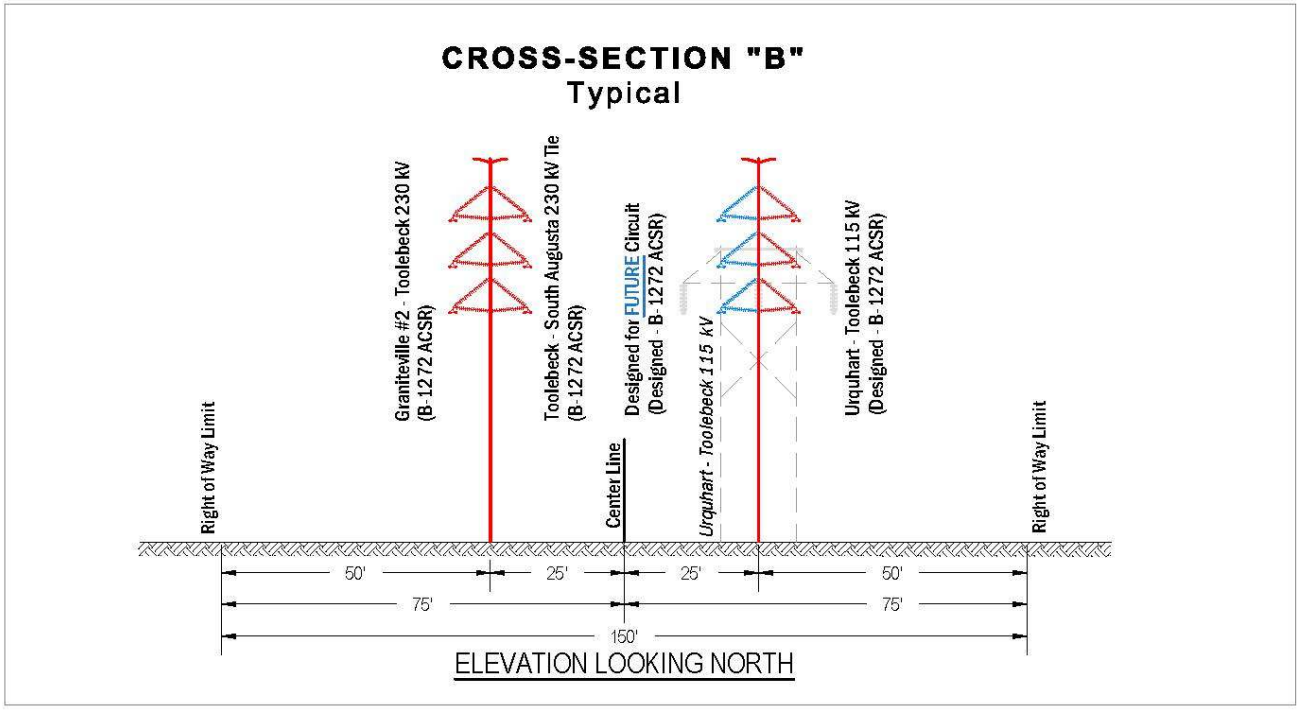


Figure 3.1-6 Whiskey Road to Toolebeck Transmission Substation

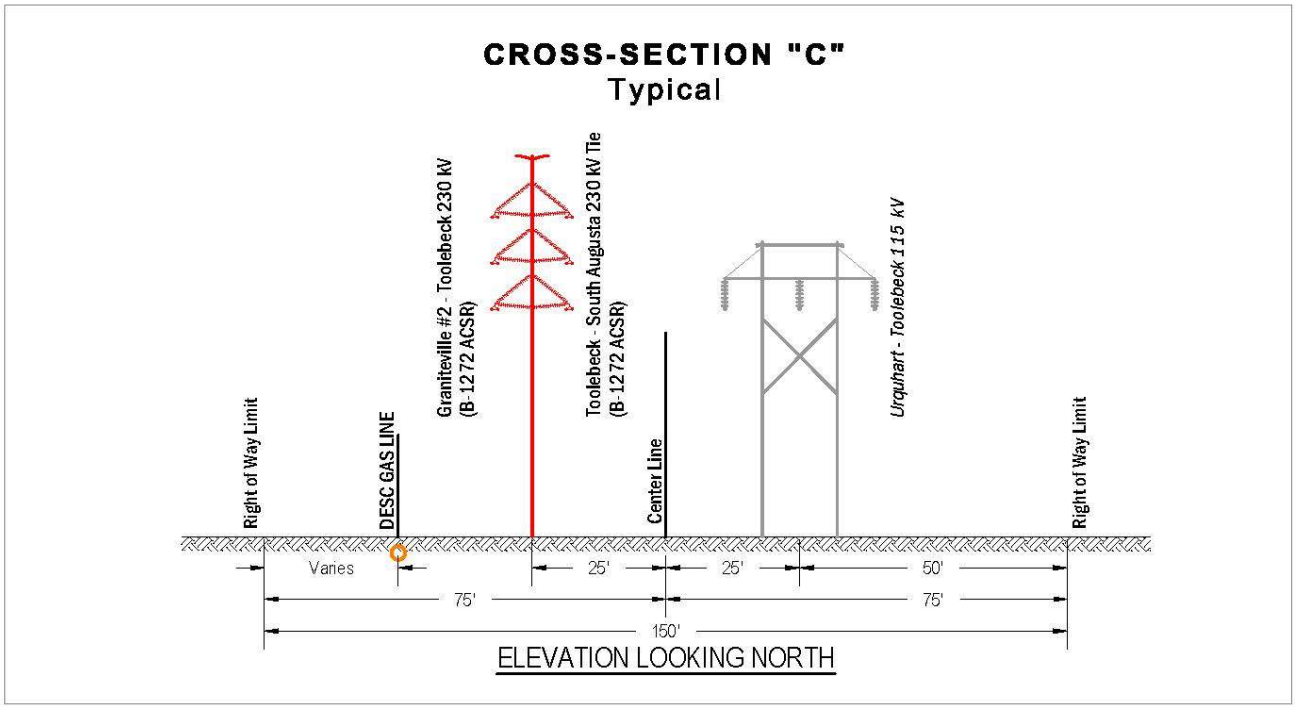
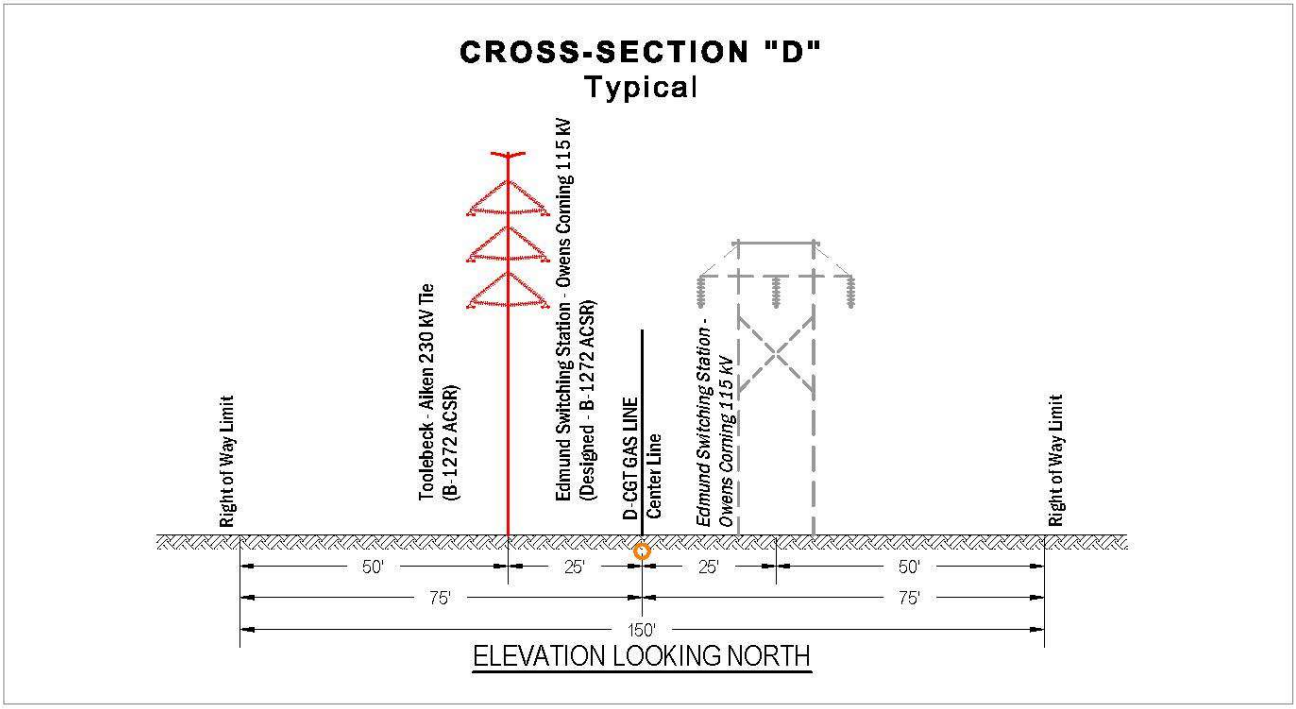


Figure 3.1-7 Toolebeck Transmission Substation to Santee Cooper Interconnection Point



Design and construction of the Project Lines will meet or exceed all applicable requirements of the National Electrical Safety Code edition that are current when designed.

The Project Lines' route crosses one U.S. highway, multiple public/private roads, and one railroad. The road and railroad crossings for the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie (Urquhart Junction to Toolebeck Substation) and Toolebeck – Aiken 230 kV Tie (Toolebeck Substation to Santee Cooper Interconnection Point), are identified in Chart 3.1-1.

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Chart 3.1-1 Project Lines' Road and Railroad Crossings

Road/Railroad Crossings *(Urquhart Junction - Toolebeck Substation)*	**Approximate Distance Along the Lines (Miles)**
Storm Branch Rd	0.21
Barretts Church Way	1.04
Boyd Pond Rd	1.78
Good Hope Farms Rd	2.29
Good Hope Farms Rd (2nd xing)	2.68
Silver Bluff Rd	3.39
Pickett Ln	3.59
Adams Rd	3.74
Eve St	3.87
Anderson Pond Rd	4.26
Highland Reserve Ct	5.39
Steeplechase Rd	5.46
Spaulding Bridge Rd SW	5.52
Three Runs Creek Way SW	5.77
Three Runs Creek Way SW (2nd xing)	5.87
Burden Lake Rd	6.07
Woodside Plantation Dr	6.57
Spencer Dr	7.34
Whiskey Rd	7.52
Athol Ave	7.90
Powder House Rd SE	8.28
Banks Mill Rd	9.04
Hopeland Farm Dr	9.59
Implement Rd	9.79
Amanda Ct	10.38
Toolebeck Rd	10.51
Road/Railroad Crossings *(Toolebeck Substation – Santee Cooper Interconnection Point)*	**Approximate Distance Along the Lines (Miles)**
Woodward Dr	0.51
Aiken Railroad	0.52
US Hwy 78 (Charleston Hwy)	0.54
Wagener Rd	1.96
Turbyfill Ln	2.20
Green Hill Rd	2.68
Bob Bell Ct	2.98
Wrights Mill Rd	3.56
Farmfield Rd	5.61
New Holland Rd	5.66
Hayden Rd	6.31

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4.0 The Affected Environment

DESC compiled information on the affected environment by reviewing the published literature, interpreting aerial photography, reviewing Federal and South Carolina governmental agency information and performing field investigations. This chapter describes the general characteristics of the physiographic provinces within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be located and provides specific information about environmental, land use, cultural and scenic resources in the immediate vicinity of the project. A Geographic Information System ("GIS") was used to analyze, model, and manage data for an area that extended outward 1.25 miles in each direction from the centerline of the proposed Project Lines for cultural resource data collection and 1.0 mile for protected species data collection. Other data were compiled in the GIS system for the area extending outward 1,000 feet in each direction from the proposed Project Lines' centerline; selected additional data were compiled for the area within the existing and proposed new right-of-way within which the proposed Project Lines will be located. This data collection and mapping process allowed a qualitative and quantitative analysis of the likely effects to environmental, land use, cultural and scenic resources that will result from construction of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, Toolebeck – South Augusta 230 kV Tie, and associated facilities.

