APPENDIX D
SUPPLEMENTAL ANALYSIS ON PRIVATE LANDS

McClellanville
115-kV Transmission Line Project

SUPPLEMENTAL ANALYSIS ON PRIVATE LANDS

FINAL REPORT

Prepared for Central Electric Cooperative Inc.

Prepared by WSP USA

July 2024

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INTRODUCTION

Central Electric Power Cooperative, Inc. (Central Electric or the Applicant) proposes to construct and maintain a new 25.8-mile, 115-kilovolt (kV) transmission line between the existing Jamestown Substation and a new Berkeley Electric Cooperative, Inc. (Berkeley Electric) McClellanville Substation near the town of McClellanville, South Carolina. The proposed McClellanville transmission line would address system capacity, system reliability, human safety, and power quality issues in the McClellanville service area.

The draft Final Environmental Impact Statement (EIS) for the McClellanville 115-kV Transmission Line Project identifies the Jamestown corridor as the preferred alternative after extensive studies of various corridors by Central Electric (2005a, 2005b, 2010a, 2010b) and after the consideration of alternative technology solutions (Burns & McDonnell 2020, 2022). This alternative is preferred over the Charity corridor, which is also analyzed in the EIS, because it is shorter and would have demonstrably fewer environmental impacts (McGavran 2017). The Belle Isle corridors, which are evaluated in the supplemental EIS, were eliminated from further consideration due to public opposition and extensive technical and financial reviews of potential corridors.

Approximately 70 percent of the Jamestown and Charity corridors would cross National Forest System (NFS) lands managed by the Francis Marion National Forest (FMNF), and 30 percent would cross private lands. To further avoid and minimize impacts, the Jamestown corridor needs to be refined in areas where it would cross private lands. The goal of this effort is to refine the proposed corridor to include a limited set of alternative corridors across private lands, in accordance with the United States (U.S.) Department of Agriculture, Rural Utilities Service (RUS) guidance (RUS 2016). [1] This report summarizes the efforts and findings of the supplemental analysis of alternative corridors on private lands for the McClellanville 115-kV Transmission Line Project.

The proposed transmission line would cross four census block groups in Berkeley and Charleston counties that contain both impoverished and minority environmental justice populations. Although these populations could benefit from improved electricity reliability and power quality, the transmission line could adversely affect residents if it were located close to their homes. Consequently, potential environmental justice impacts are a key consideration for this routing across private lands.

STUDY AREA AND ALTERNATIVE CORRIDORS

Study Area Delineation

The first step of this routing study was to define the study area. There are three locations with concentrations of private lands (study areas) where additional routing analysis is necessary for the Jamestown alternative. These study areas are referred to as: (1) Jamestown, (2) Honey Hill, and (3) McClellanville. For each study area, a boundary was delineated between a set of endpoints located at points of exit/entry to NFS lands. Central Electric reviewed the boundaries of each study area and confirmed them to be large enough to include an adequate number of alternatives but small enough to encompass only feasible alternatives. Figure 1 shows the locations of the three study areas.

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1 This routing effort is focused on the Jamestown corridor but is also applicable to the Charity corridor, an alternative analyzed in the EIS, where both corridors would share an alignment between the McClellanville Substation and the 230-kV right-of-way. Refinement of the proposed Charity corridor across private lands is otherwise not necessary because it would parallel an existing 230-kV right-of-way for approximately two-thirds of its length, from near Honey Hill to the Charity Substation.

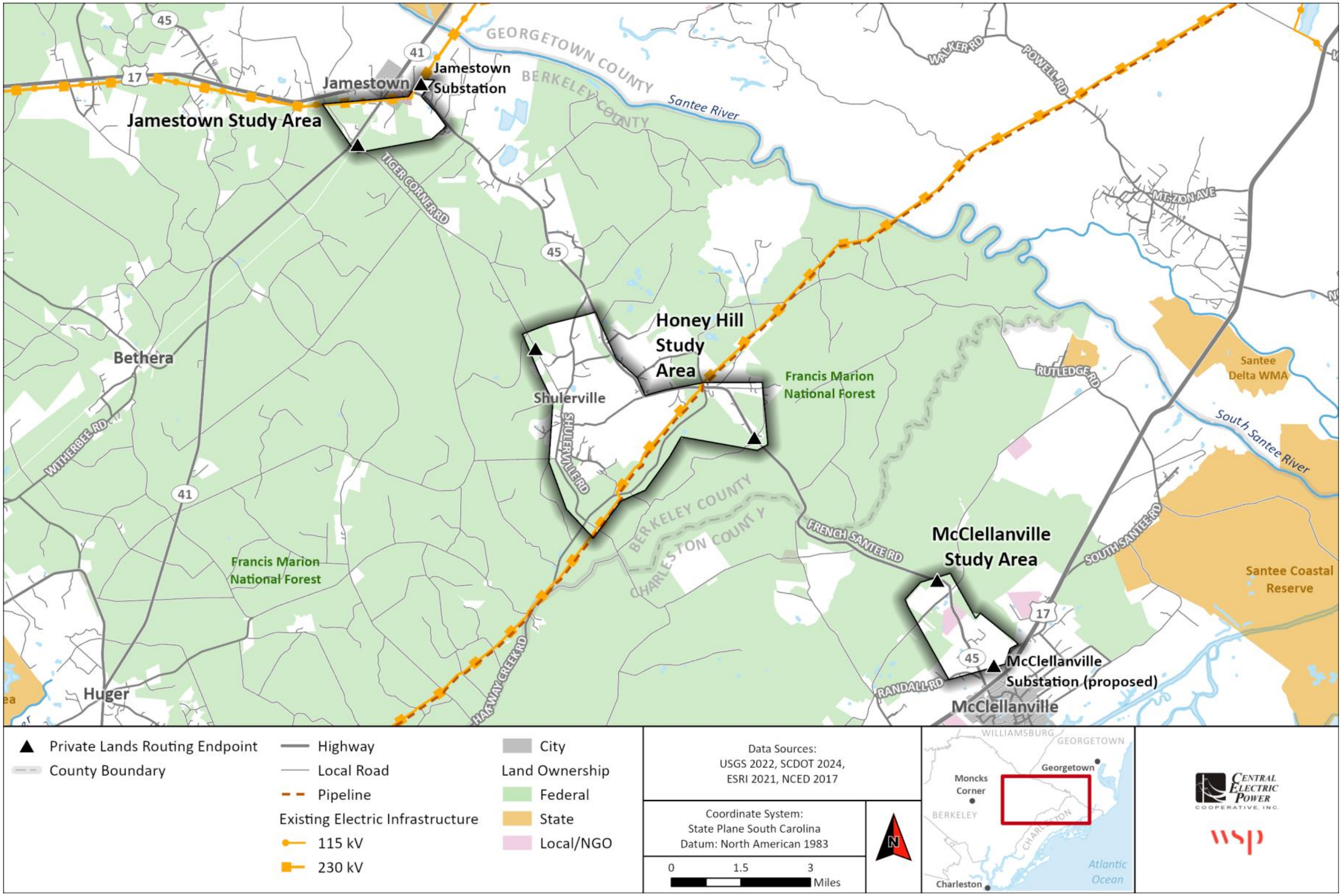


Figure 1. Study areas

Alternative Corridor Identification

After defining the study area, the routing team (comprising staff from WSP and Central Electric) identified potentially feasible transmission line corridors within the study area and eliminated those that are not practicable or demonstrated unacceptable adverse impacts due to certain constraints. At these initial stages, no property owner information was reviewed and only parcel boundaries were considered to remain impartial to individual parcel ownership.

A total of 103 study segments were identified between common intersection points, in locations following roads and other existing linear rights-of-way (ROWs), along parcel boundaries, or crossing open areas in locations with no apparent constraints. Each segment was assigned an identification number. The next step focused on eliminating segments that were identified as avoidance areas that are not suitable for locating an overhead electric transmission line. WSP USA Inc. (WSP) and Central Electric conducted a series of three working meetings to review and refine these segments, which were either deleted or adjusted where feasible, based on the following avoidance criteria:

- Avoid areas that would cross unevaluated NFS lands.
- Avoid buildings, especially residences, commercial buildings, churches, cemeteries, and emergency services.
- Avoid known cemetery parcels, historic structures and archaeological sites eligible for the National Register of Historic Places.
- Avoid or minimize severing land under common ownership to avoid uneconomical remnants.
- Avoid radio and communications towers, incompatible public infrastructure, and other utilities.

The routing team reviewed increasingly detailed information about each segment to confirm the absence of the above avoidance criteria or to modify segments by avoiding such challenging routing factors. Central Electric deemed 59 of the 103 study segments as not posing any such prohibitive constraints. Figures 2, 3, and 4 show the segments carried forward for further evaluation in black, and the eliminated segments in red, for the Jamestown, Honey Hill, and McClellanville study areas, respectively. Table 1 lists the identification numbers of the 44 eliminated study segments and provides the justification for their dismissal (exclusionary factors or avoidance criteria). Table 1 also details the 16 modified study segments (of 59 carried forward for analysis) and the justification for those changes (avoidance criteria).

End-to-end alternative corridors were developed by linking the remaining study segments together to extend between the endpoints of each study area. In total, four end-to-end alternative corridors were carried forward for analysis in the Jamestown area, and six were carried forward in the McClellanville area. The Honey Hill study area was divided into two smaller subareas to simplify the evaluation (Shulerville and Honey Hill East), with 12 end-to-end alternative corridors carried forward for analysis in the Shulerville subarea, and six carried forward in the Honey Hill East subarea.

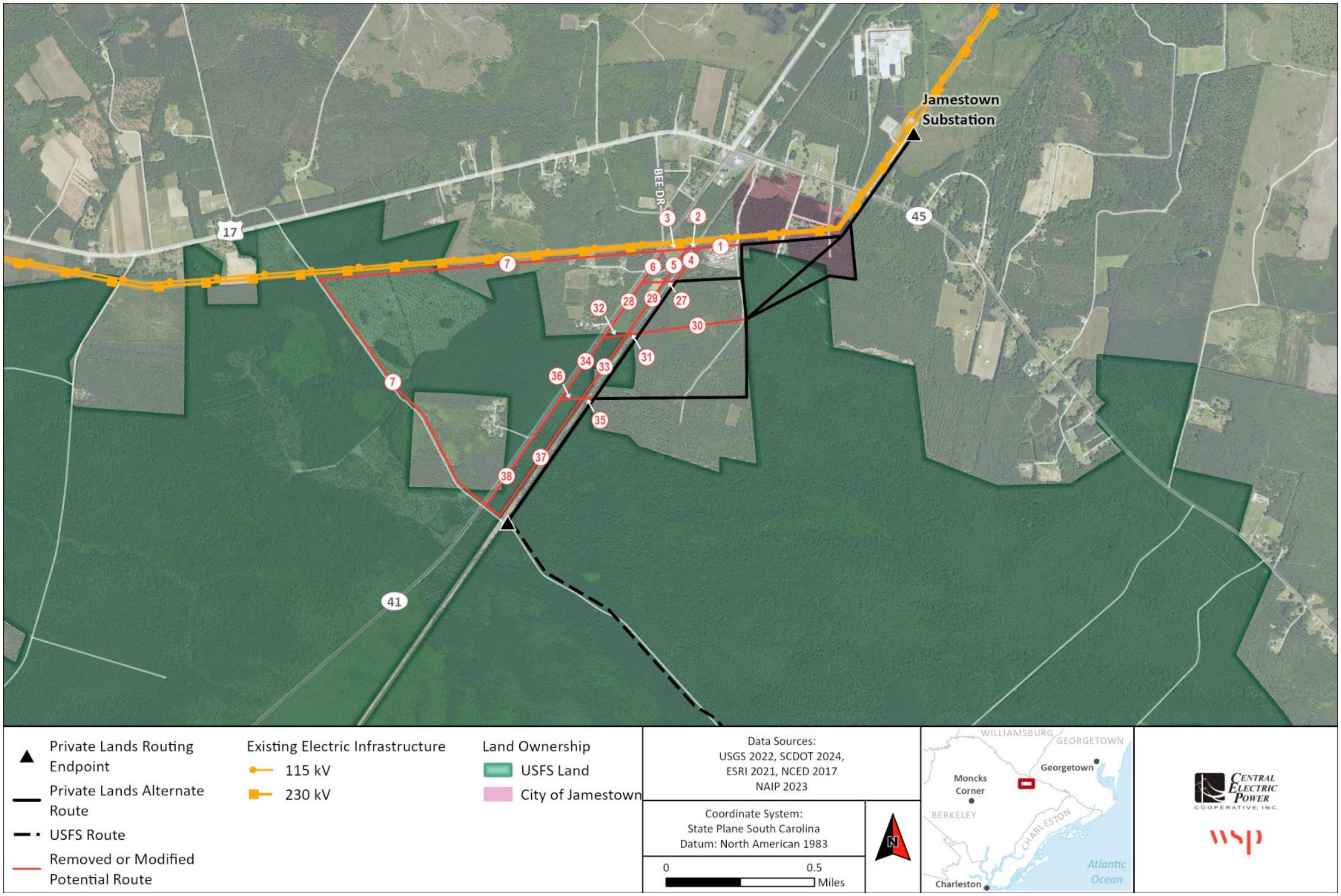


Figure 2. Study segments in the Jamestown study area carried forward for analysis (black) and eliminated from further consideration or modified (red)

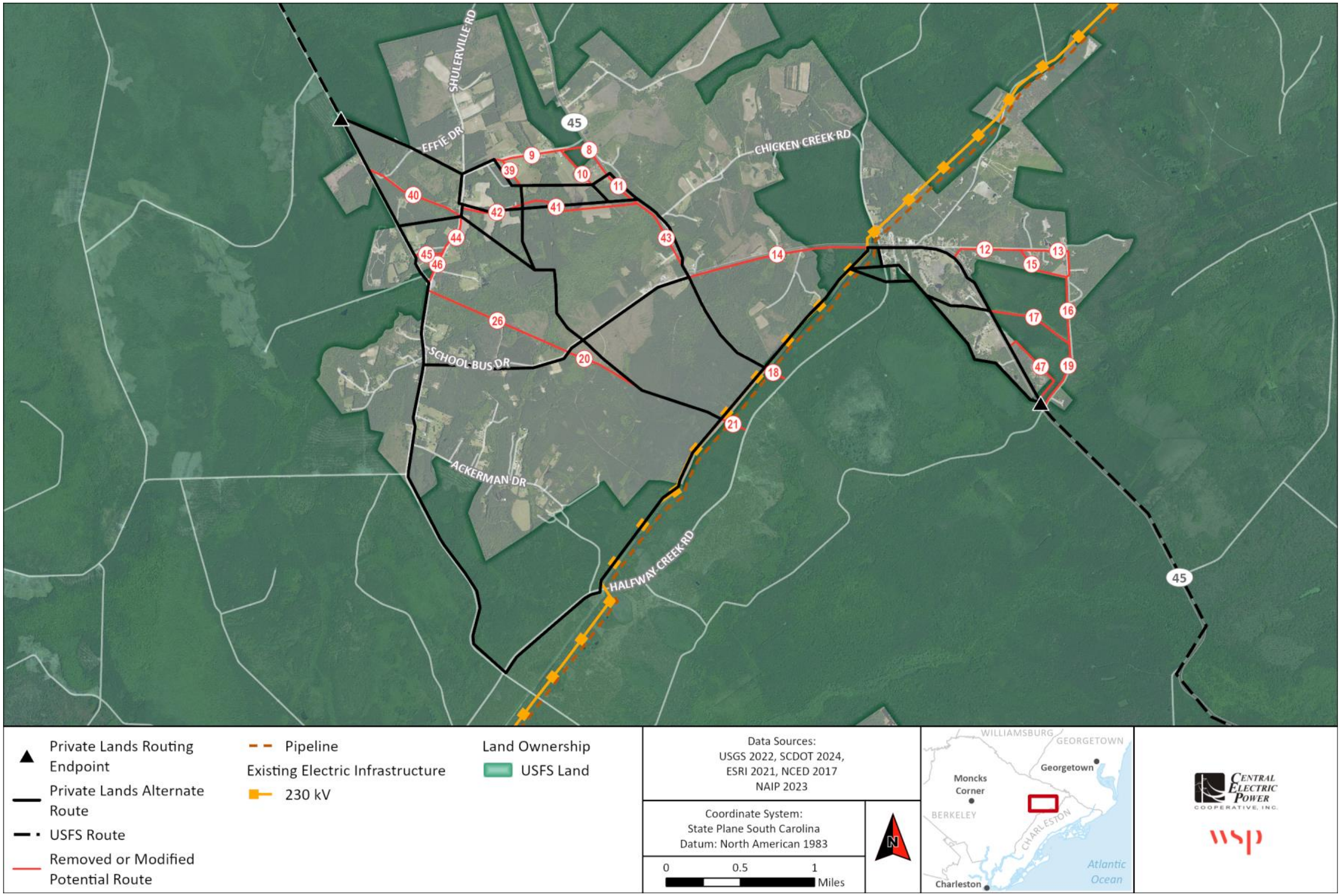


Figure 3. Study segments in the Honey Hill study area carried forward for analysis (black) and eliminated from further consideration or modified (red)