4.1 Land Use

The existing DESC 150-foot right-of-way, as illustrated in Figures 3.1-4 through 3.1-7, within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, Toolebeck – South Augusta 230 kV Tie, and associated facilities will be built has existed in its current condition, under care of a vegetative management program, maintaining the majority as cleared with a single 115 kV transmission line within it for many decades. Since the 1950s, existing land uses have been planned, developed, and implemented to accommodate the existing corridor. Land uses surrounding the 2,000-foot corridor within which the Project Lines will be built include single-family residential, institutional (church), industrial (light and heavy manufacturing), commercial/retail (banking, shopping centers, etc.), power supply (electrical substation), agricultural uses (cultivated fields, grass/pasture land, etc.), recreation (equestrian facilities, a golf course, etc.), forest land, timber production, and other undesignated uses such as fallow land.

Chart 4.1-1 provides a listing of existing land uses and their general locations that are present in the immediate vicinity of the proposed and existing DESC right-of-way within which the Project Lines will be built.

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Chart 4.1-1 Land Uses along the Project Lines' Route

From	To	Approx. Distance (miles)	Dominant Land Use(s) in the Immediate Vicinity	Comments
Urquhart Transmission Junction	Intersection with existing right-of-way	0.08	Existing transmission lines, mixed hardwood-pine forests	Additional right-of-way required parallel and adjacent to existing lines.
Junction with existing DESC right-of-way	Begin to parallel Central Electric transmission line	1.27	Single-family residential, undeveloped parcels, mixed hardwood-pine forests	Residences have maintained mixed buffer along the existing right-of-way, larger rural residential parcels
Begin to parallel Central Electric transmission line	Boyd Pond Road	0.43	Single-family residential, forests, undeveloped parcels, adjacent transmission right-of-way	Larger rural residential parcels
Boyd Pond Road	Point south of Good Hope Farms Road	0.43	Mature mixed hardwood-pine forests	Thick stands of forests surround the existing corridor
Point south of Good Hope Farms Road	Point east of Silver Bluff Road	0.85	Equestrian agricultural land uses, single-family residential	Existing route crosses multiple open fields adjoining residences
Point east of Silver Bluff Road	Silver Bluff Road	0.33	Forests of predominately pine species	Some agricultural and equestrian activities are conducted within the existing right-of-way
Silver Bluff Road	Point south of Anderson Pond Road	0.65	Single-family residential, agricultural, forests	Area of single-family residential that has maintained sections of forests and active agricultural uses
Point south of Anderson Pond Road	Point south of Silver Meadow Court	0.63	Forest land	Cultivated pine forest and unharvested sections of forest
Point south of Silver Meadow Court	Point east of Spencer Drive	2.56	Single-family and multi-family residential, recreational (golf course)	Parallels or crosses several neighborhood streets from the community development around the existing right-of-way
Point east of Spencer Drive	Point east of Whiskey Road	0.46	Commercial, single-family residential, existing electrical transmission facility	The southern edge of the Whiskey Road commercial corridor
Point east of Whiskey Road	Banks Mill Road	1.34	Agricultural operations, forest land with limited single-family residential	Areas of actively cultivated fields, forests
Banks Mill Road	Toolebeck Road	1.47	Single-family residential, cultivated and equestrian agricultural	Maintained meadows and paddocks and cultivated fields separate the majority of single-family residences in this area
Toolebeck Road	Charleston Highway (US HWY 78)	0.69	Timber production, cultivated agriculture, existing DESC substation	Adjacent to existing electrical facilities and various agricultural productions
Charleston Highway (US HWY 78)	Wagener Road	1.43	Timber production, Santee Cooper transmission right-of-way, interspersed	Portions of single-family residential and industrial uses interspersed with tracts of timber production

			industrial and single-family residential	
Wagener Road	Point northeast of Wrights Mill Road	1.89	Single-family residential, equestrian and livestock agricultural facilities	Large parcels of single-family residential with portions of agricultural use, stands of mature pine forests
Point northeast of Wrights Mill Road	Point southwest of New Holland Road	1.44	Timber production	Pine forests in various stages of timber production
Point southwest of New Holland Road	Santee Cooper Interconnection Point	1.88	Sparse single-family residential, timber and agricultural production	Cultivated and livestock fields intermingled with stands of pine timber production

Existing land uses within 1,000 feet of the Project Lines' proposed centerline are represented by various figures in this report (*Figures 5.1-A and 5.1-B*).

4.2 Physiography

South Carolina covers 32,020 square miles and includes portions of the Blue Ridge, Piedmont and Coastal Plain physiographic provinces. A small area along the northwestern boundary of the State lies in the Blue Ridge province. The Piedmont province occupies the area between the Blue Ridge province and the Coastal Plain province (the Piedmont/Coastal Plain boundary is known as the "Fall Line"). The area between the Fall Line and the Atlantic Ocean is the Coastal Plain province, which is comprised of three sub-provinces (Upper Coastal, Middle Coastal, and Lower Coastal).

The Project Lines' route is located just south of the Fall Line, in the interface region between the Coastal Plain and the Piedmont. This area is known as the "Fall Line Hills District" of the Southern Coastal Plain physiographic province. More specifically, it is located in the middle portion of the Savannah River Valley, a major watershed that slopes from more than 5,000 feet elevation in the Appalachian Mountains to sea level at the Atlantic coast.

The Fall Line of South Carolina marks the common boundary of the Piedmont and Coastal Plain provinces. The Fall Line is a boundary of bedrock geology between the metamorphics of the Blue Ridge and Piedmont with the largely unconsolidated sediments of the coastal plain, but it can also be recognized from stream geomorphology. Falls or rapids are commonly present in streams near the Fall Line; below the Fall Line streams develop much broader flood plains. Elevations in South Carolina range from mean sea level ("MSL") at the coast to 3,560 ft. above MSL on Sassafras Mountain in the Blue Ridge province. Elevations along the Fall Line generally range from 275 feet to 650 feet above MSL.

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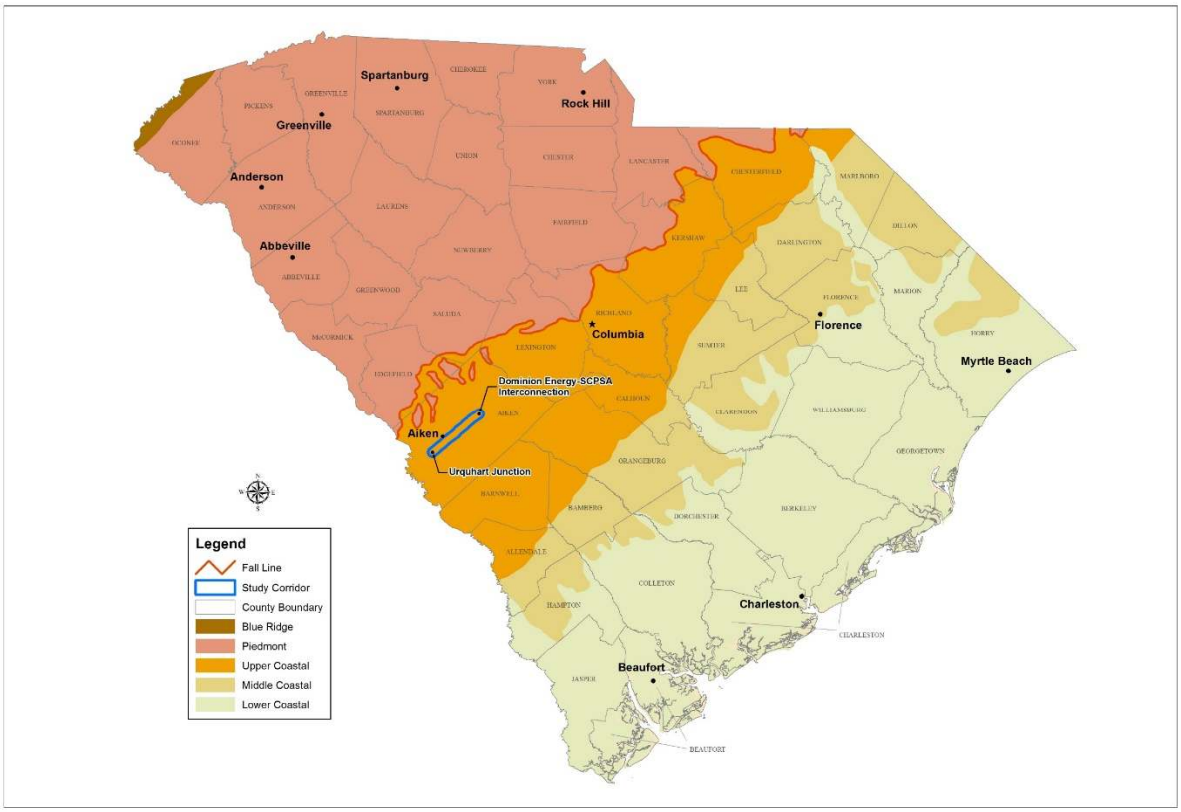
The Project Lines will reside entirely within the Upper Coastal physiographic sub-region of the Coastal Plain province. Figure 4.2-1 displays the South Carolina physiographic provinces and the project location in relation to them.

Figure 4.2-1 South Carolina Physiographic Provinces



Coastal Plain Physiographic Province Land Cover

According to the South Carolina Department of Natural Resources, there are eight major land cover classifications defined for the coastal plain, of which six are either unique to the province or reach their greatest extent there. The predominant habitat types that comprise the coastal plain are 1) grassland and early successional habitats, 2) pine woodland, and 3) river bottoms. Although the remaining types are less extensive, they provide habitat diversity that is important to a number of animals, especially wetland-dwelling species. Included below are descriptions of the major land cover classifications in the Coastal Plain physiographic province and the fauna that are common to the habitat provided by the classifications.

Pine Woodland

This classification is used to describe all pine-dominated forests throughout the province, including those occupying a variety of soil moisture characteristics except floodplains. The canopy is dominated by one or several species of pine, generally loblolly pine (*Pinus taeda*), or longleaf

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(*Pinus palustris*), depending on elevation, soil type and silvicultural history. Dense shrub thickets of hollies (*Ilex* spp.) and wax myrtle (*Morella cerifera*) may be present. Higher elevation pine woodlands have abundant grasses and herbaceous cover, particularly when burning is frequent. Optimal habitat for priority species consists of open stands of longleaf pine, sparse understory and shrub layers, a ground cover of wiregrass (*Aristida* spp.), and diverse herbaceous species. Wet prairie, grass-sedge bog, herb bog or pitcher plant bog, is typically found in the outer coastal plain on flat sites with high water tables and soil that is saturated for at least part of the year. Vegetation consists of a thin canopy of pines, almost always longleaf (*Pinus palustris*), although loblolly and pond pine (*P. serotina*) may also be present. The understory is essentially absent or very scattered. Herbaceous flora is quite rich, consisting of many grasses and sedges. Pine flatwoods intergrades with pine savanna; like pine savanna, it is pine woodland situated on essentially flat or rolling terrain with sandy soil and a high water table. Unlike pine savanna, pine flatwoods feature a well-developed sub-canopy of several tall shrub species. Pine flatwoods are the principal forest type for much of the lower coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Henslow's Sparrow, Northern Bobwhite, Red-cockaded Woodpecker, Black Bear, Northern Yellow Bat
High Priority	Eastern Diamondback Rattlesnake, Mimic Glass Lizard, Pine Woods Snake
Moderate Priority	Slender Glass Lizard, Eastern Fox Squirrel, Eastern Woodrat

Sandhill Pine Woodland

Sandhill pine woodland is a variation of pine woodland composed of species adapted to xeric, sandy soils. The type occurs principally in the sandhills but also on sand ridges in the coastal plain. Absent frequent fire, a canopy of longleaf pine and a sub-canopy of turkey oak prevail, interspersed with scrub oak species and scrub/shrub cover. Frequent burning leads to development of longleaf pine-wiregrass communities.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Eastern Wood Pewee, Northern Bobwhite, Red-cockaded Woodpecker, Wood Thrush, Coral Snake, Gopher Tortoise, Pine Snake, Southern Hognose Snake
High Priority	Pine Woods Snake
Moderate Priority	Eastern Woodrat, Eastern Fox Squirrel

Upland Forest

Vegetation composition of upland forest is similar to that of oak-hickory forest in the Piedmont, where it is a major vegetation type. Upland forest is rare in the coastal plain, typically occurring on fire-suppressed upland slopes near river floodplains or between rivers and tributaries. It intergrades with river slope communities. Representative canopy trees include white

oak (*Quercus alba*), black oak (*Quercus velutina*), post oak (*Quercus stellata*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), loblolly pine (*Pinus taeda*), flowering dogwood (*Cornus florida*), and black gum (*Nyssa sylvatica*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Grassland and Early Successional Habitats

A variety of open-land habitats occupy a considerable portion of upland sites in the Piedmont, sandhills and coastal plain, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. Vegetation on most sites consist of pine woodland and oak-hickory forest, although many sites are maintained in early successional stages. Agricultural lands with surrounding forest edge habitat occur widely throughout the province and represent the prevailing cover type in the "agriculture belt" that composes most of the inner coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Common Ground-Dove, Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Painted Bunting
High Priority	High Priority: Barn Owl
Moderate Priority	American Woodcock, Bewick's Wren, Meadow Vole, Eastern Woodrat

Ponds and Depressions

Topographic depressions in the coastal plain support a variety of permanently and semi-permanently flooded isolated freshwater wetlands that have open or closed canopy forest cover. Vegetation cover varies with hydrology, substrate and fire frequency. Depression meadows, pond cypress ponds, swamp tupelo ponds, pocosins and limestone sinks are also included in this habitat type. Landforms include natural and artificial ponds dominated by cypress and/or swamp tupelo, limestone sinks, and Carolina bays. Shrub-dominated pocosins or grass-sedge-herb dominated depression meadows occur on peat- or clay-based substrates, typically in Carolina bays. Absent fire, vegetation in most of these habitats reverts to mixed floodplain hardwood and cypress-tupelo dominated forest. Upslope from these lowland habitats, the transition to well drained uplands supporting pine woodland is often abrupt.

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Associated Wildlife Species *(SC Department of Natural Resources Priority List)*

Highest Priority	Highest Priority: Little Blue Heron, Yellow-crowned Night-Heron, Flatwoods Salamander, Tiger Salamander, Carolina Gopher Frog, Broad-striped Dwarf Siren, Chamberlain's Dwarf Salamander
High Priority	High Priority: Black Swamp Snake, Chicken Turtle, Florida Cooter, Florida Green Watersnake, Florida Softshell Turtle, Gulf Coast Mud Salamander, Yellowbelly Turtle, Upland Chorus Frog, Mink, Southeastern Bat
Moderate Priority	Moderate Priority: Great Blue Heron, Great Egret, Common Snapping Turtle, Spotted Turtle, Southern Dusky Salamander, Northern Cricket Frog

Hardwood Slopes and Stream Bottoms

A complex of hardwood and hardwood-pine communities occupies the floodplains of small streams, mesic bluffs and infrequently flooded flats in association with streams or rivers. Fire is infrequent, due either to the sheltered locations of these communities on bluffs or their isolation within a floodplain. Several mixed mesophytic subtypes characterized by the presence of American beech *(Fagus grandifolia)* occur in sheltered sites with moist soils, particularly on north-facing river bluffs and on slopes of drains and creeks. On upland flats within floodplains (hammocks), southern magnolia *(Magnolia grandiflora)* frequently shares dominance with American beech. The calcareous cliff and marl forest subtype occurs on circumneutral soils derived from limestone or unconsolidated calcareous substrates such as marl. Forest structure of all subtypes is diverse, with understory, shrub and herbaceous species varying according to soil moisture and chemistry. All subtypes intergrade with blackwater stream forest or river bottom forest on lowland sides and with upland forest on upland sides.

Associated Wildlife Species *(SC Department of Natural Resources Priority List)*

Highest Priority	Black-throated Green Warbler, Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Blackwater Stream Systems

Tributary streams in the sandhills and coastal plain are commonly known as "blackwater streams" for the color of tannins leaching from decaying vegetation. Forests on the narrow floodplains formed by these streams typically have a canopy dominated by swamp tupelo *(Nyssa biflora)* and red maple *(Acer rubrum)*. On broader sites, bald cypress *(Taxodium distichum)* can become an important canopy species. Tulip poplar *(Liriodendron tulipifera)*, sweet gum *(Liquidambar styraciflua)*, pond pine *(Pinus serotina)*, loblolly pine *(Pinus taeda*), and laurel oak *(Quercus laurifolia)* are important associates. The shrub layer is open in areas subjected to the most flooding, or it can be fairly dense and pocosin-like in areas subject to infrequent flooding.

Headwaters and wet flats immediately above the floodplain can support dense, pocosin-like shrub thickets or, under suitable fire conditions, pure stands of Atlantic white cedar (*Chamaecyperus thyoides*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Kentucky Warbler, Eastern Wood Pewee, Rusty Blackbird, Swainson's Warbler, Wood Thrush, Yellow-crowned Night Heron
High Priority	Acadian Flycatcher, Black Swamp Snake, Spiny Softshell Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat
Moderate Priority	American Woodcock, Louisiana Waterthrush, Wood Duck, Spotted Turtle

River Bottoms

River bottoms, or "bottomland forests," consist of hardwood-dominated woodlands with moist soils that are usually associated with the broad floodplains of major rivers in the Piedmont or Blue Ridge. Locally, the floodplains of major coastal plain rivers are significant components of the landscape. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on lower elevation sites interspersed and intergrading with oak-dominated woodlands. Dominant trees are bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*), swamp gum (*Nyssa biflora*), Carolina ash (*Fraxinus caroliniana*), water elm (*Planera aquatica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole
Moderate Priority	American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

Land cover types and quantities within 1,000 feet of the Project Lines' route are presented in Chart 4.2-1.

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Chart 4.2-1 Land Cover Types and Quantities within 1,000 feet of the Project Lines

Land Cover Type	Acres
Barren	79.4
Cropland	172.7
Grass/Pasture	1133.9
Mixed Hardwood/Pine Forest	2186.3
Pine Forest (almost exclusively loblolly pine)	51.5
Scrub/Shrub	413.4
Urban/Built-up	214.5
Water	24.2
Wetland	126.6

The dominant land cover types in the vicinity of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, Toolebeck – South Augusta 230 kV Tie are pine forests, grass/pasture land and, to a lesser extent, shrub/scrub. The cleared right-of-way within which the Project Lines will be built includes grass/pasture and scrub/shrub, which are land cover types commonly found in transmission line rights-of-way where vegetative control practices are designed to preclude the presence of species that would eventually interfere with the safe, reliable operation of transmission lines.

4.3 Surface Water Hydrology

The route for the Project Lines resides within the Savannah River and Edisto River drainage basins, with the divide occurring along Highway 78 approximately 0.5 miles north of the Toolebeck Transmission Substation. The Project Lines' route is more specifically located within the Hollow Creek and Upper Three Runs watersheds of the Savannah River drainage basin and the Upper South Fork Edisto River watershed within the Edisto River drainage basin. The waters crossed by the Project Lines and the watersheds they reside in are shown in Chart 4.3-1.

Chart 4.3-1 Watersheds and Waters Crossed by the Project Lines

Drainage Basin	Sub-Basin	Watershed	Length of Lines' Route in the Watershed (Approximate Miles)	Waters Crossed by the Lines in the Watershed	Navigable Waters as Classified by SCDHEC?
Savannah River	Middle Savannah River	Hollow Creek	7.47	Unnamed tributary of Hollow Creek	No
				Unnamed tributary of Hollow Creek	No
				Unnamed tributary of Hollow Creek	No
				Unnamed tributary of Hollow Creek	No
		Upper Three Runs	4.26	none	N/A
Edisto River	South Fork Edisto River	Upper South Fork Edisto River	6.06	Shaw Creek	Yes

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All waters crossed by the Project Lines are classified by the South Carolina Department of Health and Environmental Control ("SCDHEC") as "Freshwaters." SCDHEC defines freshwaters as follows: *"Suitable for primary and secondary contact recreation, a source for drinking water after conventional treatment in accordance with the requirements of SCDHEC, suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and suitable for industrial and agricultural uses."*

Precipitation is the basic source of water resources in Aiken County, South Carolina, and the historical average annual precipitation rate in the county is 48 inches. Substantial deviation (10 inches or greater) from the average annual precipitation rate is infrequent; however, the region experienced unusually prolonged droughts in 1954-55, 1968-1969, 1986, 1996, 1998-2002, 2007-2008 and 2011. Historically, annual precipitation is fairly well distributed throughout the region, with the months of January, February, March, June, July, August and September being the wettest, with monthly averages around five inches; averages for the remaining months range between three and four inches. Snowfall in Aiken County is infrequent, and the annual average accumulation is 0.9 inches.

In September and October 2019, Palmetto Environmental Consulting, Inc. ("PEC"), on behalf of DESC, conducted a jurisdictional waters/wetlands delineation in the right-of-way within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be built. During the delineations, wetland boundaries were marked and surveyed using a Trimble GeoXH 6000 Series global positioning system unit. Mapping was created depicting the boundaries of jurisdictional waters and wetlands and used to determine that approximately 12.2 acres of wetlands, approximately 0.8 acres of open water and approximately 1,160 linear feet of stream channels are present in the existing and proposed rights-of-way.