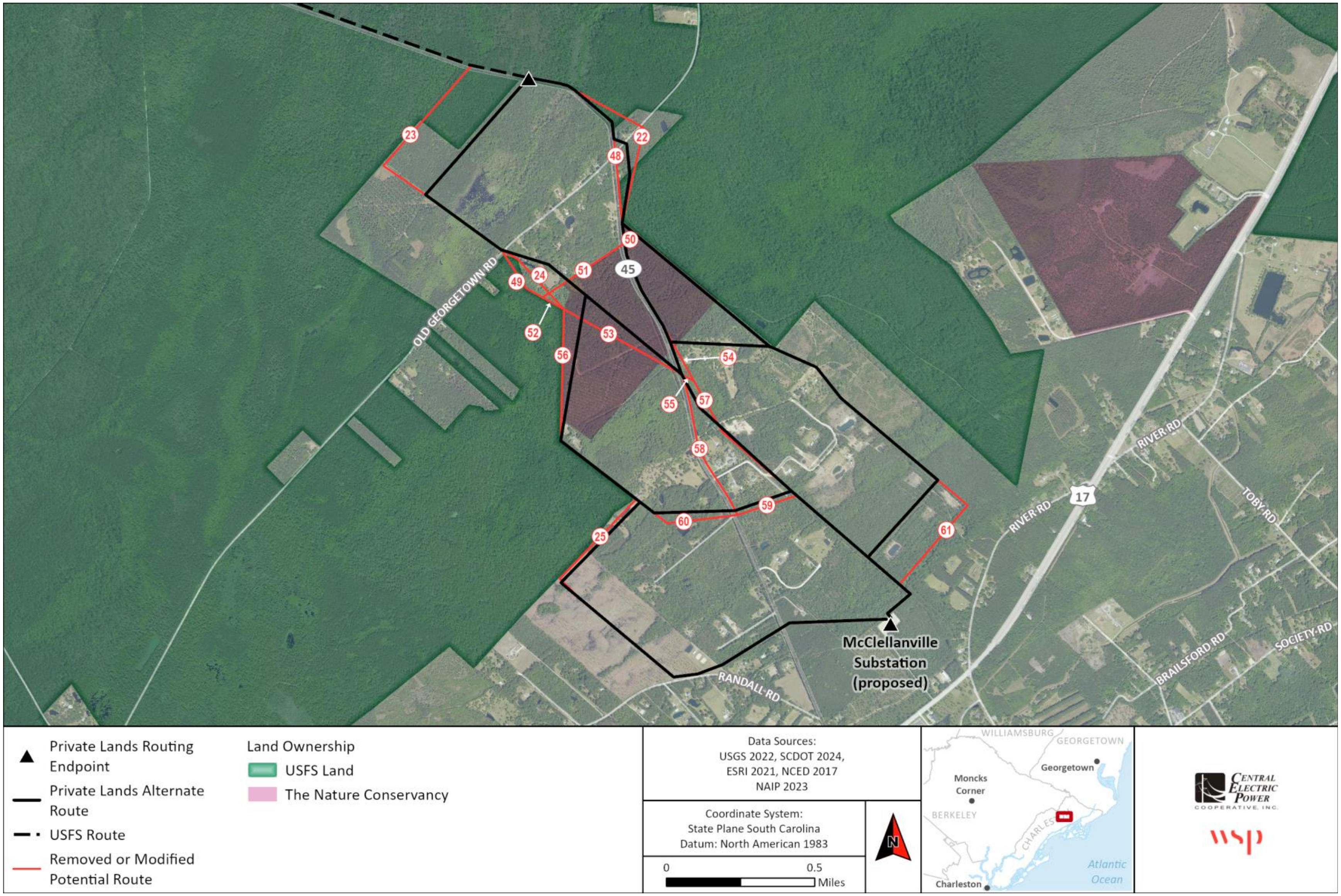


Figure 4. Study segments in the McClellanville study area carried forward for analysis (black) and eliminated from further consideration or modified (red)

Table 1. Justification for study segments eliminated from further consideration or modified and replaced by alternative segments

Study Segment ID	Justification for Elimination/Modification
Jamestown Study Area	
1	Eliminated – close to a sawmill
2	Eliminated – close to a sawmill
3	Eliminated – close to a sawmill
4	Eliminated – close to a sawmill
5	Eliminated – close to a sawmill
6	Eliminated – close to a sawmill
7	Eliminated – crosses unevaluated NFS lands
27	Eliminated – close to one red-cockaded woodpecker (RCW) cluster and railroad crossing
28	Eliminated – not usable without study segments eliminated due to RCW clusters
29	Eliminated – close to one RCW cluster and railroad crossing
30	Eliminated – crosses a very large wetland (>1,000 feet)
31	Eliminated – close to one RCW cluster and railroad crossing
32	Eliminated – not usable without study segments eliminated due to RCW clusters
33	Eliminated – close to one RCW cluster and railroad crossing
34	Eliminated – not usable without study segments eliminated due to RCW clusters
35	Eliminated – close to one RCW cluster and railroad crossing
36	Eliminated – not usable without study segments eliminated due to RCW clusters
37	Eliminated – close to one RCW cluster and railroad crossing
38	Eliminated – close to two RCW clusters
Honey Hill Study Area (Shulerville and Honey Hill East Subareas)	
8	Eliminated – crosses unevaluated NFS lands
9	Eliminated – crosses unevaluated NFS lands
10	Modified to avoid crossing unevaluated NFS lands
11	Eliminated – crosses close to buildings and no building on other side of road
12	Eliminated – dependent on other study segments that cross unevaluated NFS lands
13	Eliminated – dependent on other study segments that cross unevaluated NFS lands
14	Eliminated – crosses unevaluated NFS lands
15	Eliminated – dependent on other study segments that cross unevaluated NFS lands
16	Eliminated – crosses unevaluated NFS lands
17	Eliminated – crosses unevaluated NFS lands
18	Eliminated – crosses unevaluated NFS lands

Table 1 (Continued). Justification for study segments eliminated from further consideration or modified and replaced by other segments

Study Segment ID	Justification for Elimination/Modification
19	Eliminated – crosses unevaluated NFS lands
20	Modified to match node of route network
21	Eliminated – crosses unevaluated NFS lands
26	Eliminated – difficult crossing of Echaw Creek floodplain/wetlands
39	Modified to remove an angle and follow property boundaries
40	Modified (moved south and straightened) to avoid houses and reduce angles
41	Modified to straighten to avoid angles in wetland
42	Modified to straighten to avoid angles in wetland
43	Eliminated – close to Wesley A.M.E. Church and cemetery
44	Eliminated – very close to a house
45	Eliminated – very close to a house
46	Eliminated – very close to a house
47	Eliminated – very long wetland crossing and angle within the wetland, and close to a house
McClellanville Study Area	
22	Eliminated – crosses very long wetland and unevaluated NFS lands
23	Modified to avoid crossing unevaluated NFS lands
24	Modified to avoid impact to cultural site and stay on edge of small parcels
48	Eliminated – close to houses and visual impact to Wrens Chapel Methodist Church and cemetery
49	Modified to avoid points of intersection within archaeological site and wetlands
50	Eliminated – close to a house
51	Modified to avoid siting pole within archaeological site
52	Modified to avoid siting pole within archaeological site
53	Modified to avoid siting pole within archaeological site
54	Eliminated – no longer needed after adjustment of study segment to the south
55	Eliminated – no longer needed after adjustment of study segment to the south
56	Modified to avoid impact to cultural site and stay on edge of small parcels
57	Modified because wetland span is almost 900 feet and would require placement of pole in the wetland
58	Eliminated – front-yard residential impacts along highway
59	Modified to avoid points of intersection within wetlands
60	Modified to avoid points of intersection within wetlands
61	Eliminated – extensive wetland and floodplain crossing

Key Routing Considerations and Opportunities

The criteria considered for siting a transmission line includes routing opportunities (e.g., existing linear features) and routing constraints or sensitivities (elements of the human and natural environment that could conflict with the location of a transmission line). Opportunities are favorable conditions that can be leveraged because a transmission line would generally be considered a compatible land use, or the impacts of its presence would be reduced by an existing linear feature. Opportunities include existing linear infrastructure and compatible utility corridors, roads, rail lines, land cover edges (e.g., edges of forest clearings), and parcel boundaries. Constraints, on the other hand, include resources like regulated waters and protected species habitat, as well as limitations including the presence of existing infrastructure.

Based on the routing team's experience in previous successful transmission line studies, WSP and Central Electric discussed the criteria for identifying alternative corridors. Those criteria would require the proposed line, to the extent practicable, to:

- Maximize collocation with other linear features including compatible roads, existing electrical transmission and distribution lines, pipelines, and railroads.
- Consider paralleling property lines, land use breaks, and land cover edges.
- Minimize environmental impact and construction/maintenance costs by selecting shorter, direct routes.
- Avoid or minimize locating segments adjacent to or through existing residential development where no transmission line already exists.
- Avoid or minimize the severance of land under common ownership to reduce impacts on landowners and avoid the creation of uneconomical remnants.
- Maximize use of previously disturbed habitats and minimize use of areas with mature and/or unfragmented native vegetation.
- Avoid or minimize impacts to wetlands, floodplains, public lands, cemeteries, historic structures, archaeological sites, and threatened and endangered species habitat.
- Avoid or minimize river and surface water crossings where no crossing (road, railroad, transmission, or other utility crossing) already exists, or cross feature perpendicular to flow or in as narrow an area as possible.
- Avoid or minimize locating segments abutting schools and community facilities.
- Encourage location close to existing industrial and extractive land uses.
- Avoid locations with concentrations of older or historic buildings, traditional business districts, or known commercial businesses.
- Maintain adequate distance from registered public and private airports consistent with Federal Aviation Administration and other applicable State and county regulations.
- Minimize structure angles greater than 40 degrees (to reduce infrastructure, maintenance, and replacement costs and for a more resilient design).

WSP reviewed the transmission line routing considerations specified by RUS' (2015) *Design Manual for High Voltage Transmission Lines*. Central Electric provided examples of other recent routing studies, the EPRI-GTC (2006) *Overhead Electric Transmission Line Siting Methodology*, and a spreadsheet of its transmission line siting criteria. WSP used these resources to compile all readily available public geographic information system (GIS) datasets, satellite imagery, and aerial photos to explore land uses, land cover, and environmental conditions.

DESKTOP ANALYSIS OF RED-COCKADED WOODPECKER HABITAT

Background Information

The federally endangered red-cockaded woodpecker (RCW) is a habitat specialist, residing year-round in open, mature pine forests with open understories and lacking a dense midstory, such as those stands historically maintained by periodic wildfires and now promoted by mechanical, chemical, and prescribed fire treatments. The FMNF contains abundant RCW habitat and supports numerous RCW clusters (nesting sites). These clusters consist of multiple large pine trees with established nesting and roosting cavities that the birds excavate. Potential impacts to RCW or RCW habitat must be evaluated as part of the permitting process for the project. Specifically, RCW foraging and nesting habitat assessments are required in accordance with the U.S. Fish and Wildlife Service (2003) Recovery Plan for the RCW. This routing effort assesses RCW habitat to assist in avoiding it, and if it cannot be avoided, to determine the area of potential habitat within the proposed corridors.

RCW are associated with and dependent on pine savannas and forests with large-diameter pine trees, which they use for foraging and nesting. Historically, RCW habitat included fire-dependent longleaf pine (*Pinus palustris*) savannas with open understories dominated by a diverse community of forbs and grasses. Centuries of fire suppression in the southeast led to the conversion of open pinelands to hardwood forest with shrubby understories, and subsequently to the decline of RCWs.

The USFWS (2003) Recovery Plan provides a survey protocol in appendix 4, which classifies RCW habitat as follows:

- **Foraging habitat:** pine or mixed pine forests, woodlands, or savannas where 50 percent or more of the dominant trees are pine 30 years or older, regardless of understory condition. Pine trees with a diameter at breast height (DBH) of 10 inches or more serve as a proxy for 30-year-old trees; however, this varies based on establishment methods, management, and site growth conditions.
- **Nesting habitat**: pine or mixed pine forests that contain pines 60 years in age or older, which may be scattered or clumped within younger stands, also regardless of understory condition.

These characteristics do not necessarily describe good quality foraging and nesting habitat; rather, they provide a conservative description of suitable habitat (USFWS 2003).

Coarse-Scale Desktop Review

For an initial assessment of stands dominated by or codominant with pines, WSP used the ecosystem mapping provided by the U.S. Forest Service (USFS). Its classification of ecosystems was used for the 2017 FMNF Revised Land Management Plan and is based on the framework of ecological units (Cleland et al. 1997). These data were cross walked to the NatureServe U.S. Ecological Systems and Land Cover system descriptions (NatureServe 2009). Based on the systems descriptions, each ecosystem was classified as either potential RCW habitat or not RCW habitat. Table 2 presents the ecosystems mapped within the study area and whether they offer potential RCW habitat.

Fine-Scale Desktop Review

Areas classified as non-pine habitat were verified using historical aerial imagery, which WSP also used to determine stand age for the purposes of identifying suitable foraging and nesting habitat. Developed areas and stands visible as cleared of tree cover in 1999, or more recently, were classified as non-RCW habitat because the trees would be less than 30 years old regardless of species. Google Earth did not include imagery between 1994 and 1999, so 1999 was used as the cutoff for stands less than 30 years because stands cut in 1994 would be 30 years old in 2024. Stands were labeled with the year cleared in the imagery and/or as deciduous or developed. To identify RCW foraging habitat (i.e., pine stands between 30 and 60 years old), WSP biologists identified stands cut between 1964 and 1994 using Google Earth imagery from 1991; Charleston County historical aerial imagery from 1968, 1989, and 1994; and Berkeley County historical aerial imagery from 1969, 1989, and 1995. The remaining stands were assumed to be potentially 60 years or older in 2024 (not cut since 1964 at least). This is not entirely accurate because aerial imagery between 1964 and 1968/1969 was not available.

Table 2. Ecosystems mapped in the study area and whether they provide potential RCW habitat

Ecosystem	Pine Potentially Dominant or Codominant?
Wet Pine Savanna and Flatwoods (wet phase)	Yes
Upland Longleaf Pine Woodland (xeric to dry phase)	Yes
Upland Longleaf Pine Woodland (dry to dry-mesic phase)	Yes
Wet Pine Savanna and Flatwoods (mesic to wet phase)	Yes
Upland Longleaf Pine Woodland (dry-mesic to mesic phase)	Yes
Broad Nonriverine Swamp and Wet Hardwood Forest	Yes
Carolina Bay Cypress Wetlands	Yes
Depression Ponds	Yes
Peatland Pocosin and Canebrake	Yes
Mesic Slope Forest	Yes
Streamhead Seepage Swamp, Pocosin and Baygall	Yes
Maritime Forest	Yes
Narrow Nonriverine Swamp and Wet Hardwood Forest	No
Blackwater Stream Floodplain Forest (headwaters phase)	No
Small Blackwater River Floodplain Forest	No
Blackwater Stream Floodplain Forest (typic phase)	No
Tidal Wooded Swamp	No
Dry and Dry-Mesic Oak Forest	No
Salt and Brackish Tidal Marsh	No

RCW cluster locations documented by USFS and SC Department of Natural Resources (SCDNR) Heritage Trust Program (historic RCW clusters) were used to verify the accuracy of the desktop analysis and as an indicator of stands older than 60 years. Within a half mile of the evaluated corridors, only one known RCW cluster was located within a polygon classified as non-pine based on the FMNF ecosystem mapping; it was located on the edge of the non-pine polygon.

Results

In total, within the 600-foot-wide corridors carried forward, WSP biologists classified via desktop analysis approximately 1,424 acres of unsuitable RCW habitat (47 percent), 1,265 acres of potentially suitable RCW nesting habitat (42 percent), and 339 acres of potentially suitable RCW foraging habitat (11 percent). Following the field survey, the area of suitable habitat was determined to be substantially less, totaling 1,860 acres of unsuitable RCW habitat (61 percent), 1,012 acres of potentially suitable RCW nesting habitat (33 percent), and 156 acres of potentially suitable RCW foraging habitat (5 percent). Further detail on the RCW field survey and habitat mapping is provided below under "Field Survey."

ROUTING CRITERIA REFINEMENT

The routing team, WSP with Central Electric, identified the corridors to be carried forward for analysis. The criteria considered for siting the transmission line were refined to include only applicable routing constraints and opportunities. For consistency in the analysis, all metrics with a higher score are less suitable for siting a transmission line. For opportunities such as following existing infrastructure and property boundaries, the metrics were inverted; for example, the opportunity to follow existing infrastructure was measured by the metric "Length NOT parallel to an existing corridor (miles)."

Based on discussions with Central Electric and consultation with RUS, Table 3 lists the routing factors determined to be most important and indicates the assigned weights. For each routing factor, the table indicates whether it is calculated for the proposed transmission line centerline (segment), or within a 75-foot-wide buffer (ROW width) or a 600-foot-wide buffer (corridor width). Weights range from 1 to 10 and were determined through collaboration with Central Electric based on the routing team's experience and stakeholder input from past transmission projects in coastal South Carolina.