DESC regularly maintains its transmission line rights-of-way to prevent vegetation growth that would interfere with the safe, reliable operation of transmission lines; therefore, no forested wetlands are present in the existing right-of-way, and, likewise, none are present in the newly proposed right-of-way sections. The wetlands in the right-of-way are primarily herbaceous wetlands. Wetland vegetation species consist of many of the same species found in uplands, but also include sycamore, (*Platanus occidentalis*), Chinese privet (*Ligustrum sinense*), various knotweeds (*Polygonum* sp.), bushy bluestem (*Andropogon glomeratus*), lamp rush (*Juncus effusus*), various sedges (*Carex* sp.), woolgrass (*Scirpus cyperinus*), false nettle (*Boehmeria cylindrica*), black willow (*Salix nigra*), and giant plume grass (*Saccharum giganteum*).

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4.4 Wildlife

Land use and natural plant communities strongly influence wildlife diversity in the vicinity of the Project Lines' route. The bottomland forests of the area offer habitat for white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*). Other representative species in this area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), prothonotary warbler (*Protonotaria citrea*), Carolina wren *(Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), red-shouldered hawk (*Buteo lineatus*), parula warbler (*Parula americana*), green frog (*Rana clamitans*), bird-voiced tree frog (*Hyla avivoca*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*).

The mixed hardwood/pine and pine forests provide habitat that supports the eastern diamondback rattlesnake (*Crotalus adamanteus*), green anole (*Anolis carolinensis*), northern cardinal (*Cardinalis cardinalis*), bobwhite quail (*Colinus virginianus*), and eastern fox squirrel *(S. niger*). Other representative species found in the forested areas of the region include the white-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), wild turkey, red-tailed hawk (*Buteo jamaicensis*), pine warbler (*Dendroica pinus*), eastern towhee (*Pipilo erythrophthalmus*), pine snake (*Pituophis melanoleucus*), oak toad (*Bufo quercicus*), and flatwoods salamander (*Ambystoma cingulatum*).

Common in recent clear-cut areas in the vicinity of the Project Lines' route and in the existing right-of-way are scrub/shrub communities. The representative species found in these areas include the eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-tailed hawk, Carolina wren, northern mockingbird (*Mimus polyglottos*), yellow-breasted chat (*Icteria virens*), eastern cottontail, golden mouse (*Peromyscus nuttalli*), and white-tailed deer.

4.5 Fisheries

The perennial streams crossed by the Project Lines' route are typical of South Carolina's lower piedmont / upper coastal plain freshwater streams where an abundance of finfish and mussels are present. The Savannah River is the major waterway in the vicinity of the Project Lines' route. In the "Fall Line Hills District" of the middle segment of the Savannah River Valley (the region in which the Project Lines will be located), the Savannah River supports an important sport fishery for warmwater species that include largemouth bass, crappie, striped bass, spotted bass, bluegill, redbreast sunfish, catfish, American eel, shortnose sturgeon, chain pickerel, bowfin and longnose gar.

Flood control lakes and farm ponds throughout the region provide habitats for largemouth bass, common bream, sunfish and catfish.

4.6 Protected Species Literature and Records Search

PEC conducted a protected species literature and records searches in September 2019 to determine the presence of known occurrences of federally and state-listed animal and plant species on or within one mile of the existing and proposed right-of-way within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be located. The literature and records search included review of the following resources:

- The U.S. Fish and Wildlife Service's ("USFWS") South Carolina List of At-Risk, Candidate, Endangered, and Threatened, and Species of Concern for Aiken County, last updated September 9, 2019;
- The South Carolina Department of Natural Resources ("SCDNR") Heritage Trust Program's Rare, Threatened, and Endangered Species Database GIS layer, last updated June 2017; and,
- The SCDNR list of Rare, Threatened, and Endangered Species Known to Occur in Aiken County, last updated 2015.

The literature and records research revealed no known occurrences of state or federally-listed species within a one-mile radius of the Project Lines. However, in coordination with the South Carolina Department of Natural Resources (SCDNR) personnel provided one occurrence of winter grape-fern (*Botrychium lunarioides,* ranked S1 by SCDNR) within one mile of the Project Lines.

Seventy-six (76) species of federally- and state-listed plants and animals either occur or potentially occur in Aiken County, South Carolina. These species, as well as the results of the records search and protected species field investigation over the existing and proposed rights-of-way, are summarized in the following report prepared by PEC: *"Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Toolebeck – Aiken 230 kV Tie, and Segments of the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie and Associated Facilities"* dated November 7, 2019, which summarizes the investigation within the existing and new right-of-way (*Appendix B*). Because of the large number of species listed in Aiken County, the PEC report only addresses those species for which appropriate habitat is located within the existing and proposed rights-of-way in which the Project Lines will be built.

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4.7 Cultural Resources

In September and October 2019, Brockington and Associates, Inc. ("Brockington"), a national cultural resource consulting firm headquartered in Norcross, Georgia, with an office in Charleston, South Carolina, conducted background research to determine previously recorded architectural and archaeological resources within 1.25 miles of the Project Lines' route. Additionally, the scope of Brockington's investigation included a "windshield reconnaissance survey" to identify any previously unrecorded architectural resources within 1.25 miles of the Project Lines' route that appear potentially eligible for listing in the National Register of Historic Places ("NRHP"). The area of the cultural resource investigation contains approximately 40,466 acres in central Aiken County, South Carolina.

The findings of the background research and windshield reconnaissance survey along the Project Lines' route are summarized below.

Archaeology

Brockington conducted the archaeological site search for the area within 1.25 miles of the of the Project Lines using ArchSite, South Carolina State Historic Preservation Office's (SHPO) online cultural resources GIS database. This database system provides information on previous cultural resource surveys as well as previously recorded archaeological sites. The recorded sites within 1.25 miles of the Project Lines are summarized according to their National Register of Historic Places ("NRHP") status in Chart 4.7-1.

Chart 4.7-1: Classifications of Previously Recorded Archaeological Sites within 1.25 Miles of the Project Lines' Route

Archaeological Resource NRHP Classifications	Quantity
Potentially Eligible for Listing on the NRHP	16
Not Eligible for Listing on the NRHP	15

Architecture

Brockington conducted a literature review to determine all previously recorded architectural resources within 1.25 miles of the Project Lines. The review of digital file records through ArchSite or local Aiken County records revealed that 71 previously recorded architectural resources reside within 1.25 miles of the Project Lines, but none occur in the right-of-way. Chart 4.7-2 summarizes the findings of the architectural records review.

Chart 4.7-2: Classifications of Previously Recorded Individual Architectural Resources within 1.25 Miles of the Project Lines' Route

Individual Resource NRHP Classifications	Quantity
Eligible for Listing on the NRHP	5
Unevaluated for Listing on the NRHP	1
Not Eligible for Listing on the NRHP	65
Total	71

Windshield Reconnaissance Survey

In addition to the records review to determine the locations and NRHP status of all previously recorded architectural resources within 1.25 miles of the Project Lines' route, Brockington conducted a "windshield reconnaissance survey" during September 16-20, 2019, throughout the project area. The windshield reconnaissance survey consisted of an inspection of architectural resources visible from all publicly accessible roads. It is important to note that topographic and aerial maps often indicate resources located along private roads as well as abandoned and existing field roads. If a previously recorded resource was found to be inaccessible, Brockington examined current aerial photographs to make a reasonable determination if the resource remained in existence. The purpose of the windshield reconnaissance survey was to accomplish the following three objectives:

1. Evaluate all previously recorded architectural resources;
2. Locate and assess architectural resources not previously recorded that appear to meet the minimum fifty-year age requirement for the NRHP; and,
3. Identify potentially eligible NRHP properties, including structures and historic districts.

As discussed above, researched records revealed that 71 previously recorded above-ground resources, including five individual architectural properties eligible for NRHP listing, 65 resources not eligible for the NRHP, and one resource unevaluated for listing on the NRHP. During the course of Brockington's survey, 18 sites were determined not extant, primarily due to the age of the original surveys. None of the remaining 53 previously listed, extant sites are within the existing or proposed right-of-way in which the Project Lines will be built. During the windshield survey, Brockington identified no previously unrecorded individual architectural resources with sufficient architectural integrity to be considered eligible for listing in the NRHP. Seventeen resources, including one previously unevaluated resource, could not be accessed due to their location within gated properties. Brockington recommended each resource retain their previous NRHP assessments due to aerial imagery suggesting they are extant. Numerous other properties

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were observed throughout the study area during the windshield reconnaissance survey that appear to be 50 years old (thus, meeting the minimal standard for NRHP eligibility consideration); however, due to significant alterations or modifications, these properties appear to have lost their architectural integrity and may not meet eligibility criteria for listing on the NRHP under Criterion C. The presence of aboveground cultural resources within 1.25 miles of the Project Lines' route, as identified by the background records review and during the windshield reconnaissance survey, are summarized in Chart 4.7-3.

Chart 4.7-3: Classifications of All Architectural Resources within 1.25 Miles of the Project Lines' Route, Including Previously Recorded Resources Reviewed and Documented During the Windshield Reconnaissance Survey

Resource NRHP Classifications Reflecting Findings of the Windshield Survey	Quantity
Eligible for Listing on the NRHP	5
Unevaluated for Listing on the NRHP	1
Not Extant	18
Not Eligible for Listing on the NRHP	47
Total	71

Brockington summarized the findings of the cultural resources background research and windshield reconnaissance survey for the Project Lines in a letter report dated December 2019, which is included in this report (*Appendix C*).

In addition to the cultural resources background research and windshield reconnaissance survey, Brockington conducted a comprehensive Phase I archaeological resources survey from September 2 through October 18, 2019, throughout the 17.8-mile Project Line's route, including existing right-of-way, a 1.2-acre tract at Urquhart Junction, and a 5-acre tract around the Toolebeck Transmission Substation. The archeological survey covers 100 feet from the western edge of the existing 115 kV transmission line corridor. The field investigations identified one archaeological resource within the project corridor, a historic artifact scatter (Isolate 1) recommended not eligible for inclusion on the NRHP. Brockington recommended that no additional archaeological management considerations are warranted for this project and prepared a report dated December 2019 entitled *"Phase I Intensive Archaeological Resources Survey for the Toolebeck – Aiken 230 kV Tie and a Portion of the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie, and Associated Facilities"* that describes the methodology, findings, and summary of the Phase I archaeological survey (*Appendix C*).

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4.8 Visual Resources

The degree to which a planned transmission line will affect the scenic quality of the area or region through which it passes is directly related to the scenic quality of the area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic quality is derived from the interrelationship of multiple factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Using these factors, the United States Bureau of Land Management ("BLM") developed a visual resource inventory methodology for the purpose of rating the scenic quality of federal lands under its jurisdiction. The BLM methodology is a system whereby the visual quality of land areas can be scored with objectivity, integrity, and consistency on a numeric scale by considering and rating the interrelationship of multiple visual factors associated with specific areas. The factors include those which contribute to the scenic content and quality of specific areas including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

On DESC's behalf, an interdisciplinary team of landscape architects, civil engineers, and professional geographers employed by Pike Engineering, LLC ("Pike") executed the BLM methodology to assess and rate the scenic quality of four specific areas within which the Project Lines will be constructed. The four areas include sections of the Project Lines' route that were delineated to include scenic factor similarities that are generally specific to each individual area and are not necessarily prevalent in adjacent areas.