WSP created a matrix to manage calculations and assigned routing factors to six categories: (1) constructability/engineering, (2) water resources, (3) wildlife habitat, (4) cultural resources, (5) built environment, and (6) land use/land cover. Each corridor was scored based on the GIS data in accordance with Table 3, and the following discussion highlights the factors with weights greater than or equal to 7.

The following routing factors were determined to be most important (highest weight) for selecting the preferred corridor:

From an engineering and constructability perspective:

- Number of major angles (greater than 40 degrees)

From a water resources perspective:

- Area of wetlands and surface waters
- Number of wetland spans greater than 500 feet that require one or more poles within a wetland
- Area of forested wetlands (requiring clearing)
- Area of Echaw Creek floodplain
- Number of potential poles within the Echaw Creek floodplain
- Area of forests within 30 feet of wetlands (requiring clearing)

From a wildlife habitat perspective:

- Area of RCW nesting and foraging habitat

- Area of forested habitat
- Area of suitable habitat for threatened and endangered species

From a cultural resource perspective:

- Area of archaeological sites
- Number of historic structures

From a built environment perspective:

- Number of residences
- Length not parallel to an existing corridor

From a land use/land cover perspective:

- Area of NFS lands
- Area of The Nature Conservancy (TNC) lands

Table 3. Routing factors for evaluating alternative corridors, with weights range from 1 to 10 based on the importance of the metric to siting the transmission line

Routing Factor	Spatial Extent of Calculation			Weight
	Segment	75-ft Wide (ROW)	600-ft Wide (Corridor)	
Constructability / Engineering Requirements				
Length (miles)	X			2
Angles 0-15 degrees	X			1
Angles 15-40 degrees	X			2
Angles >40 degrees	X			7
Number of state highways crossings (count)	X			1
Number of county/local/USFS road crossings (count)	X			1
Number of railroads crossings (count)	X			1
Number of airports and runways within 8,000 feet (count)	X			1
Number of oil and gas pipeline crossings (count)	X			1
Number of communication towers within 1,000 feet (count)	X			1
Number of existing transmission line crossings (count)	X			1
Water Resources				
Area of surface waters (acres)		X	X	8
Area of wetlands (acres)		X	X	10
Number of wetlands crossed with span length >500 feet (count)	X			10
Area of PFO wetlands (acres)		X	X	10
Area of ROW with forest within 30 feet of wetlands or hydric soils (acres)		X		8
Area of ROW with forest within 31-100 feet of wetlands or hydric soils (acres)		X		4
Area of 100-year floodplain (acres)		X	X	10
Area of 500-year floodplain (acres)		X	X	5
Number of potential power poles required within 100-year floodplain crossings (count) required	X			10
Number of potential power poles required within 500-year floodplain crossings (count)	X			5
Wildlife Habitat				
Area of suitable nesting habitat for RCW (acres)		X	X	10
Area of suitable foraging habitat for RCW (acres)		X	X	8
Area of forest (acres)		X	X	8

Table 3 (continued). Routing factors for evaluating alternative corridors, with weights range from 1 to 10 based on the importance of the metric to siting the transmission line

Routing Factor	Spatial Extent of Calculation			Weight
	Segment	75-ft Wide (ROW)	600-ft Wide (Corridor)	
Area of National Wetland Inventory wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays (acres)		X	X	8
Cultural Resources				
Area of listed, eligible, or undetermined archaeological sites (acres)		X	X	10
Number of listed, eligible, or undetermined historic structures (count)			X	10
Number of cemeteries (count)			X	5
Built Environment				
Number of parcels (count)		X	X	4
Number of unique landowners (count)		X	X	5
Number of parcels <10 acres in size (count)		X	X	5
Length NOT parallel to an existing corridor (feet)	X			10
Length NOT parallel to an existing corridor (percent)	X			5
Number of residences (count)		X	X	10
Number of non-residential buildings (count)		X	X	3
Land Use/Land Cover				
Length within forest and NOT adjacent to land cover edges, existing corridors (openings), or parcel boundaries (miles)	X			5
Area of pavement and other impervious surfaces (acres)	X			5
Area of cropland crossed (acres)		X	X	3
Area of prime farmland crossed (acres)		X	X	3
Area of scrub/shrub thicket crossed (acres)		X	X	1
Area of barren/grass/pasture crossed (acres)		X	X	1
Area of Town of Jamestown parcels crossed (acres)		X	X	4
Area of NFS lands crossed (acres)		X	X	8
Area of FMNF recreation areas crossed (acres)		X	X	4
Area of TNC land crossed (acres)		X	X	7

FIELD SURVEY

WSP conducted a field survey of the proposed alternative corridors to provide information on the location and quality of potential nesting and foraging habitat for RCW (see above) and enhance understanding of local conditions and potential environmental constraints.

Methodology

Prior to the field survey, a field map was created using ArcGIS Online, which included the alternative corridor segments and the following layers to guide field navigation: aerial photographs, roads, land ownership, parcel boundaries, residences and other structures, RCW habitat potential identified from the desktop analysis, National Wetland Inventory (NWI) polygons, regulatory floodplain boundaries, and RCW clusters. These data were loaded into ArcGIS Field Maps and viewed on an iPad for field data collection. The Field Maps application, together with a Trimble R1 Global Positioning System (GPS) receiver, allowed WSP to update existing GIS data and collect additional of point, line, and polygon features.

WSP conducted roadside habitat ground-truthing surveys April 8–12, 2024, in the three study areas: McClellanville, Honey Hill, and Jamestown. The purpose was to determine, as much as practicable, if the forest stand conditions match those mapped in the desktop exercises. Field surveys were performed by two wildlife biologists, including a Registered Forester and Certified Wildlife Biologist, both who have performed numerous RCW surveys. The field surveys were limited to open public roads and public lands. Biologists drove all accessible roads, and walked in locations on NFS lands, viewing as much as possible of the proposed alternative corridors. In forested areas on private lands, the biologists were able to view approximately 75 feet into forest stands. A spotting scope and binoculars were used in places where needed to document forest characteristics. Biologists identified nesting and foraging habitat for RCWs based on tree species composition, tree diameters, and tree stocking density. Also, because hardwood encroachment and midstory tree growth threatens pine habitat required by RCWs, WSP biologists made notes describing RCW habitat suitability under current conditions, such as understory and midstory structure, plant species composition, and any evidence of recent habitat management. They also searched for cavity trees or other evidence of RCW activity within stands where suitable nesting habitat was observed. Finally, WSP took geolocated photographs to document the range of RCW habitat conditions and any other constraints observed.

Following the field survey, WSP biologists reviewed field notes and reclassified forested stands that were assessed as potential nesting and foraging habitat, as defined by the USFWS (2003) protocol. Another attribute was added to the shapefile to indicate whether the assessed stands could provide suitable foraging or nesting habitat based on current conditions/management.

Field Survey Findings

WSP biologists were able to view most of the proposed alternative corridors from public roads but several locations across private lands were not possible to view. Figures 5, 6, and 7 show the track-log of biologists within the Jamestown, Honey Hill, and McClellanville study areas, respectively.

In general, the desktop analysis was accurate in terms of classifying RCW habitat based on the dominance of pine trees and stands with pine trees greater than 30 or 60 years old. Two forest stands were upgraded from non-habitat to foraging habitat because of recent management. A second forest stand was upgraded from foraging habitat to nesting habitat because of management and RCW nesting activity observations. Several stands were downgraded from foraging and nesting habitat to non-habitat due to hardwood dominance (Photos 1 and 2). All other forest stands classified as suitable RCW habitat were verified or unchanged from the desktop analysis. In general, WSP biologist observed less potential RCW habitat than was identified by the desktop analysis. Overall, forest stands on private lands that meet the USFWS definition of RCW nesting or foraging habitat were in poor condition and not likely to be used by RCW due to the lack of active management (e.g., prescribed fire, thinning) and a resulting dense understory and midstory. On private lands, WSP biologists found no evidence of RCW nesting and did not hear any RCW vocalizations during the surveys.

A final map of foraging and nesting habitat within the alternative corridors is provided in Figures 8, 9, and 10 for the Jamestown, Honey Hill, and McClellanville study areas, respectively. Further details regarding observations of RCW habitat within each study area is provided following the figures.

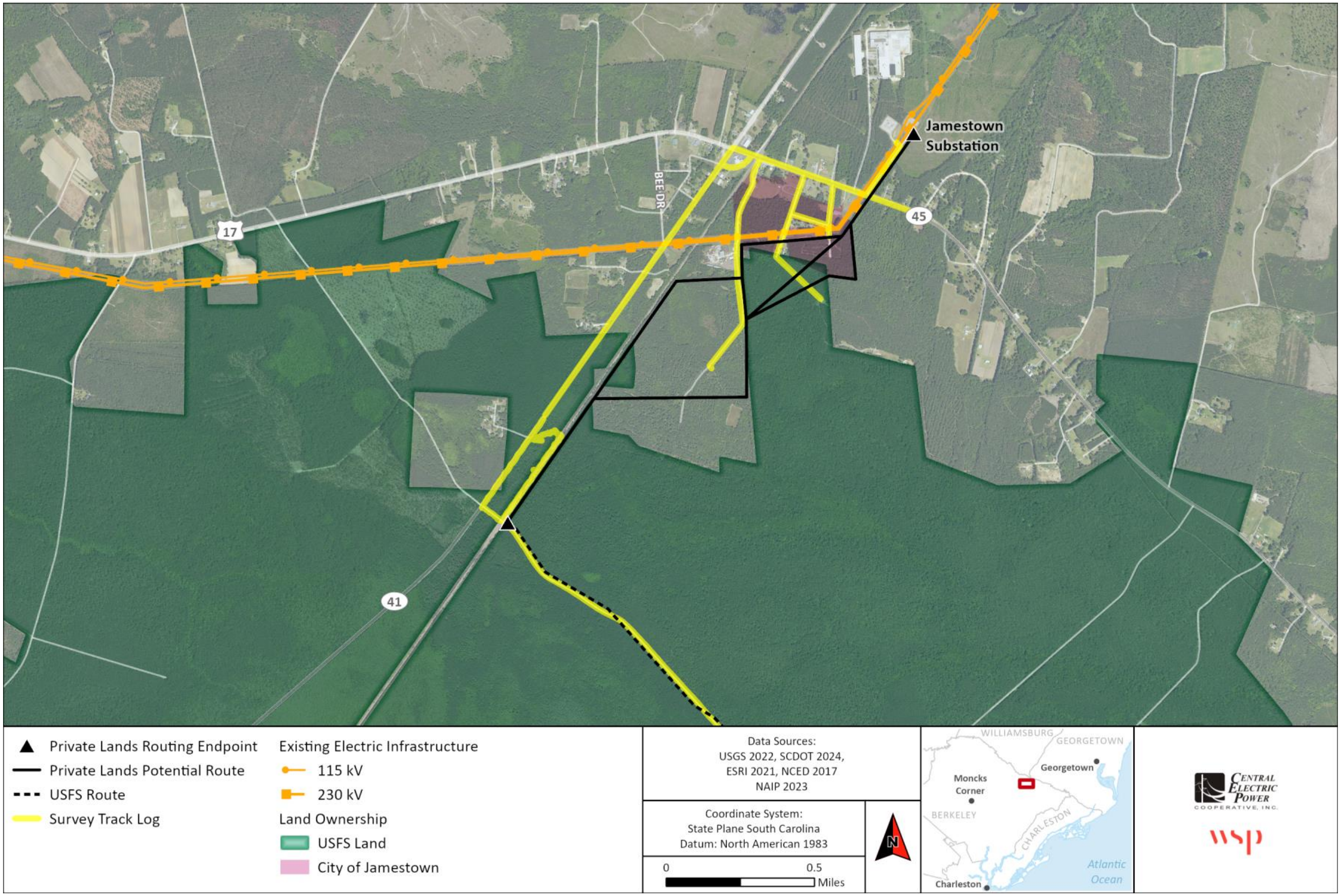


Figure 5. Track-log of WSP biologists showing accessible public roads and lands within the Jamestown study area

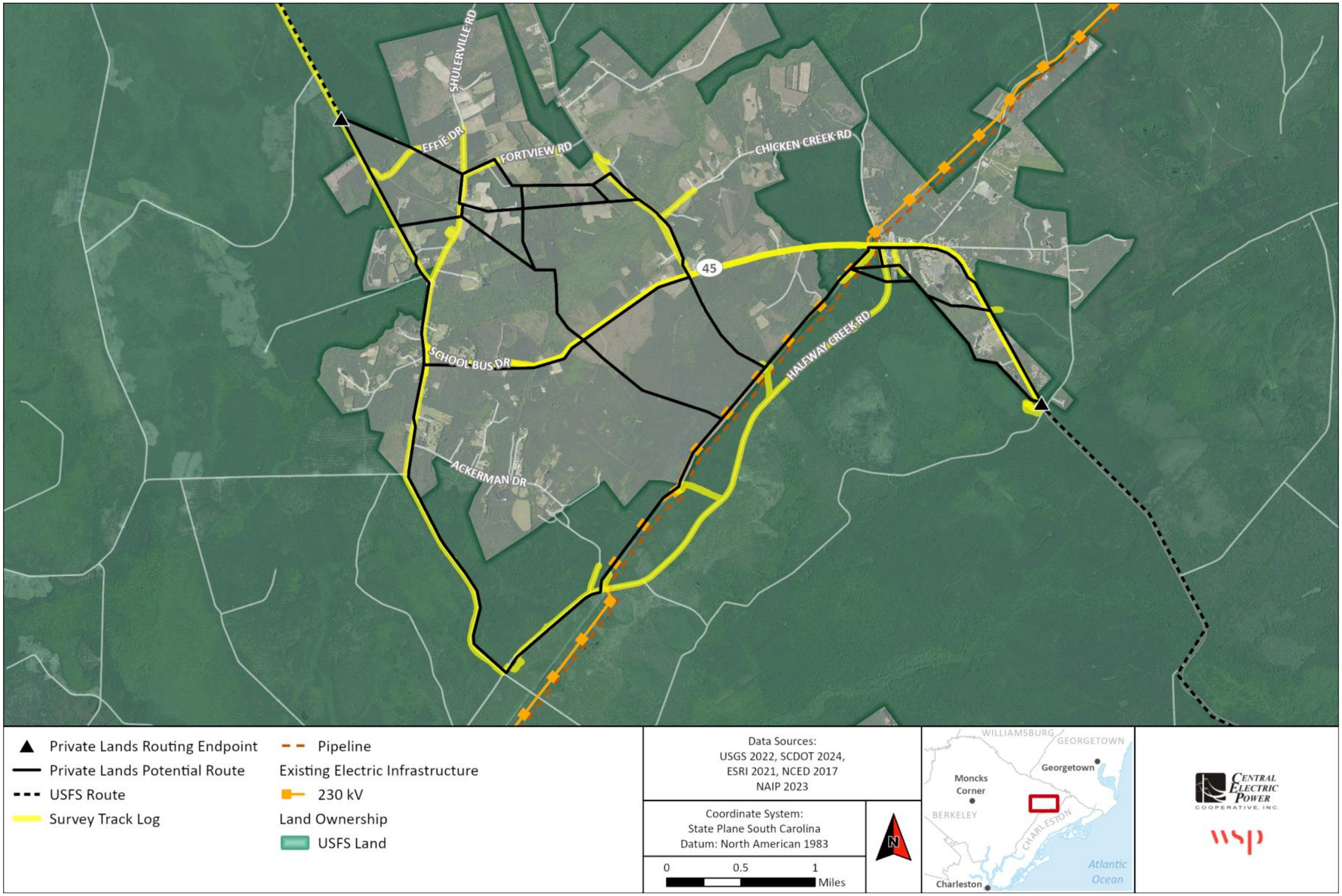


Figure 6. Track-log of WSP biologists showing accessible public roads and lands within the Honey Hill study area