Chart 4.8-1, adopted from the BLM's Visual Resource Rating System, provides information about the criteria used to assess scenic quality in each of the four delineated areas along the Project Lines' route. Guidance for scoring defined areas for each scenic quality rating criterion is provided in Chart 4.8-2.

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Chart 4.8-1: Scenic Quality Rating Criteria

Explanation of Rating Criteria
Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, (for example, the Grand Canyon) or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features, which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind-beaten trees, and Joshua trees).
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Color
Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance that adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

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Chart 4.8-2: Scenic Quality Inventory and Evaluation Chart

Key Factors	Rating Criteria and Score	Rating Criteria and Score	Rating Criteria and Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features that are dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.* **5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

Note: Score values within each Key Factors category range from minimum to maximum scores for the key factor. It is possible to assign any numeric score within the minimum to maximum range based on scenic quality conditions observed.

* *A rating greater than 5 can be given to this criterion in the scarcity category but should be supported by written documentation.*

By applying the appropriate rating criteria and scores for each of the key factors shown in Chart 4.8-2 based on actual scenic conditions present along the Project Lines' route, total scores

were derived for each of the four individual sections indicating the scenic quality of each. The following is the BLM explanation of scenic quality, which is indicated by the total scores:

Total Score	Scenic Quality
19 or higher	High Scenic Quality
12-18	Moderate Scenic Quality
11 or lower	Low Scenic Quality

Scoring Methodology

Pike conducted a GIS analysis of vegetation, hydrography, land use, and topography along the Project Lines' route to gain insight into key scenic quality factors including landform, vegetation, water, color, scarcity, cultural modifications, and influence of adjacent scenery. Additionally, a windshield survey was conducted to observe, record, and photograph visual conditions along public roads in the immediate vicinity of the Project Lines' route. As previously explained, the Project Lines' route was segmented into four sections based on similarity of scenic conditions represented by each section. Finally, each section was scored using the BLM scoring protocol. The following is a listing of the four scenic quality sections, which are shown in Figure 4.8-1:

Scenic Quality Section 1: Urquhart Junction to Anderson Pond Road

Scenic Quality Section 2: Anderson Pond Road to Whiskey Road

Scenic Quality Section 3: Whiskey Road to US Highway 78

Scenic Quality Section 4: US Highway 78 to Santee Cooper Interconnection Point

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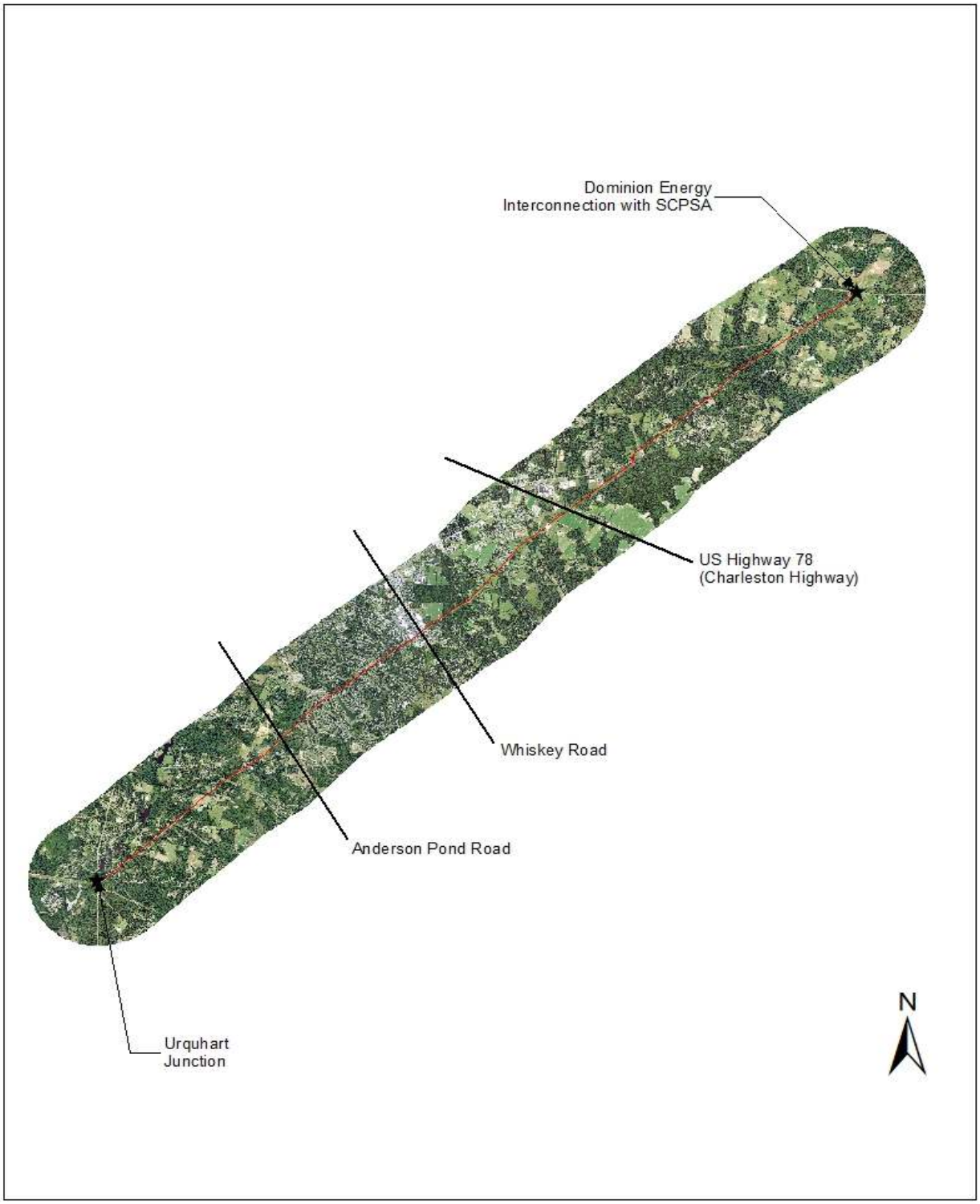
Figure 4.8-1: Scenic Quality Segments



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Urquhart Junction to Anderson Pond Road

View of DESC R.O.W. from Oakcrest Lane

View of DESC R.O.W. from Good Hope Farms Road

View of DESC R.O.W. From Boyd Pond Road

View of Boyd Pond Park

From Urquhart Junction, an additional 1.2 acres of right-of-way will be acquired adjacent to the existing Graniteville #2 – South Augusta 230 kV Tie and the Project Lines' will extend northeast 0.2 miles crossing over Storm Branch Road and continuing for a distance of 1.1 miles crossing Barrett's Church Way before reaching a Central Electric transmission line, of which it will parallel for an additional distance of 0.45 miles. The Project Lines' route maintains the northeastern bearing across Boyd Pond Road as it crosses through 0.4 miles of mature pine growth before opening to a 0.4-mile crossing of an equestrian farm, including Good Hope Farms Road. From the equestrian facilities, the Project Lines continue through 0.4 miles of rural residential property, a 400-foot pasture crossing, and 0.4 miles of pine forests prior to crossing Silver Bluff Road. The Project Lines' route then passes through approximately 0.5 miles of a rural residential area consecutively crossing Pickett Lane, Adams Road, and Eve Street. The Project

Line's route then borders 900 feet of pasture before it continues 0.6 miles northeast, transecting a thick stand of pine forest, during which it crosses Anderson Pond Road.

Large portions of the land within the delineated area from Urquhart Junction to Anderson Pond Road have remained forested, and while there is one area containing equestrian facilities, most of the development consists of residential areas retaining a rural quality by utilizing a development pattern that is primarily contained to the road corridors. Due to the presence of sandy soils, areas of steeper terrain, and the lack of significant vegetative groundcover, erosion is visible throughout this area. The combination of the common views of existing electric lines in the vicinity and the height of the existing pine forest vegetation, the scenic quality of the area is only minimally affected.

Urquhart Junction to Anderson Pond Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Flowing, or still, but not dominant in the landscape. **2**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **2**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **1**
Scarcity	Interesting within its setting, but fairly common within the region. **2**
Cultural modifications	Modifications add little or no visual variety to the area and introduce no discordant elements. **0**

Total Scenic Quality Score: 11

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Anderson Pond Road to Whiskey Road

View of DESC R.O.W. from Burden Lake Road

View of DESC R.O.W. within Woodside Plantation

View of typical conditions within Woodside Plantation

View of DESC R.O.W. from Woodside Plantation Drive

The Project Line's total length from Anderson Pond Road to Whiskey Road is approximately 3.3 miles. Along this segment the route continues northwest, exiting the thick stand of pine forest at a crossing with a Santee Cooper 115 kV transmission line that angles from the southeast to the north near Silver Meadow Court. From this point, the route travers 1.9 miles of the gated residential community of Woodside Plantation. Within the Woodside Plantation community, the route cross community roads in nine locations but is generally not a dominant visual feature in the landscape due to successful landscape screening efforts along the roads within the transmission line right-of-way. Within this segment, the Project Lines' route run adjacent to the golf course driving range west of Woodside Plantation Drive.

From Woodside Plantation Drive, the Project Lines' route continues past the community maintenance facility and crosses over the community garden plots, which are located within DESC's right-of-way. The Lines' route continues to be surrounded by medium-density residential

homes during the remaining 0.9 miles to Whiskey Road at which point it briefly transects the southern edge of the area's commercial corridor.

Much of this area, primarily the Woodside Plantation community, has developed around the existing DESC transmission corridor that will include the future Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie line route. The intermixed residential, recreational, and natural environments create a practical and moderately harmonious landscape composition. Though this is the highest density development along the route, meandering neighborhood roads, tightly placed residences, and tall stands of pines have retained the golf course community qualities that are found within adjacent areas. In general, though the cultural modifications are congruent with the natural environment, this area of the Project Lines' route lacks many of the landscape and scenic features necessary to classify it as having higher degrees of scenic quality according to the BLM scenic quality criteria.

Anderson Pond Road to Whiskey Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Flowing, or still, but not dominant in the landscape. **1**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **2**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area and introduce no discordant elements. **0**

Total Scenic Quality Score: 9

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Whiskey Road to U.S. Highway 78

View of DESC R.O.W. within commercial corridor

View of equestrian farm

View of DESC R.O.W. within livestock fields

View of DESC R.O.W. within cultivated fields

After crossing the southern edge of the area's Whiskey Road commercial corridor, where large box stores and subsequent adjacent parking lots dominate the landscape, the route continues 700 feet passing an existing electrical substation facility where it runs parallel to a Santee Cooper 115 kV transmission line for 2.4 miles. From Powderhouse Road, the Project Lines' route continues 0.5 miles through the woods before the tree-lined landscape surrounding the right-of-way begins to open up for the next 1.9 miles, during which time the Project Lines' route consecutively crosses Banks Mill Road, Hopeland Farm Drive, Implement Road, Amanda Court, and Toolebeck Road. The existing Santee Cooper transmission line ends the parallel routing and turns east for 0.4 miles before crossing Toolebeck Road. After the route crosses Toolebeck Road, the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie lines terminate into the Toolebeck Transmission Substation. The Toolebeck – Aiken 230 kV Tie exits the Toolebeck Transmission Substation and continues for 0.53 miles across both cultivated and equestrian agricultural fields prior to crossing U.S. Highway 78.

Though there is inclusion of commercial uses, rural and agricultural land uses begin to become more apparent in this section of the Project Lines' route. Many property owners have fenced riding areas and pasture lands for the training and recreational enjoyment of horses. Interspersed within this rural residential landscape are cultivated agricultural fields. The wide pastures with tree-lined edges contain contrasting dark rail fences with lush green grass, training paddocks, and significant extended views of regularly maintained meadows beneath the Project Lines' right-of-way further enhancing associated agricultural and equestrian activities. The harmonious landscape composition is not brought about by a single planned development, but rather by the juxtaposition of residential and pastural landscapes that are constructed and maintained with a consistent style.

Whiskey Road to U.S. Highway 78 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **2**
Scarcity	Interesting within its setting, but fairly common within the region. **2**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **1**

Total Scenic Quality Score: 10

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U.S. Highway 78 to Santee Cooper Interconnection Point

View of industry along U.S. Highway 78

Typical view of rural roads

Typical view of DESC R.O.W. within agricultural fields

View of Interconnection with SCPSA

Upon crossing U.S. Highway 78 the Project Lines' route begins to parallel a Santee Cooper transmission line and continues largely surrounded by pine growth for a total of 1.4 miles to where it crosses Wagener Road. After taking a northern bearing for 0.2 miles, pulling away from the Santee Cooper transmission line which continues slightly before bearing north, the Project Lines' route again continues northeast, crossing perpendicular to the Santee Cooper line and over Turbyfill Lane. For the next mile the Project Lines' route continues as it crosses agricultural fields, two gravel roads, and a landscape interspersed with stands of pines, hardwoods, and fencerow growth. From there the route runs 2.25 miles through a pine-lined corridor that is largely unbroken except for 4-5 adjacent residential properties at the Wrights Mill Road crossing. A single stream emerges from the mixed hardwood-pine forest, crosses the Project Lines' route, and disappears back into the trees. Exiting the pine-lined corridor, the route opens for 0.35 miles across agricultural fields prior to crossing New Holland Road. The next 0.65

miles between New Holland Road and Hayden Road contains cultivated land within the Project Lines' right-of-way between the scattered remaining tall pines from previous timber harvests. Upon crossing Hayden Road, the Project Lines' route once again transects a corridor within managed pine forests for 0.9 miles where it emerges into an agricultural field containing the site of interconnection with Santee Cooper.

With the exception of industrial properties largely focused near U.S. Highway 78, the remaining development consists of scattered residential or large agricultural usages. This route segment contains largely undeveloped areas covered in tall stands of pines that screen much of the segment from viewsheds originating on public roads. The scenic qualities are interesting, but common to the region.

U.S. Highway 78 to Santee Cooper Interconnection Point Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Flowing, or still, but not dominant in the landscape. **2**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **2**
Scarcity	Interesting within its setting, but fairly common within the region. **2**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**

Total Scenic Quality Score: 14

Summary

Application of the BLM methodology for assessing scenic quality along the route of the Project Lines' reveals the majority of the route (three scenic quality sections comprising approximately 63% of the total length) will be located within low scenic quality areas (Total Scenic Quality scores of 11 or less). One scenic quality section (approximately 36% of the Project Lines' total length) is located in areas considered to be of moderate scenic quality (Total Scenic Quality score of 12-18). None of the scenic quality sections are located in areas considered to be of high scenic quality (Total Scenic Quality score of 19 or higher). This evaluation does not necessarily indicate unattractiveness of the majority of the area; rather, scores indicating low scenic quality represent a metric that correctly indicates lack of topographic high points that would offer

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interesting elevation relief and long views and vistas, lack of landscape diversity (water, texture, color), lack of adjacent scenic features visible from the immediate area of the route, and the degree to which the Project Lines pass through areas that are highly modified by various types of development and infrastructure. Total Scenic Quality Scores are also indicative of visual sensitivity present in defined areas regarding the addition of transmission lines through the areas. Generally, high Total Scenic Quality Scores are indicative of areas where the appearance of new transmission lines would be more incongruent than would they be in areas where Total Scenic Quality Scores are low.

4.9 Environmental Justice

The United States Environmental Protection Agency ("EPA") provides guidance for considering the principles of Environmental Justice for new development. The EPA defines Environmental Justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. DESC fully believes in the principles of Environmental Justice in evaluating the impact of new transmission lines in its service territory and has applied these principles to this project even though the existing corridor was originally built in the 1950s and population growth has occurred along the corridor since that time. One of the first steps in assessing fair treatment is to identify the population that is currently around the existing right-of-way that the Project Lines could potentially impact.

DESC utilized the EPA's EJSCREEN tool to identify Block Groups and their corresponding demographic indicators within 1,000 feet of the Project Lines' route. EJSCREEN is based on nationally consistent data from census and other sources. DESC found 11 different block groups within the 2,000-foot route corridor each with its unique demographic indicators. Based on the results of EJSCREEN, Chart 4.9-1 shows these 11 block groups and identifies the percentages of minority populations and low income populations within this route corridor. Minority populations are defined as all people that are not Non-Hispanic White Alone, and low income is defined as less than or equal to twice the federal poverty level.

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Chart 4.9-1 Demographic Indicators within 1,000 feet of the Project Lines' Route

Block Group ID	Population	Demographic Indicator	Value	Acres
1	1,234	Minority Pop Low Income Pop	23% 15%	904
2	2,087	Minority Pop Low Income Pop	67% 51%	1,482
3	2,438	Minority Pop Low Income Pop	28% 28%	749
4	3,342	Minority Pop Low Income Pop	33% 15%	272
5	1,864	Minority Pop Low Income Pop	18% 35%	259
6	2,937	Minority Pop Low Income Pop	26% 29%	100
7	2,187	Minority Pop Low Income Pop	21% 1%	147
8	3,819	Minority Pop Low Income Pop	11% 20%	904
9	4,311	Minority Pop Low Income Pop	18% 22%	1,407
10	2,629	Minority Pop Low Income Pop	22% 29%	34
11	605	Minority Pop Low Income Pop	57% 22%	94

A block group is the lowest level of granularity for which accurate demographic data is available. Any block group that touched the route corridor was included for analysis. The population of the block groups in Chart 4.9-1 represents the entire population both within and outside the route corridor and does not represent the amount of people within the route corridor. The acres in the above table show the geographic size of each block group that is within the route corridor.

The average minority population for a typical block group in South Carolina is 36% according to EJSCREEN, and the average low-income population for a typical block group in South Carolina is 37%. Considering these typical percentages, DESC has determined based on EPA guidance that any block group that is in the upper quintile of minority or low-income would represent a more predominantly minority or low-income population.

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5.0 Consequences of the Proposed Action

As discussed in Section 2.1, except for 4.9 acres required to augment the existing right-of-way, the Project Lines will be built entirely within existing, cleared DESC right-of-way that has been in place since the 1950s.

This chapter describes short- and long-term effects to environmental resources, land use, cultural resources and scenic resources that may occur resulting from the construction and operation of the Project Lines. An array of environmental, cultural resource, land use and scenic data were collected from various local, state and federal agencies and developed from field studies to support the findings presented in this chapter. The data were organized into GIS data layers and mapped for the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie data collection and analysis area, which includes the geographic area extending outward as far as 1.25 miles on each side of the centerline of the future Project Lines for the analysis of cultural resources and 1.0 mile for analysis of rare, threatened, endangered and protected species. The potential effects to other resources were analyzed for an area extending outward 1,000 feet from the future lines and/or the area within the existing or new DESC right-of-way in which the Project Lines will be located.

As illustrated in the subsequent sub-sections, the short- and long-term impacts to environmental, cultural, land use and scenic resources, if any, as a result of the construction and operation of the Project Lines are anticipated to be negligible.

5.1 Land Use

DESC collected and mapped existing and future land use data in the immediate vicinity of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie Lines' route (*Figure 5.1-A*). Typically, the most significant effect to land use resulting from construction of electrical transmission lines is the permanent restriction on building erection, timber production and other uses within the right-of-way that could interfere with the reliable, safe operation of the lines. Considering the approximate 17.5 miles of the lines that will be built in the existing DESC rights-of-way between Urquhart Junction and Santee Cooper Interconnection Point, those restrictions have been in effect since the original easements were secured in the 1950s. Similarly, the additional 0.3 miles of right-of-way to be acquired, will require the clearing of some mixed hardwood-pine that is adjacent to the aforementioned existing DESC right-of-way; therefore, the Project Lines will have very minimal effect on existing land use.

Permitted uses in the right-of-way include pastures, crop production, roads, driveways, parking lots, walking trails and many other uses that will not interfere with the safe, reliable

operation of the Lines. Chart 5.1-1 lists the acreages of current land uses within the right-of-way.

Chart 5.1-1 Land Use in the Project Lines' Right-of-Way

Land Use	Acres
Commercial – Paved Parking Lot	2.7
Farmland (Cropland, Pastures / Grassland / Hay Fields, and Community Garden)	20.3
Railroad Right-of-Way	0.5
Recreation	9.8
Road Right-of-Way	9.5
Water (River / Lake / Pond)	0.7
Utility (Toolebeck Substation Property)	0.8
No Identifiable Land Use (New Right-of-Way)	4.9
No Identifiable Land Use (Existing ROW; Other Than Routine Right-of-Way Management)	280.1

The locations of all occupied buildings within 1,000 feet of the Project Lines' route were digitized from aerial photography and field studies and compiled in a GIS database (*Figure 5.1-B*). Chart 5.1-2 displays the quantity of all occupied buildings (residential, commercial, industrial and institutional) that are present within various distance ranges of the Project Lines' route.

Chart 5.1-2 Proximity of Occupied Buildings to the Project Lines' Right-of-Way

Proximity of Buildings to the Lines	Quantity
Number of occupied buildings within 200' of the proposed Lines	77
Number of occupied buildings between 200' and 500' of the proposed Lines	278
Number of occupied buildings between 500' and 1000' of the proposed Lines	617
Total	972

With the exception of 4.9 acres, the Project Lines will be built entirely within existing, cleared DESC right-of-way that has been in place since the 1950s, prior to the majority of the surrounding development of buildings and current land uses, and the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will have no adverse effect on existing occupied buildings or their current uses.

5.2 Soils

Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts, and soils will be stabilized, as necessary, with vegetation as construction progresses over the length of the Project Lines' right-of-way. Earth grading activities will be limited, if any, due to the utilization of existing right-of-way and access roads. DESC will comply with the South Carolina Department of Health and Environmental Control Regulation 72-300 through 72-316 (June 28, 2002) and National Pollutant Discharge Elimination System (NPDES)

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regulations with all line construction operations and will employ seeding and erosion and sediment control measures that meet or exceed local, state, and federal requirements.

5.3 Prime Farmland and Farmland of Statewide Importance

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

Farmlands of Statewide Importance are soils that are, in addition to soils classified as prime farmland, important for the production of food, feed, forage, fiber, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 5.3-1 lists the acreage of Prime Farmland and Farmland of Statewide Importance that occur in the existing and proposed new right-of-way within which the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be built (*Figure 5.3*).