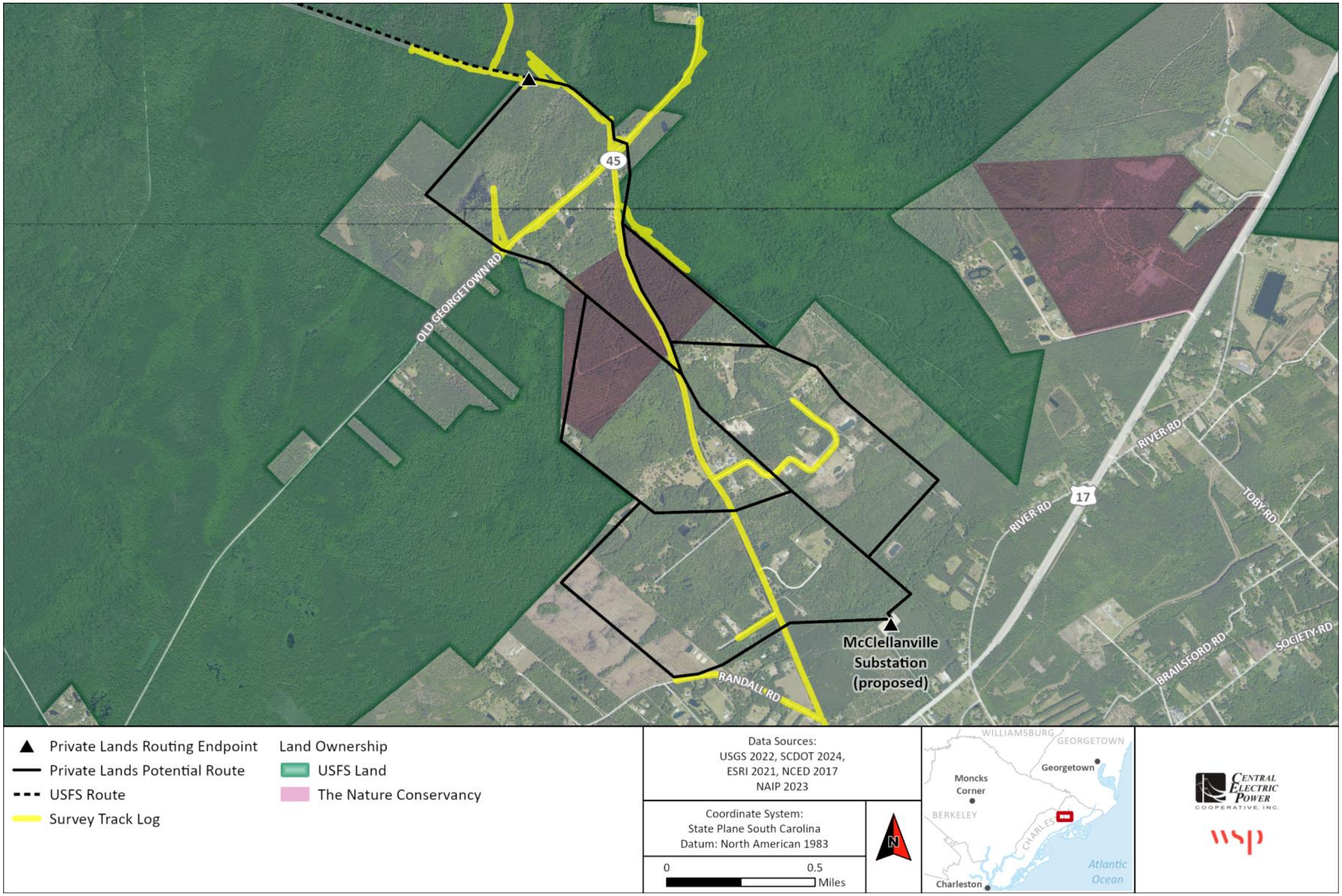


Figure 7. Track-log of WSP biologists showing accessible public roads and lands within the McClellanville study area

Photo 1. Example of a forest stand classified via desktop analysis as RCW nesting habitat, but downgraded in the field to non-habitat due to the lack of pine tree dominance

Photo 2. Example of a forest stand classified via desktop analysis as RCW foraging habitat, but downgraded in the field to non-habitat due to the lack of pine tree dominance

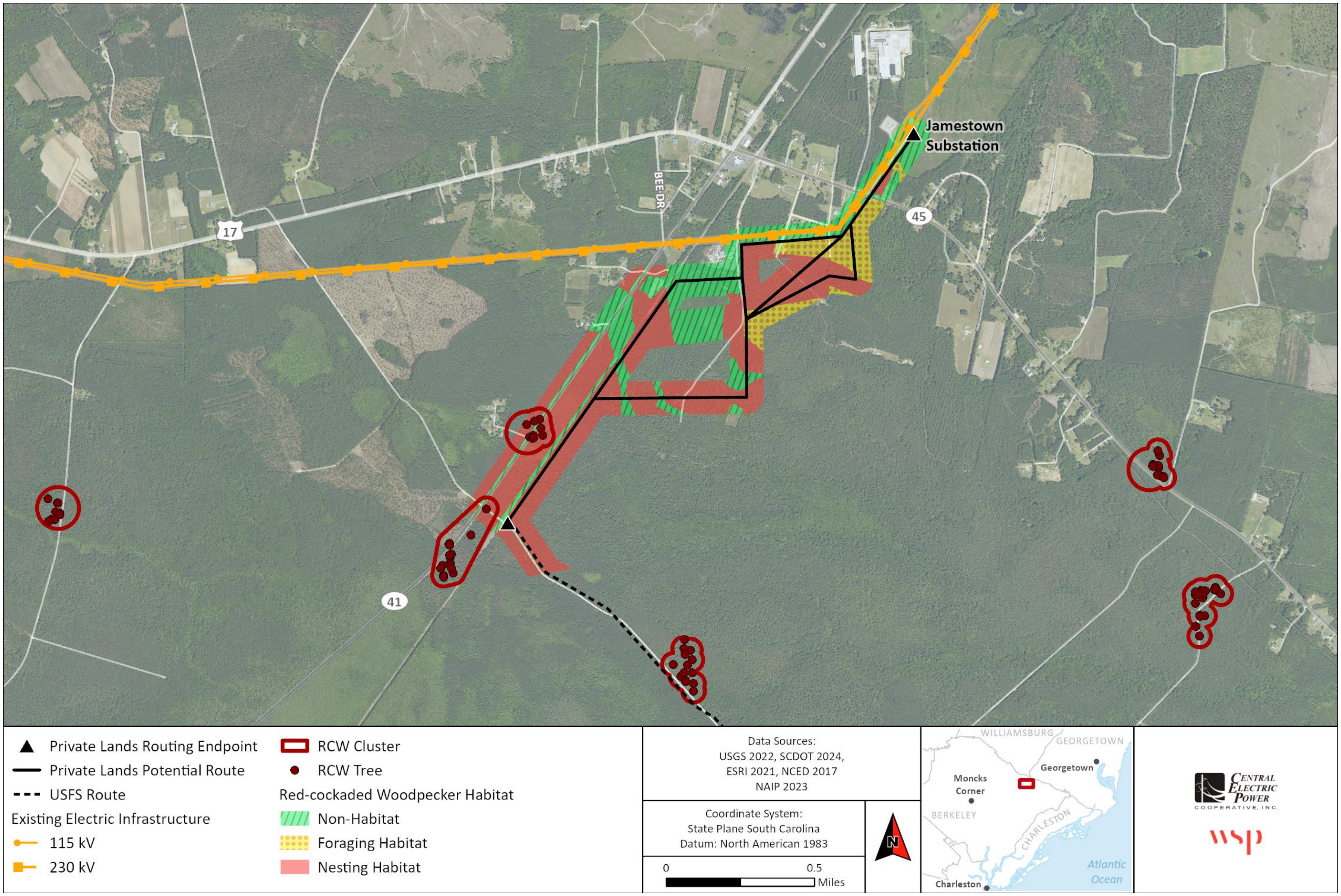


Figure 8. Suitable red-cockaded woodpecker habitat identified via desktop analysis in the Jamestown study area

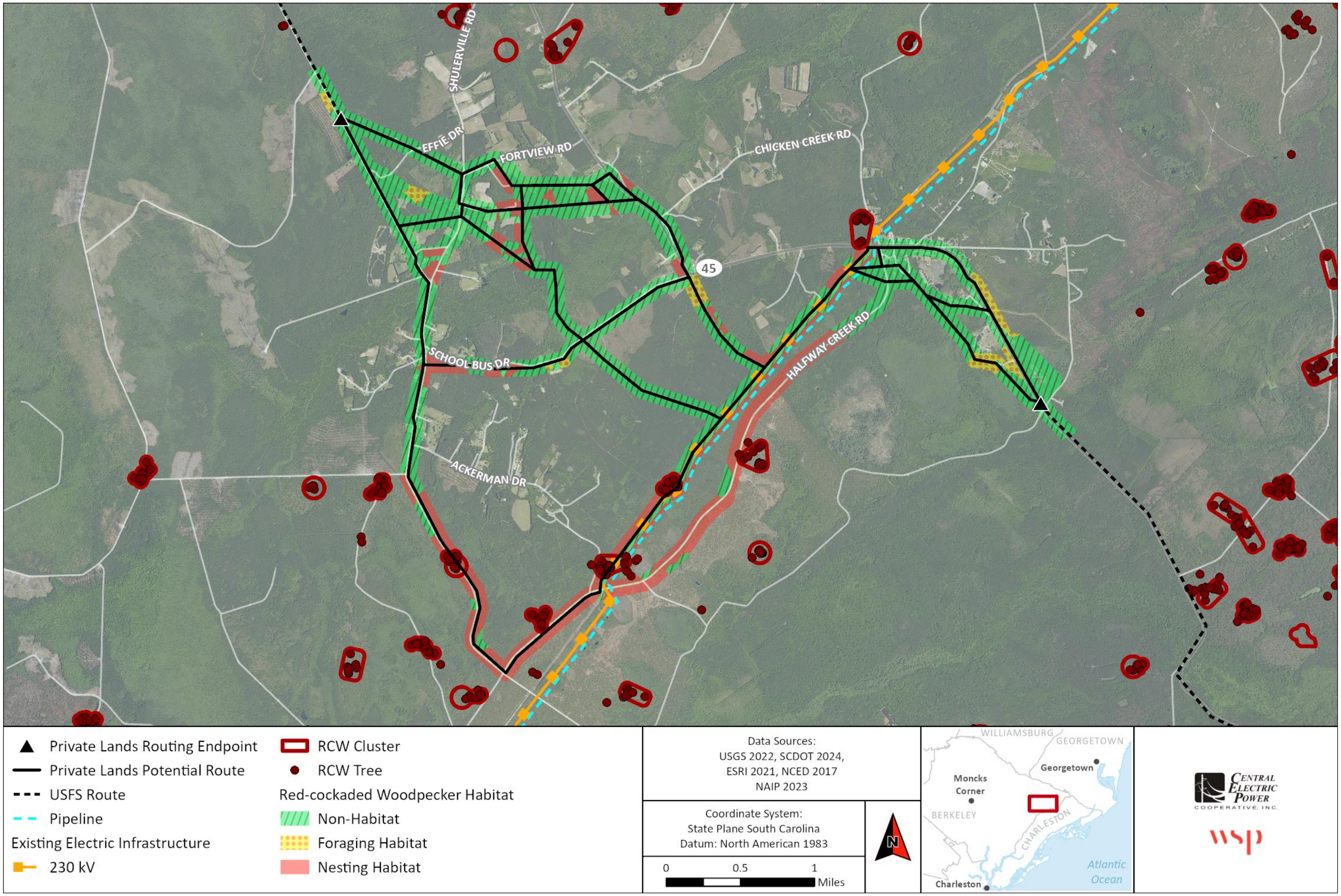


Figure 9. Suitable red-cockaded woodpecker habitat identified via desktop analysis in the Honey Hill study area

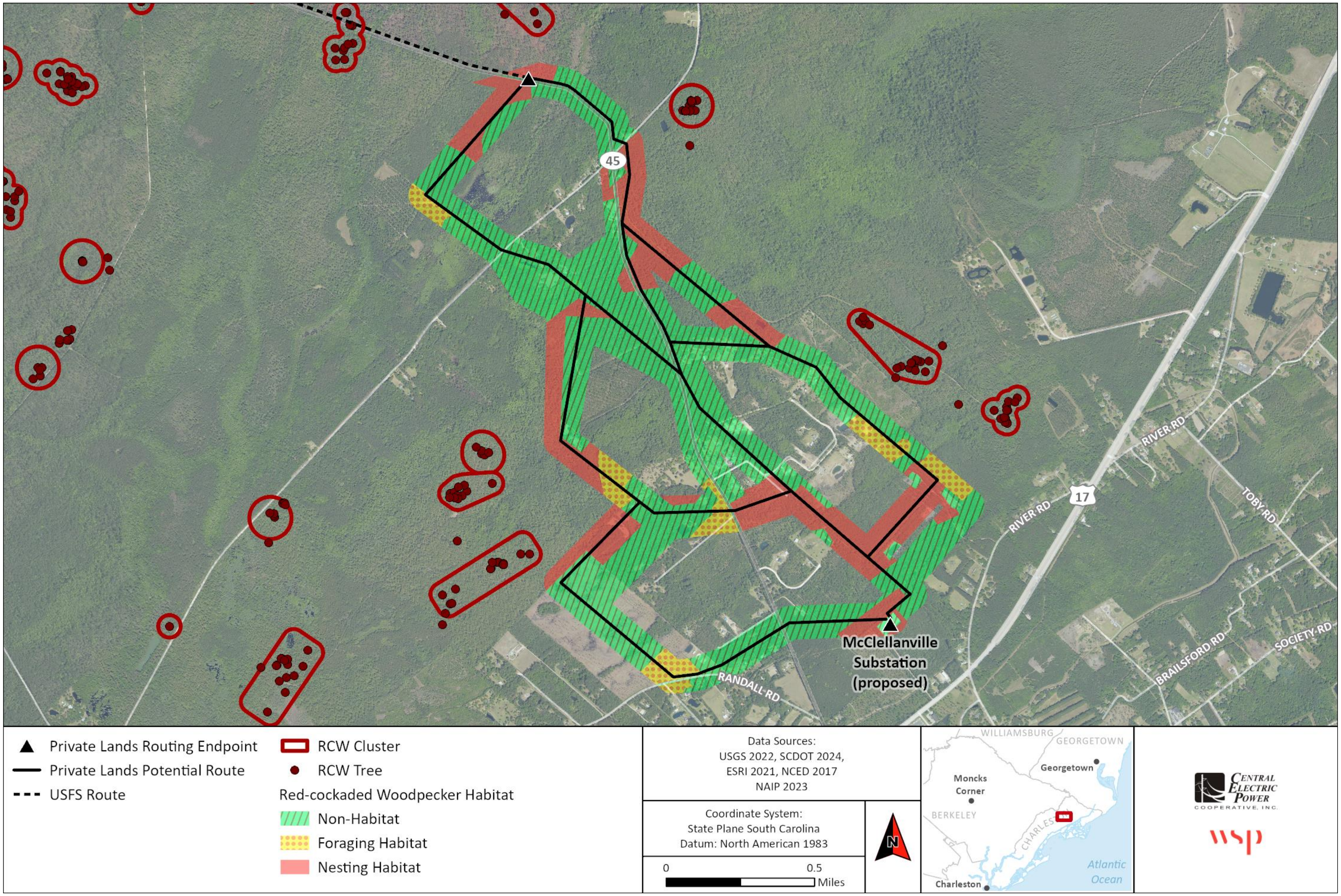


Figure 10. Suitable red-cockaded woodpecker habitat identified via desktop analysis in the McClellanville study area

Jamestown Study Area

RCW Habitat: Habitat for RCW foraging and nesting, as defined by USFWS, is present throughout this study area on private and NFS lands, and a significant portion is confirmed as nesting habitat within or adjacent to managed NFS lands. Although not all forest stands were verified, it is likely less that potential RCW habitat exists there due to wetland composition and intensive silviculture. Historical RCW cavity trees are located within the study area and along Highway 41. WSP biologists observed these cavity trees to be currently inactive; however, suitable nesting and foraging habitat was present (Photo 3). Habitat quality is suboptimal in most forest stands on private lands due to wetland encroachment, developed midstory hardwood vegetation structure, and the absence of periodic forest fires. Land use in the northeast portion of this study area is developed and generally less suitable for RCW habitat relative to the southwest portion of the study area.

Wetlands and Floodplains: In general, WSP biologists observed that the NWI data largely underestimate the extent of wetlands, especially in areas with a pine canopy. Construction of Highway 41 and the railroad have also altered natural hydrology and natural vegetation composition. The embankments of these transportation corridors have altered drainage patterns, causing some wetlands in study area to appear more expansive than indicated by NWI data.

Human Environment: Highway 41 and Highway 45 intersect near this study area and are the center of development in a rural landscape. Areas to the south of this intersection along Highway 41 and the proposed corridor are less developed. Landownership/use appeared to be residential and commercial/industrial. This study area appeared to be developing slower than the McClellanville study area; no new construction was observed during the field survey that had not been captured in the desktop analysis.

Photo 3. Potential RCW nesting habitat on NFS lands within the Jamestown study area confirmed by field surveys

Honey Hill Study Area

RCW Habitat: Habitat for RCW foraging and nesting, as defined by the USFWS, is present throughout this study area on private lands and NFS lands; however, suitable contiguous habitat is primarily located in the southwestern portion of this study area, on or adjacent to NFS lands with active forest management and use of periodic, prescribed fire. Habitat quality is suboptimal in most forest stands on private lands throughout this study area because of the structure of the developed midstory hardwood vegetation and the absence of periodic forest fires; however, areas on private lands were confirmed as having current RCW nesting and foraging potential. RCW activity was observed during the field survey within this study area and on NFS lands. No individuals or RCW activity was observed on private lands.

The desktop analysis was confirmed to be mostly accurate; however, several forest stands throughout this study area were downgraded to non-habitat due to the lack of pine tree dominance. Additionally, in two locations, the RCW habitat classification was upgraded. One stand was upgraded from non-habitat to foraging habitat in the eastern portion of the study area. This area was identified as developed in the desktop analysis, but it was found to be a thinned forest stand with an average DBH of 10 inches. The light blue outlined stand in Figure 11 depicts the upgraded RCW foraging habitat area along Highway 45. This stand could provide marginal to suitable foraging habitat currently (Photo 4).

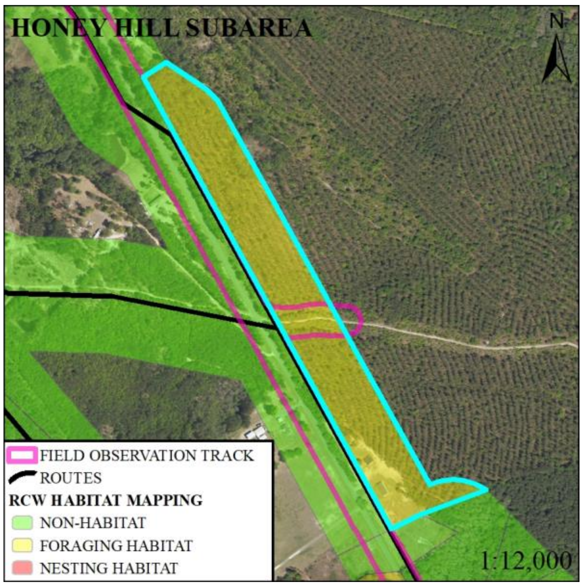


Figure 11. Honey Hill study area upgraded RCW foraging habitat area

The second area of change is in the southwestern portion of the study area, on NFS lands, where a stand was upgraded from foraging habitat (in the desktop analysis) to nesting habitat. This stand is relatively young to meet the definition of nesting habitat, but RCW nesting activity was observed on a longleaf pine tree with an approximate 12-inch DBH (Photo 5). These stands are currently providing nesting and foraging habitat for RCWs.

On private lands, one area within this study area currently has suitable RCW nesting habitat. This area is located along School Bus Drive, near the intersection with Shulerville Road. Identified as nesting habitat during the desktop analysis, this forest stand was confirmed to have potential nesting habitat present. The trees observed in this forest stand are large enough to allow RCW cavity construction (Photo 6). Additionally, evidence of prescribed fire and other habitat management activities that promote RCW habitat suitability were observed in this stand. The blue highlighted stand in Figure 12 depicts the confirmed RCW nesting habitat area on private lands.

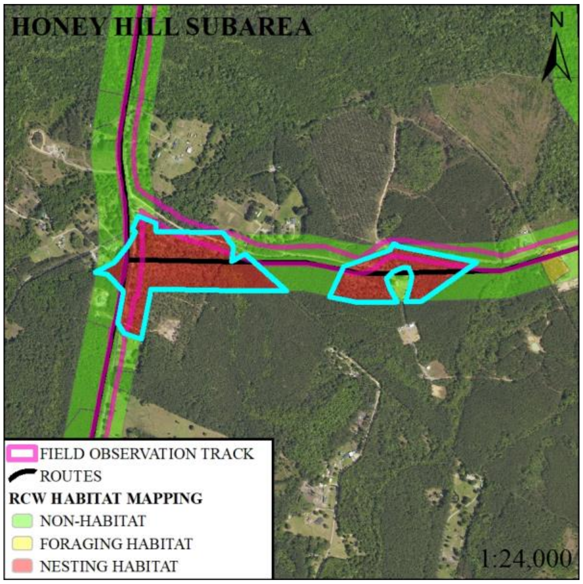


Figure 12. Honey Hill study area private lands with confirmed RCW nesting habitat area along School Bus Drive and Shulerville Road

Constructing the proposed transmission line along Santee Cooper's existing Winyah-Charity 230-kV transmission line would cross through three historic RCW clusters (161D, 161F, and 161E). WSP biologists observed that RCW habitat along the existing 230-kV line was generally in fair condition, with some active USFS management in places to maintain an open understory and suitable RCW habitat. WSP biologist viewed these three clusters and found that one (161E) had active cavity trees with an artificial cavity, while the other two (161D and 161F) did not have active cavity trees, and the surrounding habitat had a thick understory dominated by hardwood trees and thick pine stocking (not nesting habitat). If any of the proposed alternative corridors are determined to be preferable to the Jamestown alignment proposed in the draft final EIS, cutting off the 230-kV line would avoid potential impacts to these three RCW clusters, plus two others (161A and 161C) located in the vicinity of the intersection of Halfway Creek Road and Shulerville Road. In addition to avoiding potential impacts to RCW clusters, impacts to RCW habitat would be reduced in this location because proposed routes that cut off the 230-kV do not provide potential RCW habitat because these lands are managed for timber production, which generally is not conducive for RCW habitat (e.g., thick timber stocking, lack of periodic forest fires).

Wetlands and Floodplains: The Jamestown alternative would cross the regulatory floodplain of Echaw Creek at one of three proposed locations, from west to east: (1) along Shulerville Road; (2) along an unimproved road entirely on private lands; (3) along SC Highway 45 (Figure 13).

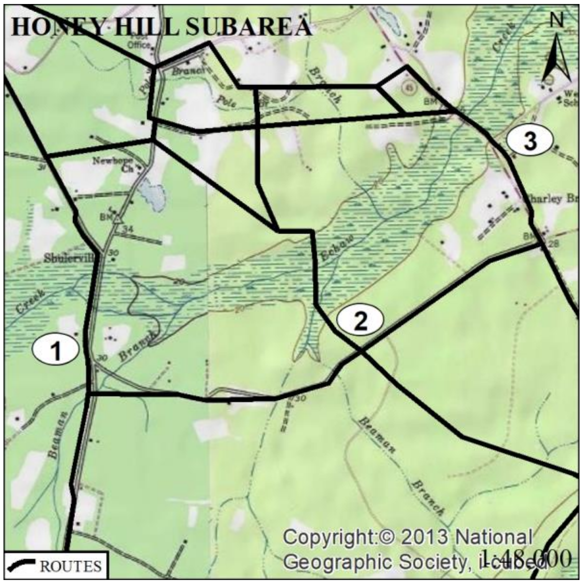


Figure 13. Honey Hill study area route options across Echaw Creek and floodplains

Field observations of hydrologic conditions revealed that the easternmost crossing along Highway 45 (#3 in Figure 13) would be the shortest floodplain crossing, and the NWI polygon provides a fairly accurate wetland boundary. Thus, the proposed alignment of the alternative corridor on the east side of the highway would cross less wetland compared to an alignment on the west side of the highway, totaling approximately 900 feet. At the westernmost crossing, along Shulerville Road (#1 in Figure 13), floodplain wetlands were estimated to be slightly longer (1,000 feet). The Shulerville Road option provides a relatively straight approach from the north and south, while the Highway 45 option has a curved approach to the north and south. Additionally, these two route options along the roads are more impeded with development compared to the middle crossing option. This crossing area (#2 in Figure 13) was mostly inaccessible, and no information was ground-truthed; however, this would be the longest wetland crossing option at approximately 1,500 feet. Other wetland crossings exist throughout this study area, but this is the most significant wetland area, requiring spans greater than 1,000 feet.

Human Environment: This study area has sporadic and concentrated residential development, particularly along Highway 45. This study area appeared to be developing slower than the McClellanville study area, and landownership appeared to be generational. Additionally, active though infrequent forest and wildlife management was observed on private lands. No new structure construction was observed during the field survey that had not been captured in the desktop analysis.

Photo 4. Potential RCW foraging habitat on private lands within the Honey Hill study area confirmed by field surveys

Photo 5. Potential RCW nesting habitat on NFS lands within the Honey Hill study area confirmed by field surveys

Photo 6. Potential RCW nesting habitat on private lands within the Honey Hill study area confirmed by field surveys

McClellanville Study Area

RCW Habitat: Habitat for RCW foraging and nesting, as defined by the USFWS, is present throughout this study area; however, habitat quality is suboptimal in most forest stands because of the structure of the developed midstory hardwood vegetation and the absence of periodic forest fires. High-quality habitat was observed at the northern extent of this study area and adjacent to NFS lands. No RCW activity or individuals were observed during the field survey within this study area.

The desktop analysis was confirmed as mostly accurate; however, several forest stands throughout this study area were downgraded to non-habitat due to the lack of pine tree dominance. Additionally, one forest stand in the southwest portion of this study area was upgraded from non-habitat to foraging habitat. Identified as a clearcut in the desktop analysis, this stand was observed to be low-density loblolly pine with an average DBH of 14 inches (Photo 7). The blue outlined stand in Figure 14 depicts the upgraded RCW foraging habitat area.

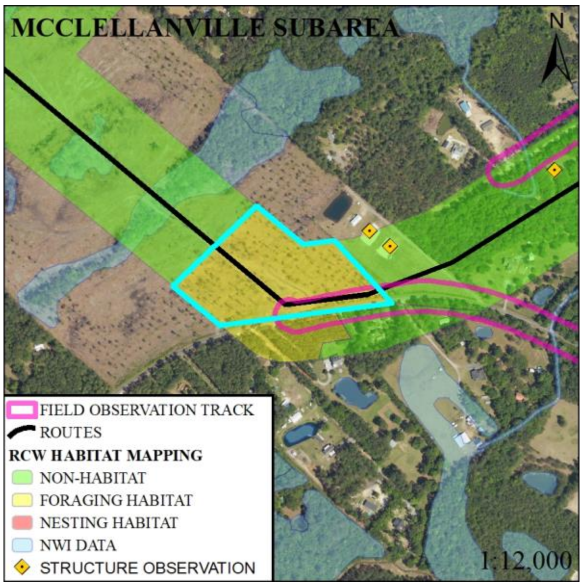


Figure 14. McClellanville study area upgraded RCW foraging habitat area

Wetlands and Floodplains: In general, WSP biologists observed that the NWI data largely underestimate the extent of wetlands in the study area. For example, along corridor F (see Figure 20), the actual wetland area extends well beyond the represented NWI data. In Figure 15, the wetland observation points locate the potential extent of the wetlands in this study area. In this location, the centerline of proposed alignment would cross approximately 1,500 feet of wetlands and require at least two poles. A forest road is located at this wetland crossing that would facilitate access.

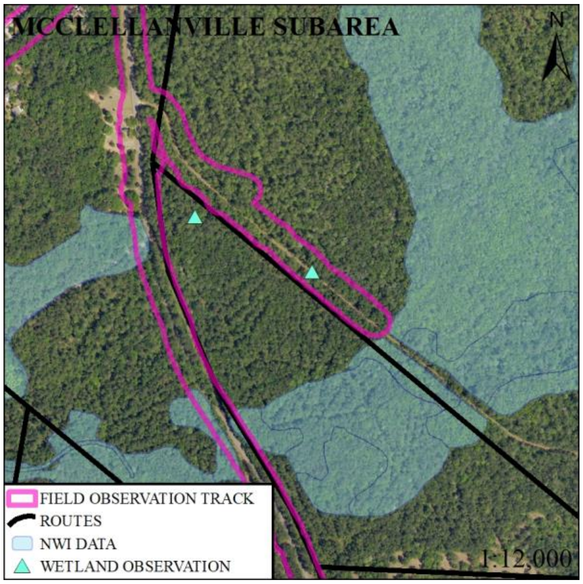


Figure 15. McClellanville study area wetland extent along corridor F

Another large wetland crossing occurs in the northern portion of the McClellanville study area (Figure 16). The proposed crossing follows the existing paved Highway 45; however, the road turns within the wetland area. The centerline of the proposed route would cross approximately 1,200 feet and require at least two poles and a turn within a wetland.

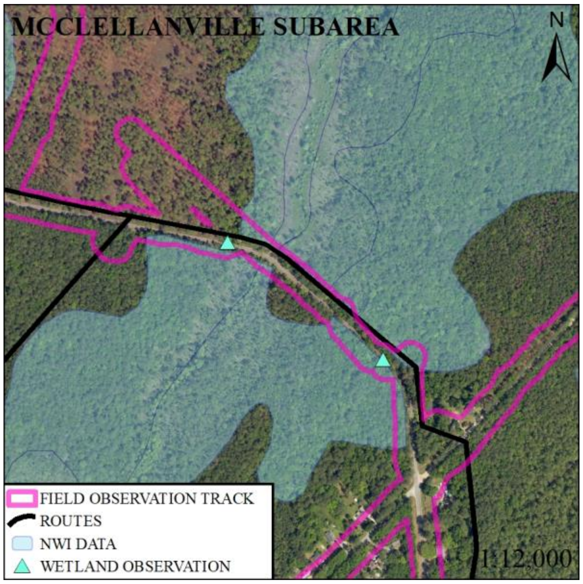


Figure 16. McClellanville study area stream wetland crossing at a tributary of Mill Branch at Highway 45

Human Environment: Due to its proximity Highway 17 and the coast, the McClellanville study area is experiencing more residential development than either the Honey Hill or Jamestown study areas. WSP biologists observed two new homes under construction on Randall Road, both within a proposed 600-foot-wide alternative corridor.

Photo 7. Potential RCW foraging habitat on private lands within the McClellanville study area confirmed by field surveys

CORRIDOR ANALYSIS AND EVALUATION

Methodology

As discussed above under "Alternative Corridor Identification," 28 end-to-end corridors were carried forward for analysis—4 in the Jamestown study area (Figure 17), 12 in the Shulerville subarea (Figure 18), 6 in the Honey Hill East subarea (Figure 19), and 6 in the McClellanville study area (Figure 20). For the sake of comparison, the corridor analyzed in the EIS was also included in the evaluation (one per study area or subarea), bringing the total number evaluated corridors to 32.

For each end-to-end corridor, GIS metrics were calculated (Table 3). The raw calculations are presented within a preliminary 75-foot-wide buffer (ROW width) and a 600-foot-wide buffer (corridor width) and are shown in Tables 3, 4, 5, and 6 for the Jamestown, Shulerville, Honey Hill East, and McClellanville study areas/subareas, respectively. The analysis of corridors uses the calculations within the 75-foot ROW, unless use of the 75-foot ROW affects comparison of corridors. In those cases, both calculations within the 75-foot ROW and 600-foot-wide corridor are discussed.

- Area of surface waters and wetlands – This routing factor is based on information from NWI and the National Hydrography Dataset (NHD). Field observations indicate that these sources underestimate the extent of wetlands and surface waters in the project area. The area of these features within the 600-foot corridors was used in the analysis to avoid cases where a NWI or NHD feature may occur adjacent to but not within the ROW but could impose a constraint on the transmission line siting.
- Area of forested wetlands – The area of forested wetlands within the 600-foot-wide corridor was factored into the analysis for the same reason as described above. In general, the degree to which wetlands may impose a constraint on the project area is best captured by the wider corridor.
- Area of suitable RCW nesting and foraging habitat – The amount of suitable RCW habitat, as defined by the USFWS protocol, is included in the analysis within the 600-foot-wide corridor because potential effects to RCW habitat could extend beyond the 75-foot ROW.
- Area of NWI wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays – This metric approximates the area of suitable habitat for frosted flatwoods salamander and pond-breeding amphibians. It is included in the analysis within the 600-foot-wide corridor for the same reason discussed above for wetlands in general.
- Historic structures, archaeological sites, and cemeteries – No listed, eligible, or undetermined historic structures or cemeteries are within the 75-foot ROW. Because these features could pose a constraint beyond the proposed ROW, they are evaluated within the 600-foot-wide corridor.
- Number of residences – No residences are within the 75-foot-wide ROW in the Jamestown study area or Honey Hill East subarea but several occur within a 600-foot-wide corridor. Because residences within the corridor could be impacted even if they are not located within the ROW, the results consider residences within both the 75-foot ROW and the 600-foot-wide corridor.
- Area of NFS lands – Because the final ROW could be sited anywhere within the 600-foot-wide corridor, the acreage of NFS that could be affected by the final ROW is not captured by the 75-foot ROW. In cases where a proposed corridor follows the FMNF boundary, the final ROW could likely be sited on the private land side, although USFS may still consider this as an indirect impact.