Chart 5.3-1 Prime Farmland and Farmland of Statewide Importance

Farmland Classification	Acres
Prime Farmland	63.0
Farmland of Statewide Importance	42.9
Not Prime Farmland or Farmland of Statewide Importance	223.5

Disturbance to prime farmland soils and soils associated with farmland of statewide importance that will result from construction of the Project Lines will be de minimis since no new access roads are likely to be required and limited to no grading will occur that would disturb the "plow layer." Assuming new structures will be installed at an average spacing of 600 feet over the approximate 17.8-mile route, the number of new structures placed in prime farmland soils and soils of statewide importance will be approximately 43 over the portion of the Project Lines' route

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where prime farmland soils and soils of statewide importance are present. Assuming six-foot diameter holes will be augured to install these structures, the total area of impact to prime farmland soils and soils of statewide importance resulting from construction of the Project Lines will be approximately 1,215 square feet.

5.4 Wetlands and Stream Buffers

Wetlands are defined by 33 CFR Part 328 and protected by Section 404/401 of the U.S. Clean Water Act. Based on wetland surveys and delineations conducted in September and October 2019 by PEC, approximately 12.2 acres of wetlands and approximately 0.8 acres of open water reside in the existing and proposed right-of-way within which the Project Lines will be built. Also, approximately 1,160 linear feet of stream channels are present in the right-of-way (*Figure 5.4-A* and *Figure 5.4-B; Appendix B*).

No structures will be placed in open water or streams, and only one navigable water (Shaw Creek) will be crossed by the Project Lines. To the extent practical, DESC will design the Lines to span wetlands; however, in the unlikely event a structure is required within a wetland, access to it for construction purposes will be accomplished on fiberglass or wooden mats, and no permanent roads will be constructed in the wetlands. Because no filling or clearing will occur in wetlands or stream buffer zones, no permanent wetland or stream impacts will result from construction and operation of the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie.

Chart 5.4-1 lists all hydrological resources within the Project Line's right-of-way.

Chart 5.4-1 Wetlands and Stream Buffers within the Project Lines' Right-of-Way

Hydrological Resource Type	Acres
Acres of river, stream, lake, or pond in the right-of-way	0.9
Acres of wetland in the right-of-way	12.2
Acres of wetland in the right-of-way within which vegetative clearing will be required	0
Acres of upland within the right-of-way within 100' of any stream, river, lake, pond, or wetland	9.3
Acres of upland within the right-of-way within 100' of any stream, river, lake, pond or wetland that will require vegetative clearing	0.2

PEC requested the United States Army Corps of Engineers ("USACE") grant a "Preliminary Jurisdictional Determination" that will confirm and approve PEC's October 29, 2019 submittal including the findings regarding the locations and quantities of wetlands, waters (perennial streams), and open waters in the existing right-of-way within which the Project Lines will be built (*Figure 5.4-A and Figure 5.4-B*; *Appendix B*). As of the date of this report, the USACE has not issued a Preliminary Jurisdictional Determination in response to this request (USACE file number SAC-2019-01792).

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Because of the measures DESC takes to protect wetlands, stream buffer zones, streams and open waters during transmission line construction, minimal, if any, short-term and no long-term impacts to waters of the United States will occur. If, in the unlikely event a structure is required in a delineated wetland, DESC will construct the Project Lines under the provisions of Nationwide Permit No. 12 ("NWP 12") after filing a preconstruction notification ("PCN") with the USACE, which will define construction measures that will be taken to ensure compliance with NWP 12 requirements.

5.5 Flood-Prone Areas

DESC obtained the Federal Emergency Management Agency ("FEMA") National Flood Insurance Program maps for Aiken County, South Carolina, and added the data to the GIS database (*Figure 5.5*). Chart 5.5-1 summarizes the flood zones that will be within the Project Lines' right-of-way.

Chart 5.5-1 Flood Zones in the Project Lines' Right-of-Way

Flood Zone Classification	Acres
Zone AE - Floodway	1.1
Zone AE - 100-Year Flood Plain (Base Flood Elevations Determined)	8.1
Zone X - 500-Year Flood Plain; 100-Year Flood Plain (Less Than 1' Depth)	0.1
Zone X - Areas Determined to be Outside 500-Year Flood Plain	320.2

The U.S. Department of Agriculture, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used for the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will have no measurable effect on floodplain values where structures, if any, are required in floodplains, and the reliability of the Project Lines will not be affected by the portions of the Project Lines that will cross designated floodplain zones.

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5.6 Land Cover

An inventory of land cover in the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie right-of-way was conducted using 2017 U.S. Department of Agriculture aerial photography, field inspections, and results of the biological investigations within the right-of-way. ArcGIS, a geospatial data authoring system, was used to aggregate the various land cover into distinct classifications (*Figure 5.6*). Chart 5.6-1 lists the quantity and classifications of land cover in the Project Lines' right-of-way.

Chart 5.6-1 Land Cover in the Project Lines' Right-of-Way

Land Cover Classification	Acres
Barren	13.4
Cropland	19.4
Grass / Pasture	205.3
Mixed Hardwood / Pine Forest	4.4
Scrub / Shrub	65.4
Urban / Built-up	8.5
Water (Lake / Pond)	0.7
Wetland (Includes Stream Channels)	12.3

Since the existing right-of-way within which the Project Lines will be built is cleared, additional land clearing is not anticipated with the exception of potential isolated encroachments within the existing right-of-way. Additional right-of-way will be required in three locations along the route; approximately 1.2 acres between two of the intersecting corridors at Urquhart Junction, approximately 3.2 acres adjacent to the Toolebeck Transmission Substation where the new Toolebeck – Aiken 230 kV Tie will leave the substation and merge with the existing transmission line corridor, and 0.5 acres at the Santee Cooper Interconnection Point. Total tree clearing within new right-of-way will be less than 1.8 acres.

5.7 Wildlife

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that (1) all new transmission structures be equipped with design features that prevent raptor electrocutions. Such features typically include designs that make the distance between phase conductors greater than the wingspread of the bird

that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., overhead ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail, whichever is greater. The 230 kV structures that will be used on Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be "raptor safe" and will meet the guidelines recommended in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated as a result of constructing the Project Lines.

Construction of the Project Lines will have no measurable effects on wildlife or wildlife habitat, adverse or otherwise, since the Project Lines will be built almost entirely in existing, cleared right-of-way.

5.8 Rare, Threatened, or Endangered Resources

As discussed in Section 4.6, of this report, PEC conducted a protected species literature and records search in September 2019 to determine the presence of known occurrences of federally- and state-listed animal and plant species on or within a one mile of the right-of-way within which the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie will be located. The literature and records search revealed no known occurrences of state or federally listed species within one-mile radius of the right-of-way. However, coordination with SCDNR reflects that an occurrence of winter grape-fern (*Botrychium lunarioides,* ranked S1 by SCDNR) is located 0.5 mile from the right-of-way, though the specific location was not provided (*Figure 5.8*).

DESC engaged PEC to inspect the right-of-way to verify the presence or absence of state- and/or federal-listed threatened and endangered species, and none were found during a September – October 2019 field investigation along the existing or new right-of-way. However, potential habitat (i.e., soil, water, vegetative, sun/shade exposure and slope aspect conditions that would potentially support specific plant or animal species) that would likely support 22 listed species (3 animal species and 19 plant species) was found by PEC along the existing right-of-way.

Due to the absence of protected species in the existing and proposed right-of-way and, further, due to no changes in potential habitat for listed species except for a minor amount of vegetative clearing associated with maintaining existing right-of-way and associated with the additional right-of-way at Urquhart Junction, adjacent to the Toolebeck Transmission Substation, and at the Santee Cooper Interconnection Point, no adverse effects to protected species are

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anticipated as a result of construction and operation of the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie.

The results of the protected species records searches and field investigations are summarized in PEC's November 2019 report entitled *Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Toolebeck – Aiken 230 kV Tie and Segments of the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie and Associated Facilities Aiken County, South Carolina (Appendix B*).

5.9 Cultural Resources

As discussed in Section 4.7, DESC engaged Brockington to conduct background research to identify all previously recorded archaeological and historic resources within in 1.25 miles of the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie route. Moreover, the scope of Brockington's work included a windshield reconnaissance survey to identify any previously unrecorded individual architectural, multi-property and/or district architectural resources within 1.25 miles of the Project Lines' route that appear potentially eligible for listing in the National Register of Historic Places ("NRHP") (*Figure 5.9*). DESC also engaged Brockington to conduct a Phase I archaeological investigation in the existing right-of-way within which the Project Lines will be built. The purpose of the Phase I investigation was twofold. First, it was to conduct extensive background research to determine the presence of previously recorded archaeological sites within 1.25 miles of the proposed Project Lines' route and confirm their current NRHP eligibility status. The second purpose was to conduct a comprehensive Phase I archaeological investigation in the existing and new right-of-way within which the Project Lines will be built to determine the presence, if any, of previously unrecorded archaeological resources and recommend the NRHP status of any discovered. The Phase I investigation was conducted in conformity to the standards set out in the S*outh Carolina Standards and Guidelines for Archaeological Investigations* and in accordance with *Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470).*

Before commencing the Phase I archaeological investigation, Brockington conducted background research that included a review of ArchSite program data maintained by the South Carolina Institute of Archaeology and Anthropology ("SCIAA"). These online Geographic Information Systems enable researchers to quickly determine if cultural resources surveys have been conducted in specific areas and if any cultural resources and/or historic properties have been previously recorded in the specified area. Chart 5.9-1 includes a listing and description of

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the 31 sites within 1.25 miles of the Project Lines' route that Brockington identified while conducting background research.

Chart 5.9-1 Previously Recorded Archaeological Sites within 1.25 Miles of the Project Lines' Route

Site Number	Site Description	NRHP Eligibility (SHPO Records)
38AK1091	Historic	Not Eligible
38AK0043	Prehistoric	Potentially Eligible
38AK0484	Prehistoric/Historic	Potentially Eligible
38AK0485	Prehistoric	Potentially Eligible
38AK0486	Prehistoric	Potentially Eligible
38AK0504	Prehistoric/Historic	Not Eligible
38AK0505	Prehistoric/Historic	Not Eligible
38AK0506	Historic	Not Eligible
38AK0507	Historic	Not Eligible
38AK0508	Historic	Not Eligible
38AK0509	Historic	Not Eligible
38AK0510	Prehistoric/Historic	Not Eligible
38AK0511	Historic	Not Eligible
38AK0512	Historic	Not Eligible
38AK0621	Prehistoric/Historic	Potentially Eligible
38AK0622	Historic	Potentially Eligible
38AK0623	Historic	Potentially Eligible
38AK0624	Historic	Potentially Eligible
38AK0625	Historic	Potentially Eligible
38AK0626	Historic	Potentially Eligible
38AK0627	Historic	Potentially Eligible
38AK0628	Historic	Potentially Eligible
38AK0629	Historic	Potentially Eligible
38AK0630	Historic	Potentially Eligible
38AK0631	Historic	Potentially Eligible
38AK0632	Historic	Potentially Eligible
38AK0634	Historic	Not Eligible
38AK0635	Prehistoric/Historic	Not Eligible
38AK0636	Historic	Not Eligible
38AK1003	Historic	Not Eligible
38AK1016	Historic	Not Eligible

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Brockington determined that none of the previously recorded 31 archaeological sites will be directly or indirectly affected by construction of the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie because none are located within the existing or new DESC right-of-way.