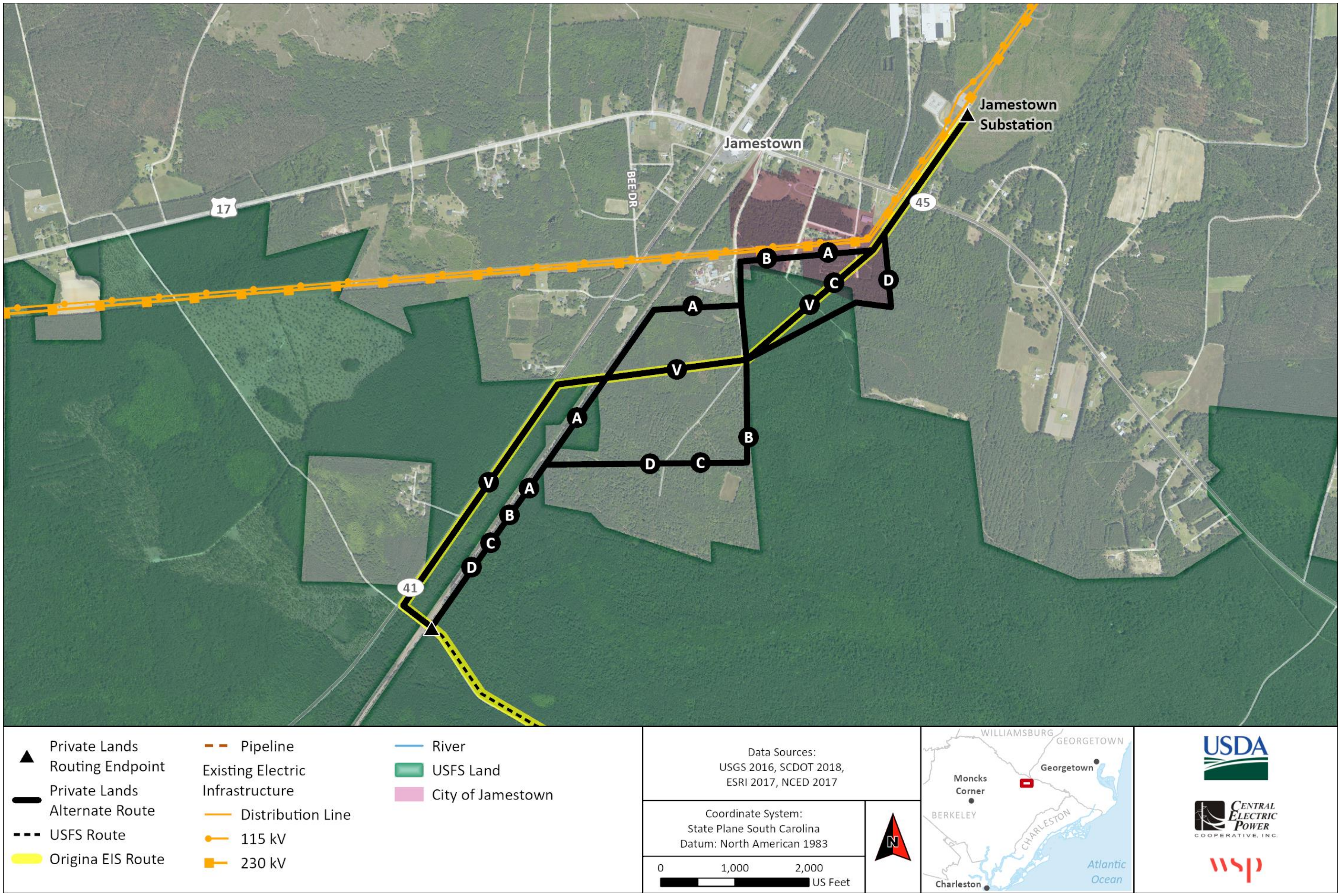


Figure 17. Alternative corridors evaluated within the Jamestown study area

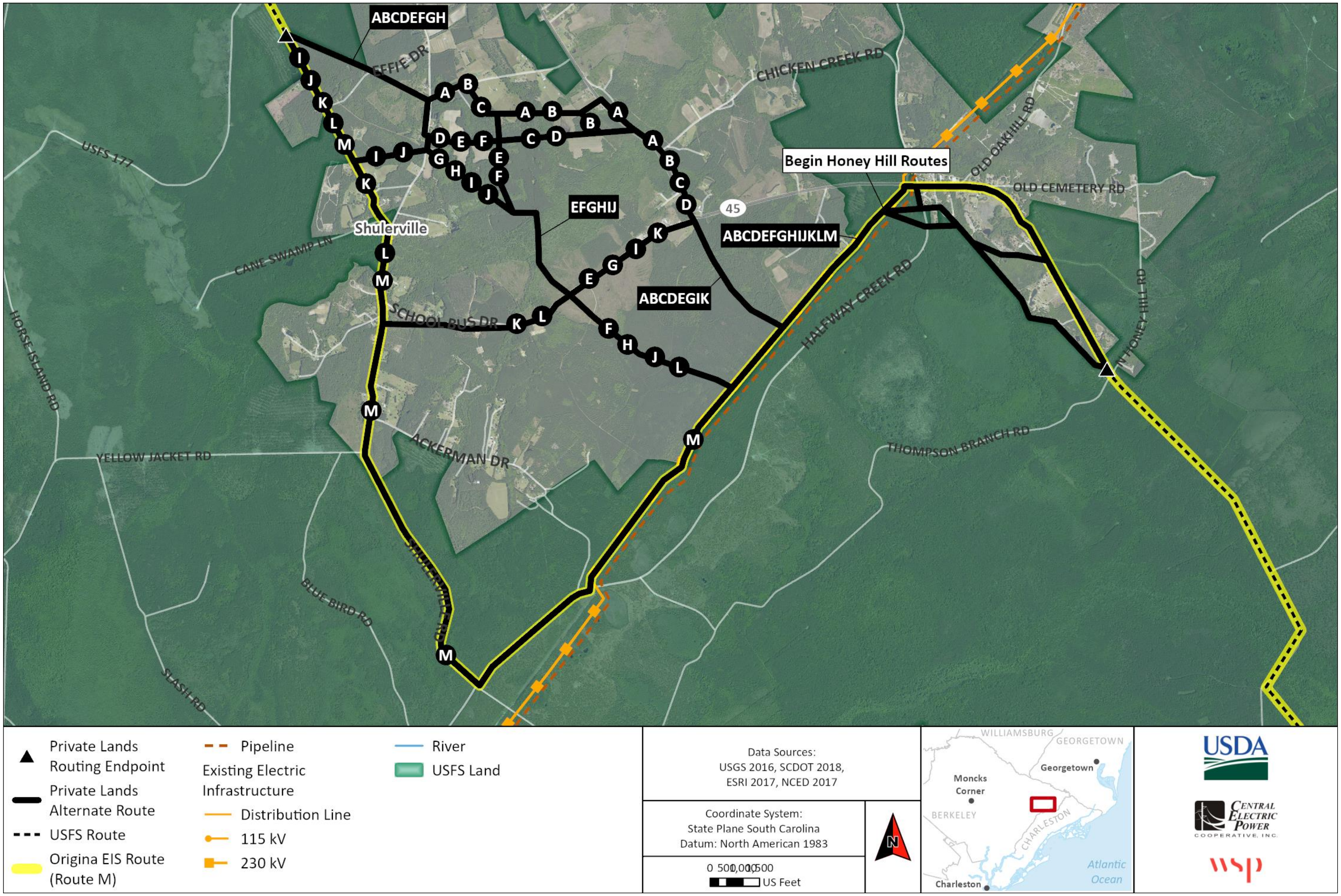


Figure 18. Alternative corridors evaluated within the Shulerville subarea [of the Honey Hill study area]

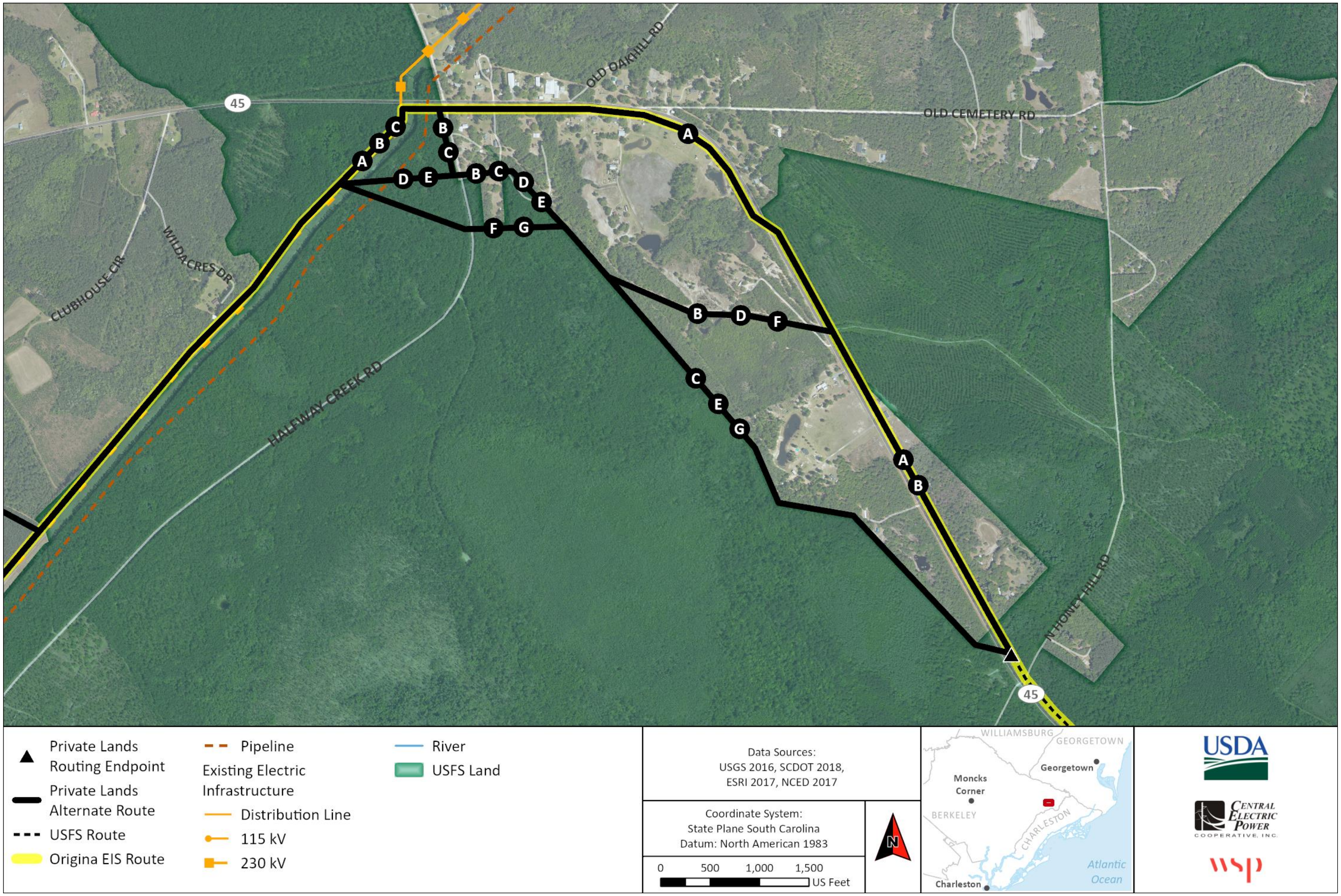


Figure 19. Alternative corridors evaluated within the Honey Hill East subarea [of the Honey Hill study area]

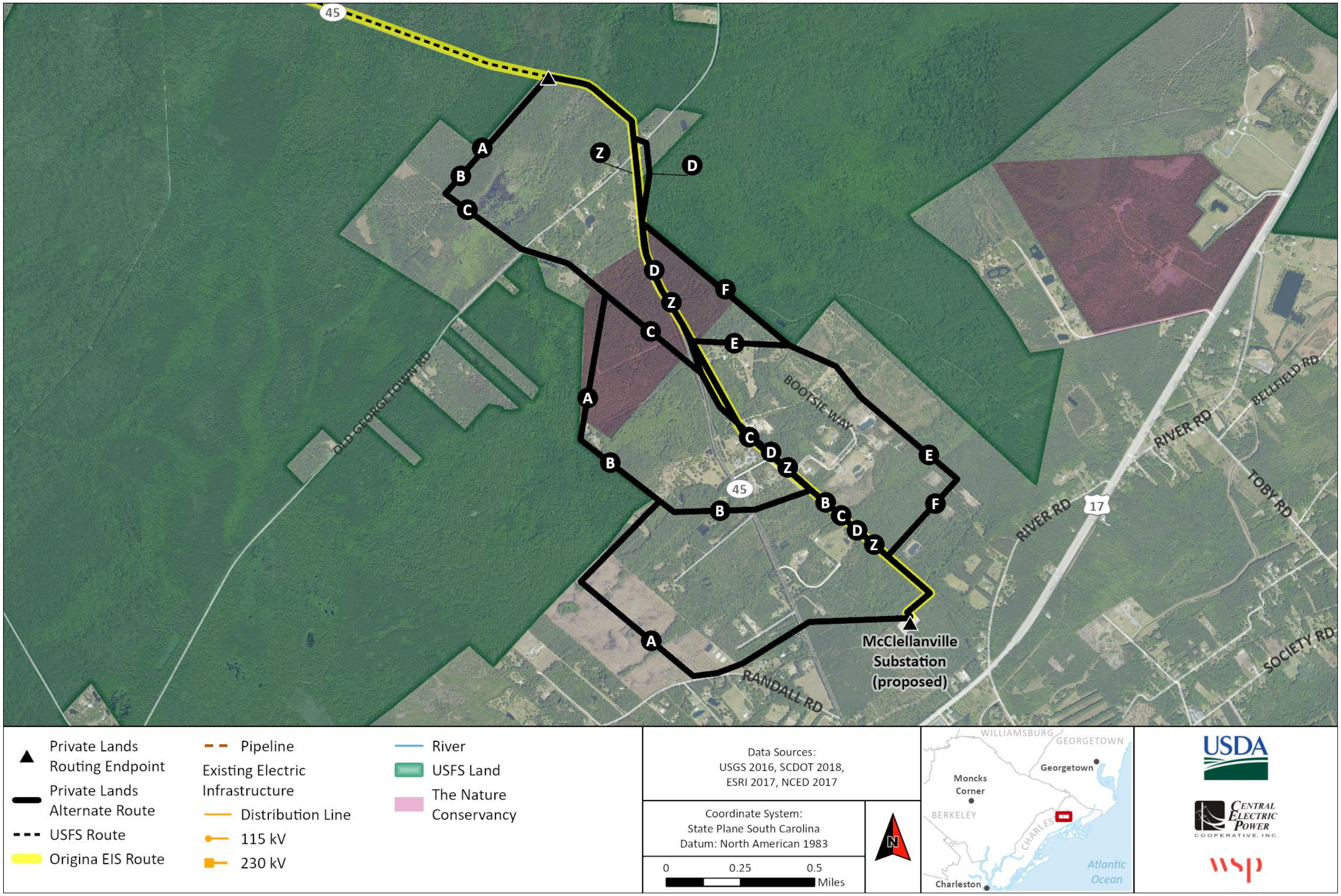


Figure 20. Alternative corridors evaluated within the McClellanville study area

WSP created a matrix to manage calculations, including the normalizing of metrics (routing factors) and scoring of corridors. The procedure used linear normalization to transform the values from 0 to 1 to allow comparison of numbers (raw calculations). Often called max-min scaling, this technique normalizes data by subtracting the minimum value from each data point and then dividing by the range. Normalizing the data is useful for comparing numeric values of varied sizes and units from multiple data sources. It also allows each metric (routing factor) to be considered equally (from 0 to 1) (see Table 3). The following formula, which was incorporated into the spreadsheet, was used to normalize the raw data:

$$x' = \frac{x - min(x)}{max(x) - min(x)}$$

However, while this method effectively rescales the data from 0 to 1, it does not retain the original variance of the data. Normalizing the metrics to scale them from 0 to 1 can thus have the effect of increasing the perceived difference among values where there is actually less variation in the raw values or have the opposite effect of compressing perceived difference among values where very small or large values (outliers) exist in the raw calculations. In general, the impacts of this transformations do not affect the overall ability to make comparisons among the corridors. However, in cases where it is not abundantly clear which corridor is the best option, the routing team investigated the potential for this effect by exploring the raw metrics.

A score was calculated for each of the six categories of metrics. Theses scores were summed, and the combined score was then used to identify the corridor having the least potential impacts. The total scores were used to identify the top-ranked corridor(s). In cases where the calculated scores do not clearly point to a top-ranking corridor, the raw metrics were reviewed, and expert judgment was applied. In such cases, the discussion of results presents specific differences among corridors that make one preferable over another. It should be noted that the results of the desktop RCW habitat analysis are also integrated into this evaluation (see Task 3 Technical Memo).

Results

The following discussion presents the evaluation of alternative corridors to determine the “preferred” option with the lowest number of identified constraints and/or greatest number of opportunities. Higher scores indicate routes with increased constraints. However, the scores themselves are unitless and have no meaning other then to indicate the relative strength of each corridor compared to others in the same study area/subarea.

Jamestown Study Area

In the Jamestown study area, corridors A and C stand out as having the fewest constraints relative to the original EIS corridor (V) and two other options evaluated (B and D) (Figure 21). Figure 22 shows the alignment of these two corridors. The total scores fail to unequivocally identify the best option between corridors A and C, and a consideration of the raw metrics and underlying GIS layers is informative (Table 4).

The evaluated corridors have similar constructability/engineering requirements, as they are all similar in length and have two to five major angles. Similarly, all corridors have minimal area with cultural resources concerns—corridors A and B have 0.1 and 0.2 acres of archaeological sites within the 75-foot and 600-foot-wide buffers, respectively, while the other corridors have no cultural resources constraints. Corridor A ranks highest with regard to the land use/land cover because it crosses the least acreage of NFS lands (45.6 acres within the 600-foot-wide corridor), compared to 67.9 acres for the original EIS corridor (V) and 61.6 acres for corridor C. The raw metrics of the wildlife habitat category were considered when contemplating whether corridors A or C are preferable. Corridor A crosses the smallest acreage of suitable RCW habitat and forested habitat in general.

For built environment constraints, corridor A scores much worse than C. For example, corridor A intersects seven residences and eight other buildings within its 600-foot-wide buffer, while corridor C intersects two residences and three other buildings. However, none of these structures are within the 75-foot-wide ROW for these corrididors. In addition, for corridor A, all buildings within the 600-foot corridor occur on the opposite side of a roadway or existing ROW. Thus, after reviewing these locations, the routing team determined that the built environment would not impose as large of a constraint as the score for corridor A suggests.

Based on the above discussion, corridor A is the best option to minimize impacts within the Jamestown study area. It has fewer environmental constraints, intersects the least acreage of NFS lands, follows the longest length of existing railroad ROW and other linear infrastructure, impacts the smallest acreage of forest and wetlands, and intersects the least acreage of sensitive wildlife habitat. The built environmental factors that make corridor A score worse than C are mitigated by the fact that either a road or transmission ROW separates the proposed transmission line from the residences and other structures that occur within corridor A.

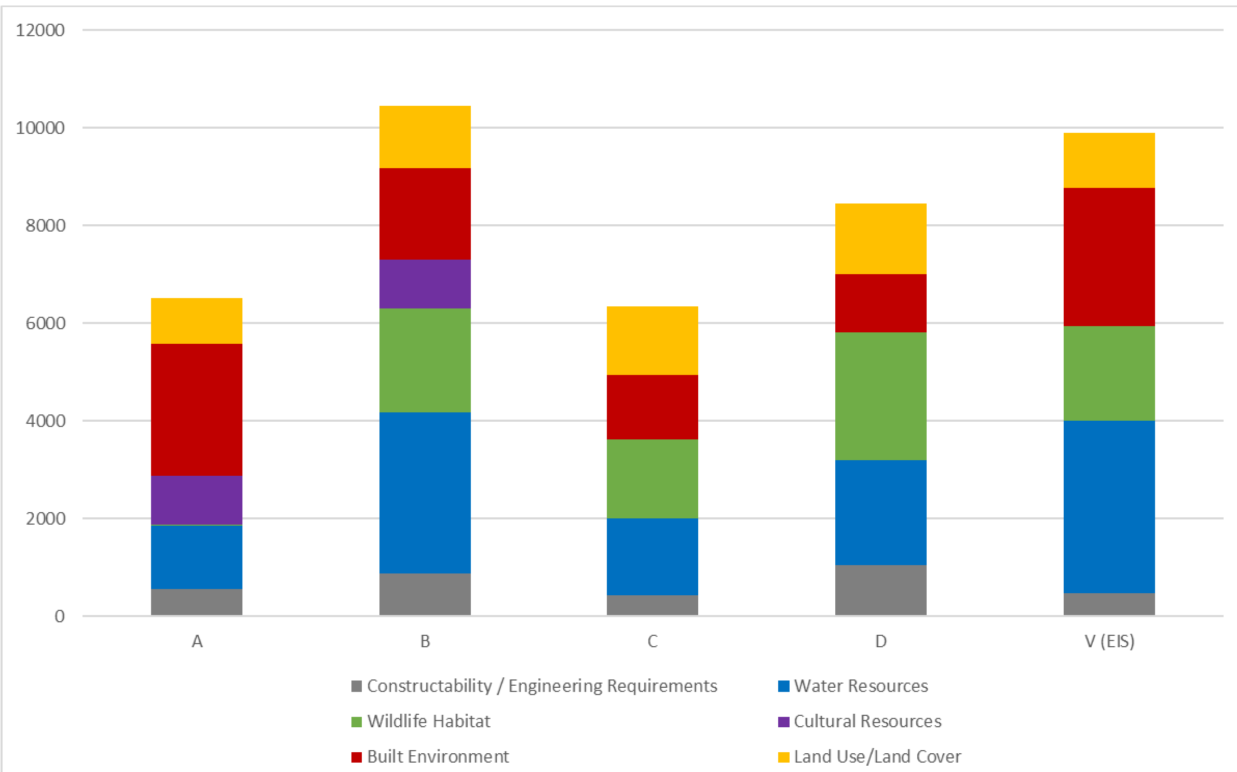


Figure 21. Total scores calculated for corridors in the Jamestown study area

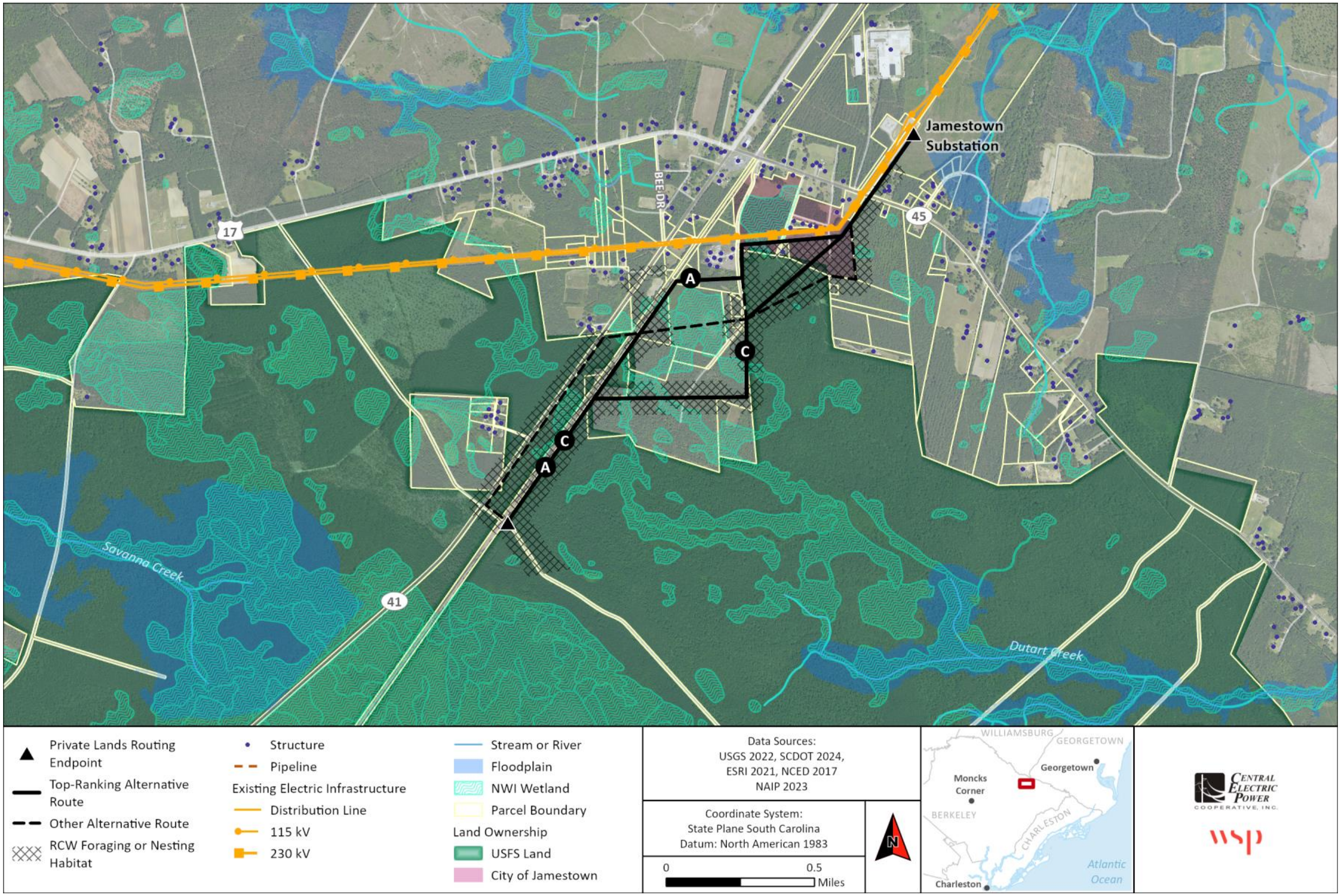


Figure 22. Top-ranking corridors (A and C) in the Jamestown study area

Table 4. Raw calculations of routing factors for the proposed corridors in the Jamestown study area

Routing Factor	75-ft Wide (ROW)					600-ft Wide (Corridor)				
Corridor	A	B	C	D	V (EIS)	A	B	C	D	V (EIS)
Constructability / Engineering Requirements										
Length (miles)	2.1	2.3	2.1	2.2	2.1	2.1	2.3	2.1	2.2	2.1
Angles 0-15 degrees	0	2	1	0	1	0	2	1	0	1
Angles 15-40 degrees	0	0	0	1	1	0	0	0	1	1
Angles >40 degrees	4	4	3	5	2	4	4	3	5	2
Number of state highways crossings (count)	1	1	1	1	1	1	1	1	1	1
Number of county/local/USFS road crossings (count)	3	3	3	2	3	3	3	3	2	3
Number of railroads crossings (count)	0	0	0	0	2	0	0	0	0	2
Number of airports and runways within 8,000 feet (count)	0	0	0	0	0	0	0	0	0	0
Number of oil and gas pipeline crossings (count)	0	0	0	0	0	0	0	0	0	0
Number of communication towers within 1,000 feet (count)	0	0	0	0	0	0	0	0	0	0
Number of existing transmission line crossings (count)	0	0	0	0	0	0	0	0	0	0
Water Resources										
Area of surface waters (acres)	0.7	0.7	0.7	0.7	0	5.8	5.8	5.8	5.8	0.0
Area of wetlands (acres)	1.2	1.4	0.9	0.9	2.0	15.8	19.8	14.3	15.3	21.1
Number of wetlands crossed with span length >500 feet (count)	0	0	0	0	1	0	0	0	0	1
Area of PFO wetlands (acres)	0.2	0.9	0.9	0.9	1.0	5.5	13.1	11.2	12.1	8.0
Area of ROW with forest within 30 feet of wetlands or hydric soils (acres)	1.8	2.1	1.4	1.4	2.6	16.9	20.4	18.2	19.6	24.5
Acres of ROW with forest within 31-100 feet of wetlands or hydric soils (acres)	0.9	1.3	0.9	1.3	1.5	12.1	12.6	10.0	11.2	7.5
Area of 100-year floodplain (acres)	0	0	0	0	0	0	0	0	0	0
Area of 500-year floodplain (acres)	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 100-year floodplain crossings (count)	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 500-year floodplain crossings (count)	0	0	0	0	0	0	0	0	0	0
Wildlife Habitat										
Area of suitable nesting habitat for RCW (acres)	10.8	13.9	13.5	14.0	12.4	76.2	99.9	105.0	108.1	95.8
Area of suitable foraging habitat for RCW (acres)	2.6	3.5	3.4	4.1	2.9	16.5	21.2	21.2	26.9	19.7
Area of forest (acres)	16.8	18.2	17.7	18.8	17.4	112.2	129.3	130.6	139.6	126.6
Area of NWI wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays (acres)	0.6	0.7	0.5	0.5	1.9	11.6	15.2	11.5	11.5	18.2
Cultural Resources										
Area of listed, eligible, or undetermined archaeological sites (acres)	0.1	0.1	0	0	0	0.2	0.2	0.0	0.0	0.0
Number of listed, eligible, or undetermined historic structures (count)	0	0	0	0	0	0	0	0	0	0
Number of cemeteries (count)	0	0	0	0	0	0	0	0	0	0

Table 4 (continued). Raw calculations of routing factors for the proposed corridors in the Jamestown study area

Routing Factor	Corridor	75-ft Wide (ROW)					600-ft Wide (Corridor)				
		A	B	C	D	V (EIS)	A	B	C	D	V (EIS)
Built Environment											
Number of parcels (count)		13	8	7	8	10	25	18	14	16	21
Number of unique landowners (count)		12	7	6	7	10	19	13	11	13	16
Number of parcels <10 acres in size (count)		5	3	2	2	**4**	16	11	8	9	11
Length NOT parallel to an existing corridor (miles)		0.2	0.4	0.8	0.7	0.9	0.2	0.4	0.8	0.7	0.9
Length NOT parallel to an existing corridor (percent)		11%	18%	39%	32%	43%	11%	18%	39%	32%	43%
Number of residences (count)		0	0	0	0	0	7	7	2	2	4
Number of non-residential buildings (count)		0	0	0	0	0	8	6	3	3	4
Land Use/Land Cover											
Length within forest and NOT adjacent to land cover edges, existing corridors (openings), or parcel boundaries (miles)		0.2	0.4	0.8	0.7	0.9	0.2	0.4	0.8	0.7	0.9
Area of pavement and other impervious surfaces (acres)		0.2	0.4	0.2	0.2	0.5	7.2	7.8	5.5	5.1	9.8
Area of cropland crossed (acres)		0.0	0.0	0.0	0.0	0.0	1.1	0.7	0.7	0.7	0.0
Area of prime farmland crossed (acres)		19.0	21.0	19.5	20.5	19.3	157.1	172.4	160.9	168.4	159.7
Area of scrub/shrub thicket crossed (acres)		0.7	0.7	0.7	0.7	0.7	6.0	6.0	6.0	6.0	6.0
Area of barren/grass/pasture crossed (acres)		0.4	0.7	0.4	0.4	0.1	6.4	6.5	2.7	2.7	5.0
Area of Town of Jamestown parcels crossed (acres)		3.6	3.6	1.9	1.3	1.9	23.6	23.6	14.1	10.1	14.1
Area of NFS lands crossed (acres)		6.9	7.3	7.9	8.3	8.4	45.6	53.5	61.6	63.4	67.9
Area of FMNF recreation areas crossed (acres)		0	0	0	0	0	0	0	0	0	0
Area of TNC land crossed (acres)		0	0	0	0	0	0	0	0	0	0

Shulerville Subarea (Honey Hill Study Area)

In the Shulerville subarea, all corridors have significantly fewer constraints and much lower total scores compared to the original EIS corridor (M). As shown in Figure 23, numerous corridors have total scores of approximately 6,000. However, there is not enough differentiation among corridors to identify an option that would conclusively minimize impacts to the greatest degree. A further analysis of the raw calculations and underlying GIS is necessary to determine which of the 13 corridors is the best option (Table 5).

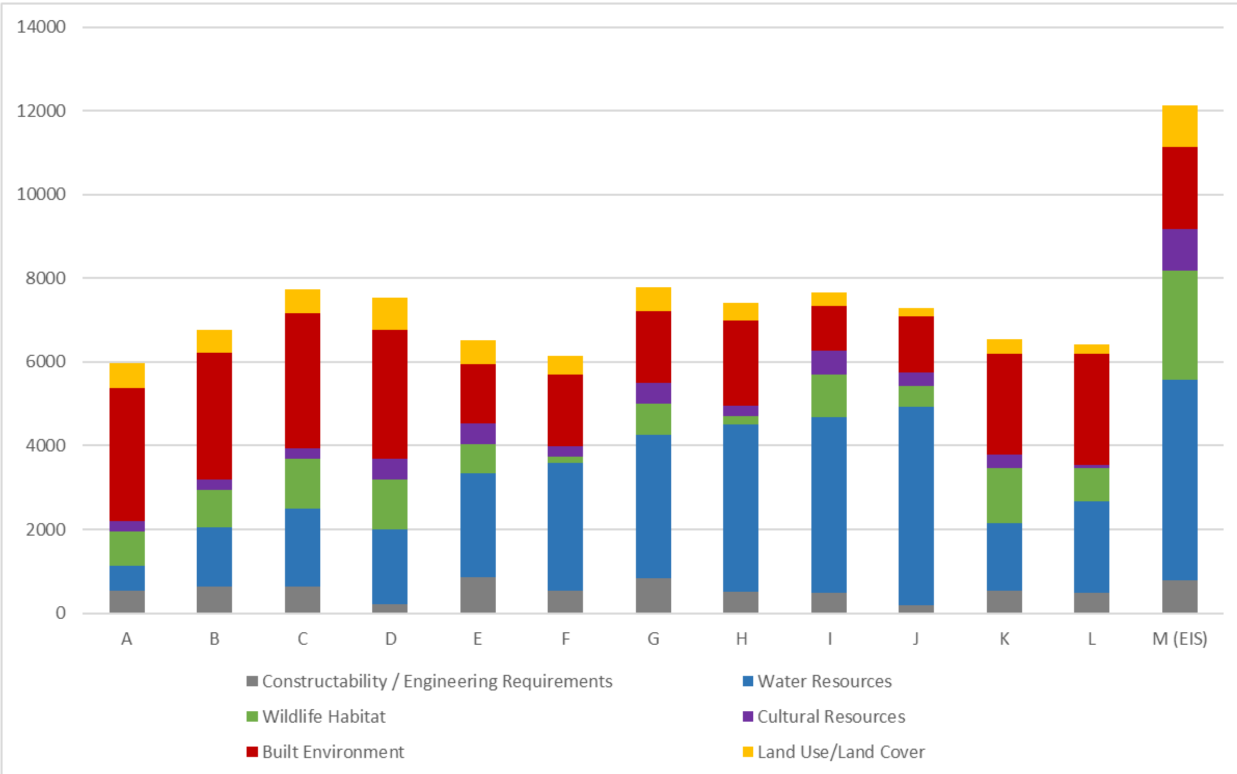
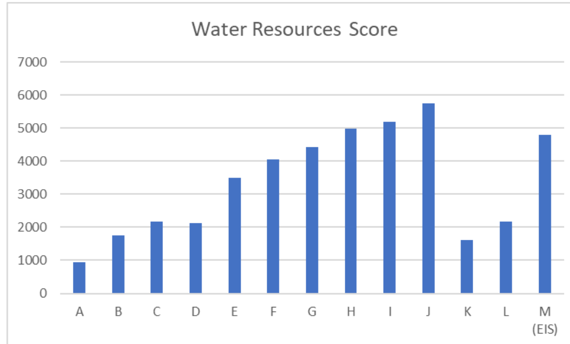
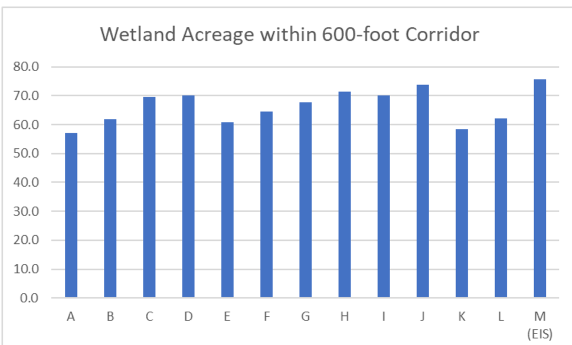


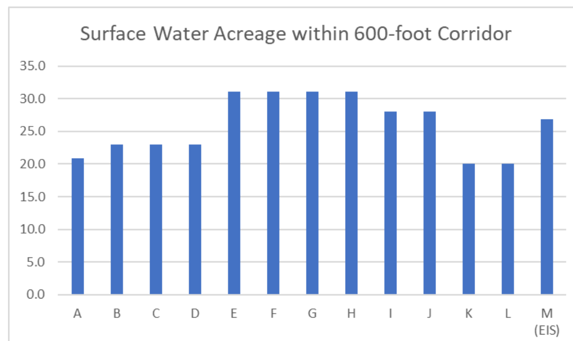
Figure 23. Total scores calculated for corridors in the Shulerville subarea, including the consideration of water resources

With respect to constructability/engineering, corridors A and B are the shortest (4.6 miles) and corridors K and L are the longest (5.5 and 5.4 miles, respectively), while the original EIS corridor (M) is more than 2 miles longer than any alternative corridor (7.8 miles). Also, all corridors have less than half as many major angles as the original EIS corridor, ranging from three to eight. Overall, corridors D and J are the highest ranked because they have least number of large angles (greater than 15º) and major angles.