After completing the background research, Brockington conducted the Phase I archaeological investigation in the existing right-of-way within which the Project Lines will be located from September 2 to October 18, 2019. The investigation included shovel test excavations at 30-meter intervals that led to the identification of one previously unrecorded archaeological resource, Isolate 1, within the existing right-of-way of the Project Lines' route (*Appendix C*). Chart 5.9-2 provides information about the previously unrecorded archaeological sites and isolated finds.

Chart 5.9-2 Archaeological Sites and Isolated Finds within the Project Lines' Route

Site Number	Site Description	Temporal Range	NRHP Eligibility
Isolate 1	Historic artifact scatter	1820-1940	Recommended Not Eligible for listing on the NRHP

In summary, none of the 31 previously recorded archaeological sites within 1.25 miles of the Project Lines' route will be affected by the project. According to Brockington, isolated finds are generally not eligible for the NRHP, and the context of the isolate find within the Project Lines' right-of-way do not support an argument for recommending it otherwise. Their field survey identified conditions not optimal for intact archaeological sites, including that most of the project corridor has been disturbed by development with some areas situated in low-lying drainages with hydric soils. Brockington, therefore, determined that the project will have no adverse effects on archaeological resources in the existing or new right-of-way of the proposed Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie. Brockington submitted the findings of Phase I archaeological investigation to the State Historic Preservation Office ("SHPO") in a report entitled *Phase I Archaeological Resources Survey for the Toolebeck – Aiken 230 kV Tie and a Portion of the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie and Associated Facilities,* dated December 2019. As of the date of this report, the South Carolina SHPO has not issued a letter of concurrence in response to this submittal.

Based on the findings of Brockington's Phase I archaeological investigation, inadvertent discoveries of cultural materials during construction are unlikely; however, such discoveries cannot be discounted. For that reason, all construction supervisory personnel will be given "cultural materials recognition" training designed to facilitate immediate recognition of possible

cultural materials that may be unearthed during construction of the Project Lines (primarily when auguring holes to set new structures). The supervisors will be instructed to stop construction activities in any specific area where unearthed material appears to be cultural material and to contact a designated person who will arrange an inspection of the suspected cultural material by a qualified expert. Construction shall not resume in such areas until the suspected cultural material is determined to be insignificant or DESC and the SHPO have agreed on an action plan that will allow construction to resume.

Given the systematic approach DESC has executed to date and will exercise during construction of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie to identify and protect cultural resources, no adverse impacts are anticipated.

Regarding architectural properties, Brockington recommended that the visual effects of the Project Lines be considered and, when possible, avoid where the construction will result in adverse effects to viewsheds of any NRHP listed or NRHP eligible resources (a total of six resources, five eligible and one unevaluated, previously identified by Brockington). Pursuant to this recommendation to consider, Pike, working closely with Brockington on DESC's behalf, conducted a viewshed analysis to determine specific locations within 1.25 miles of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie route where views of the future Project Lines may be possible. The analysis, which is described in a report prepared by Pike entitled *Historic Structures and Visual Impact Assessment Report for the Toolebeck – Aiken 230 kV Tie and Segments of the Graniteville #2 – Toolebeck 230 kV and Toolebeck – South Augusta 230 kV Tie and Associated Facilities* (*Appendix D*), was based on conservative assumptions regarding locations and heights of the new 230 kV transmission line structures that will be utilized. Computer modeling was completed based on the top elevation of each new line structure, taking into consideration topography and vegetation. This exercise yielded mapping for each of the NRHP eligible (5) and NRHP Potentially Eligible (1) resources (a total of six resources) that indicated the probability, or lack thereof, that views of the Projects Lines would be possible from the individual resources. Following the computerized view probability analysis, Pike visited each of the six resources that were analyzed in the viewshed analysis to confirm the accuracy of the predicted probability. Of the six resources assessed during the Visual Impact Analysis, it was determined that none of them will have potential views of the future Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie.

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5.10 Visual Resources

The visual implications of transmission lines are influenced by several factors. These include the distance from the viewer, the number of structures viewed, whether visible structures are seen against backdrops (vegetation, terrain, man-made elements) or silhouetted against the skyline, the extent to which foreground and mid-ground elements will provide screening, the amount of vegetative modification which contrasts with surrounding landscapes, and the overall scenic condition (landscape content or context) of the area in which the facility is seen. The potential visual implications of the future Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie were carefully evaluated, which included field studies to determine where the future Project Lines may be visible (*Figure 5.10*). The Project Lines will have very low overall visual effects to the project area for the following reasons:

1. With exception of only 0.2 miles of new right-of-way clearing, the Project Lines will be built within an existing DESC right-of-way and will, therefore, not pose any significant visual modifications resulting from right-of-way clearing;
2. The Project Lines will share an existing DESC right-of-way, parallel, or be adjacent to existing DESC, Santee Cooper, or Central Electric transmission lines for the Project Lines' entire length; and,
3. Significant portions of the Project Lines' route will traverse undeveloped areas where existing trees on each side of the right-of-way will provide significant screening or areas where the encroaching adjacent development has retained a vegetative buffer along the existing transmission corridor.

5.11 Population and Socio-Economic Factors

Population distribution and density was modeled as a GIS data layer along the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie route based on Year 2010 Census data (*Figure 5.11-A*). The analysis of the census data provides insight into the Project Lines' route regarding population center avoidance. As previously stated, the existing corridor was established in the 1950s, and population growth has developed since that time around the current corridor. Virtually all of the future Project Lines' length (97.79%) will reside in areas where the acres-per-person ratio is greater than one acre per person. Over half of the Project Lines' route resides in areas where the acres-per-person ratio is greater than four acres per person, and almost a third of the Lines' route will be in areas where the acres-per-person ratio is greater than ten acres per person.

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Chart 5.11-1 displays incremental lengths of the future Project Lines that will pass through various population density zones.

Chart 5.11-1: Population Density along the Project Lines' Route

Population Density Area (Acres per person)	Lines' Route Length in the Population Density Zone (Approximate Miles)
< 0.25 Acres per Person	0.0
0.251 – 0.5 Acres per Person	0.8
0.51 – 1 Acres per Person	1.1
1.1 – 2 Acres per Person	2.3
2.1 – 4 Acres per Person	2.3
4.1 – 10 Acres per Person	4.3
> 10 Acres per Person	6.9

Minority and low income population percentages were also modeled as a GIS data layer along the Project Lines' route based on EJSCREEN data (*Figure 5.11-B*). The analysis of this data provides insight into the Project Lines' route regarding Environmental Justice and avoiding a disproportionate share of negative environmental consequences on any one group of people based on race, color, national origin, or income.

The only block group that is in the highest quintile of predominately low-income and/or minority is Block Group 2, which is in the 85th percentile for minority population. This accounts for only 23% of the Project Line's route, which affirms that there has been fair treatment of all people regardless of minority or income status and that the Project Lines will achieve an equitable distribution of benefits and burdens from the environmental consequences of building the new lines.

5.12 Aviation

Federal Regulations, Title 14-Chapter 1-Subchapter E-Part 77 (Safe, Efficient Use, and Preservation of the Navigable Airspace) establishes standards for protecting navigable airspace and sets forth requirements for Federal Aviation Administration ("FAA") notification of proposed construction that could potentially affect the navigable airspace. Specifically, the notification "triggers" set out in Part 77 that are, or possibly could be, applicable to construction of transmission lines include the following:

1) If requested by the FAA, or if any of the following types of construction or alteration are proposed, a notice must be filed with the FAA:
   a) Any construction or alteration that is more than 200 feet above ground line at its site.

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b) Any construction or alteration that exceeds an imaginary surface extending outward and upward from the aviation facility at any of the following imaginary surface slopes:
   i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway more than 3,200 feet in actual length, excluding heliports.
   ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway no more than 3,200 feet in actual length, excluding heliports.
   iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport.

With these FAA notification triggers in mind, DESC identified no aviation facilities in the region surrounding the route of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie. Therefore, DESC has determined that FAA notification will not likely be required resulting from the constructing of the Project Lines. Nevertheless, upon completion of final transmission line engineering, DESC may submit a FAA Form 7460-1 to the FAA for selected transmission line structures to confirm that none will affect navigable airspace.

5.13 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air within the vicinity of the conductors of a transmission line. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-Hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor

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surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines and substations is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a "hissing" sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on current carrying conductors can also serve as sources of corona. Corona current carrying conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and rarely noticeable outside the transmission line rights-of-way or beyond the immediate vicinity of substations.

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

DESC's construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with the Lines' operation.

5.14 Safety

To provide for public safety and protection, DESC will design and construct the Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of design. DESC commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of the facilities.

5.15 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus, EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970s, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the

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possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

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

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

EMF levels drop sharply with increased distance from a power source. Dominion Energy, Inc. has published information prepared by the NIHES and National Institutes of Health (NIH) report titled, *Electric and Magnetic Fields Associated with the Use of Electric Power*, June 2002, listing the typical 60 Hertz magnetic field levels associated with 230 kV lines as shown in Chart 5.15-1.

Chart 5.15-1 Magnetic Field Levels Associated with 230 kV Lines

Location	Typical EMF Level Range
Under the Line	57.5 mG
Edge of Right-Of-Way	19.5 mG
50' From Edge of Right-Of-Way	7.1 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. Chart 5.15-2 shows typical magnetic field strength ranges for certain appliances as published by Dominion Energy, Inc.

Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South

Augusta 230 kV Tie are expected to have magnetic field levels, at the locations shown, within the ranges depicted in Chart 5.15-1. DESC is committed to supplying electricity in a responsible and safe manner. No federal, state, or international agency, including the Virginia Department of Health, World Health Organization, and European Commission's European Health Risk Assessment Network on Electromagnetic Fields Exposure, has conclusive evidence that exposure to low-frequency electric and magnetic fields – from household electrical sources including power lines – at the levels typically found in our communities is causally associated with any health hazards. As shown in both Chart 5.15-1 and Chart 5.15-2, electric and magnetic fields rapidly decrease in intensity as distance from the electrical source increases.

Chart 5.15-2 Magnetic Field Levels Associated with Common Appliances

Appliance	Distance from the EMF Source		
	6 Inch	1 Foot	2 Feet
Refrigerator	2 mG	2 mG	1 mG
Electric Range	30 mG	8 mG	2 mG
Electric Razor	100 mG	20 mG	*
Hair Dryer	300 mG	1 mG	*
Electric Can Opener	600 mG	150 mG	20 mG
Computer Terminal	14 mG	5 mG	2 mG
Vacuum Cleaner	300 mG	60 mG	10 mG

* At or below background levels

5.16 Ozone

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

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765 kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The Toolebeck – Aiken 230 kV Tie, Graniteville #2 – Toolebeck 230 kV, and Toolebeck – South Augusta 230 kV Tie should not produce any detectable amount of ozone under any operating condition, and thus will have no adverse effect on environmental quality.

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APPENDIX A

REFERENCES AND DATA SOURCES

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APPENDIX B

BIOLOGICAL ASSESSMENT REPORT

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APPENDIX C

CULTURAL RESOURCES REPORTS

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APPENDIX D

HISTORIC STRUCTURES VISUAL IMPACT ASSESSMENT REPORT

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