Routing factors in the water resources category, when normalized, have the greatest contribution to the total score of corridors. The values of metrics in this category are shown in the inset figure to the right, which also compose the blue portions of the bar chart in Figure 23. From these normalized values, corridors A, B, C, D, K, and L have noticeably less water resources impacts than seven other corridors. This includes the corridors that cross Echaw Creek along Shulerville Road (K and L) and along Highway 45 (A, B, C, and D). However, the routing team reviewed the raw calculations (Table 5), and for water resources, the normalization of metrics exaggerates differences among corridors. As discussed above, normalization of values is necessary to compare numbers of different sizes and units, but this data transformation affects the final scores. For example, the inset figures show the acreage of wetlands (left) and surface waters (right) among corridors, which reveals less variation for these highly weighted metrics than indicated by the normalized values for water resources category above.







While other criteria are included in the total water resources score (see Table 3), this exploration reveals that the normalization of certain metrics amplifies the variance among the corridors, making the differences appear more significant than they are. In addition, the NWI data do not necessarily delineate the fine-scale variations and dynamic hydrology of wetlands. Studies have shown NWI data to be less than 70 percent accurate in coastal plain ecosystems; for example, bottomland forests and swamp wetlands may be overrepresented in the NWI data because these wetlands typically have more distinguishable features compared to wet pine savanna and flatwoods (NCDWR 2021). Also, surveys by others in 2018, and WSP biologist in 2024, found that the Jamestown corridor crosses more wetlands than identified by NWI. Thus, to improve interpretation, Figure 24 shows the scores calculated for corridors in the Shulerville subarea without the consideration of water resources. Corridors E, F, G, H, I, and have better overall scores, and the variation among scores is greater. Figure 25 shows the alignment of the three highest ranked corridors (H, I, and J). These corridors all cross Echaw Creek in the middle of the Shulerville subarea (#2 in Figure 13), along an existing unimproved road on private lands. This floodplain crossing is estimated to be approximately 2,000 feet long, which is longer than the floodplain crossings along Shulerville Road (~900 feet) and Highway 45 (~1,000 feet). Thus, four poles likely are required within the floodplain rather than one or two for the other crossings. However, this alignment follows an

Photo 8. Private Road that would be followed by the corridors crossing Echaw Creek in the middle of the Shulerville subarea

existing dirt road that would facilitate construction and maintenance access, as shown in Photo 8 looking north from School Bus Drive. With respect to wildlife resources, corridor A crosses the least acreage of forested habitat, a proxy measure of suitable habitat for the endangered northern long-eared bat. However, the difference among all evaluated corridors is small, ranging from approximately 32 to 42 acres within the 75-foot-wide ROW (excluding the original EIS corridor [A], with approximately 68 acres). The forested acreage within corridors K and L, which follow School Bus Drive and Shulerville Road, is on the high end. Likewise, the acreage of suitable nesting and foraging habitat for RCW within the 600-foot-wide corridor is similar across the corridors analyzed, ranging from 73 to 106 acres, whereas the original EIS corridor [A] intersects 307 acres. Corridors K and L intersect the most suitable RCW habitat, and the field survey confirmed the presence of suitable RCW nesting habitat along School Bus Drive.

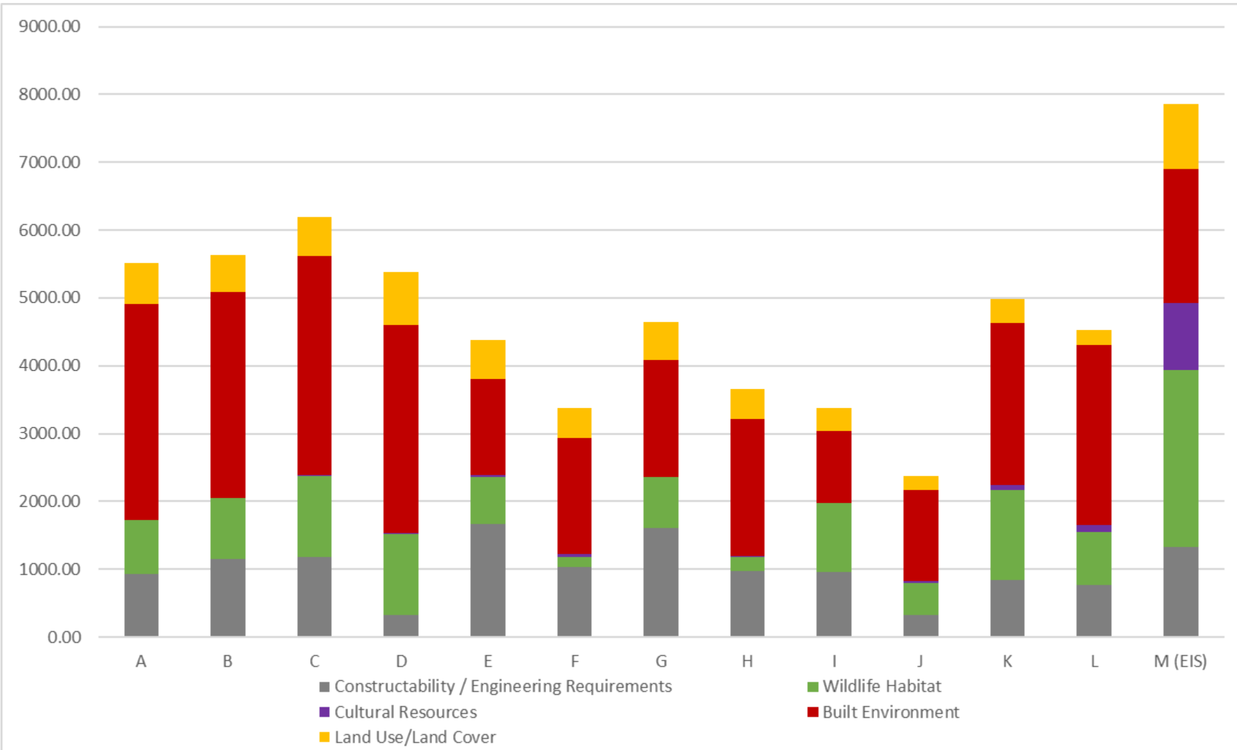


Figure 24. Total scores calculated for corridors in the Shulerville subarea without the consideration of water resources

With respect to cultural resources, no historic structures are within the 600-foot-wide buffer for any corridor, so this is not a potential constraint in the Shulerville subarea. For archaeological sites, there is little differentiation among corridors, as all corridors contain 0.3 or 0.4 acres of listed, eligible, or undetermined archaeological sites. Also, the 600-foot buffer for all corridors intersects either one or two cemeteries, except corridor L, which intersects none. Therefore, there is little advantage to any corridor regarding cultural resources in the Shulerville subarea.

With respect to the built environment, corridors A, B, C, and D, which follow Highway 45 for either 0.6 or 0.9 miles to the north of is intersection with School Bus Drive, have no advantages over other evaluated corridors. There is a residence within the 75-foot-wide ROW for these four corridors, located on the east side of Highway 45 just north of the Chicken Creek Road intersection. At this location, moving the transmission line to the opposite side of the highway involves potentially encroaching on Wesley A.M.E Church to the south. The occurrences of residences along Highway 45 make corridor A, or any other corridor using the easternmost crossing of Echaw Creek (i.e., corridors A, B, C, or D), not preferable. The 600-foot-wide buffer of these four corridors intersects 12 or more residences and 33 or more parcels. No residences are within the 75-foot-wide ROW for the other corridors (Table 5). Corridors K and L, crossing Echaw Creek at Shulerville Road, also do not have any advantages regarding built environment factors because their 600-foot-wide buffer intersects 28 and 26 parcels, and 15 and 14 residences, respectively. In contrast, the 600-foot-wide buffer of corridor J intersects only 16 parcels and 3 residences (Table 5). Thus, following corridor J likely has the least potential direct impacts to residents in the Shulerville area, which is a significant difference with respect to environmental justice considerations. Because corridor J minimizes impacts to residences even with the wetland impacts, it is preferable.

In summary, while corridor A has the lowest score due to water resources factors, selecting it or any other corridor that cross Echaw Creek along Highway 45 would have much greater potential impacts to property owners and residents. While these corridors could minimize impacts to water resources, the advantage is based on data that is subject to inaccuracies (e.g., NWI), and the effect of this advantage was exaggerated by normalizing the values of the routing factors. Corridors K and L, which cross Echaw Creek at Shulerville Road, would impact less acreage of water resources but also include numerous residences within the 600-foot-wide buffer, and these corridors would cross stands of suitable RCW nesting habitat along School Bus Drive. Upon closer inspection of the raw values, the advantages of corridors that cross Echaw Creek in the center of the subarea became more apparent (Figure 25). Corridor J is the best option to minimize impacts within the Shulerville subarea, largely based on its minimal impacts to residences in a known area of environmental justice populations.

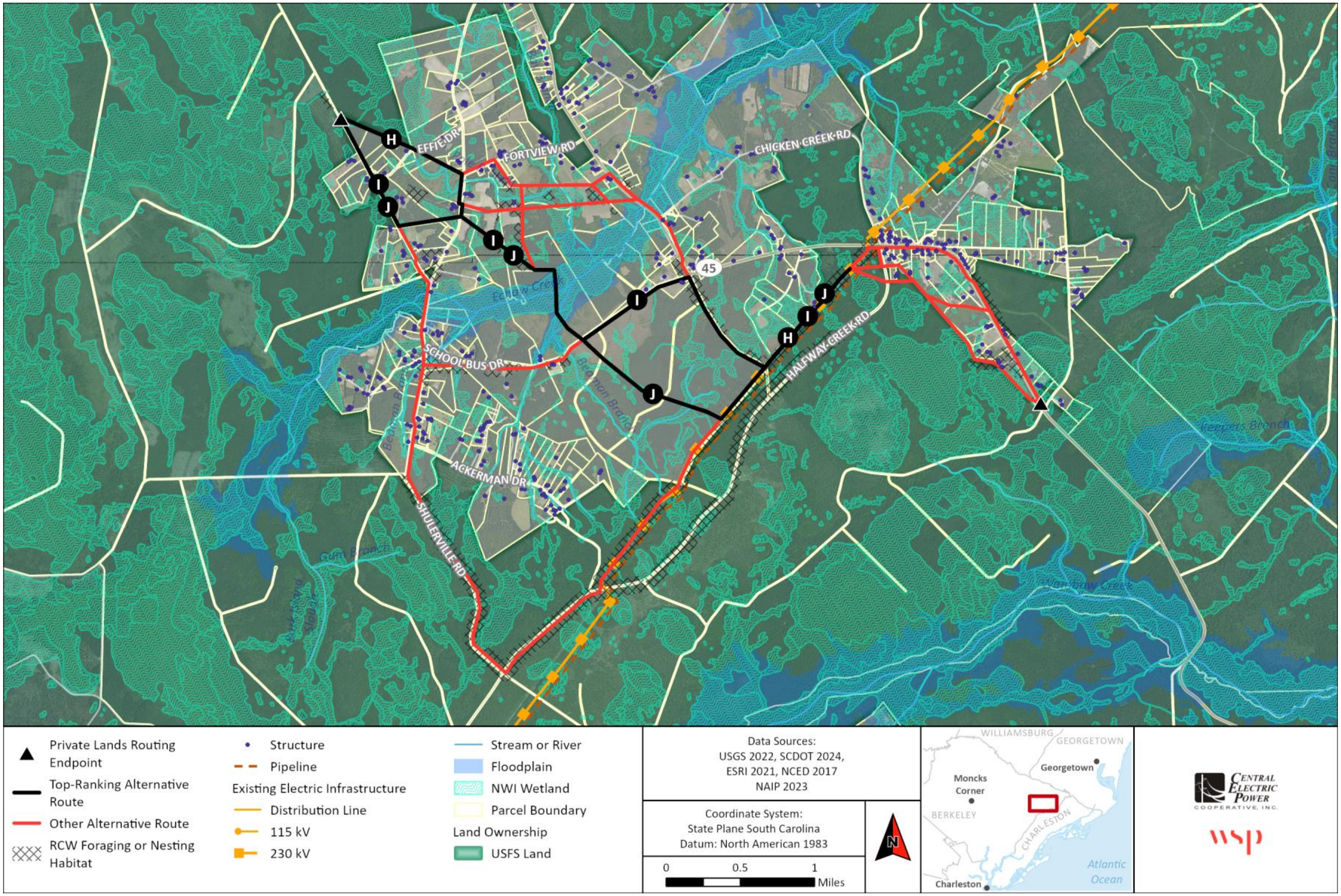


Figure 25. Top-ranking corridors (H, I, and J) in the Shulerville subarea

Table 5. Raw calculations of routing factors for the proposed corridors in the Shulerville subarea

Routing Factor	75-ft Wide (ROW)													600-ft Wide (Corridor)												
Corridor	A	B	C	D	E	F	G	H	I	J	K	L	M (EIS)	A	B	C	D	E	F	G	H	I	J	K	L	M (EIS)
Constructability / Engineering Requirements																										
Length (miles)	4.6	4.6	4.7	4.7	5.2	5.1	5.0	4.9	5.1	5.0	5.5	5.4	7.8	4.6	4.6	4.7	4.7	5.2	5.1	5.0	4.9	5.1	5.0	5.5	5.4	7.8
Angles 0-15 degrees	14	12	13	12	8	8	8	8	7	7	14	13	16	14	12	13	12	8	8	8	8	7	7	14	13	16
Angles 15-40 degrees	5	5	5	6	6	5	5	4	5	4	7	6	14	5	5	5	6	6	5	5	4	5	4	7	6	14
Angles >40 degrees	5	6	6	3	8	6	8	6	6	4	4	4	4	5	6	6	3	8	6	8	6	6	4	4	4	4
Number of state highways crossings (count)	7	7	7	6	3	3	3	3	2	2	1	1	4	7	7	7	6	3	3	3	3	2	2	1	1	4
Number of county/local/USFS road crossings (count)	4	3	3	3	3	3	3	3	1	1	7	7	7	4	3	3	3	3	3	3	3	1	1	7	7	7
Number of railroads crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of airports and runways within 8,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of oil and gas pipeline crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of communication towers within 1,000 feet (count)	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Number of existing transmission line crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Resources																										
Area of surface waters (acres)	2.3	2.3	2.3	2.3	4.1	4.1	4.1	4.1	3.2	3.2	2.4	2.4	3.1	20.9	22.9	22.9	22.9	31.1	31.1	31.1	31.1	28.0	28.0	20.0	20.0	26.8
Area of wetlands (acres)	6.0	7.0	7.8	7.5	6.7	6.7	7.0	7.0	7.5	7.5	7.3	7.3	8.6	57.2	61.9	69.5	70.2	60.8	64.7	67.7	71.5	70.1	73.9	58.5	62.3	75.7
Number of wetlands crossed with span length >500 feet (count)	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	2	2	1	1	1	1	1	1	2	2	2	2	3
Area of PFO wetlands (acres)	5.4	6.4	7.0	6.7	6.1	6.1	6.5	6.4	6.9	6.9	7.1	7.1	8.2	49.6	54.3	61.2	61.5	57.9	60.1	64.8	67.0	67.4	69.5	56.1	58.3	68.4
Area of ROW with forest within 30 feet of wetlands or hydric soils (acres)	7.9	8.7	9.7	9.2	8.3	8.7	9.3	9.7	10.2	10.6	9.9	10.3	12.7	65.3	70.3	78.6	78.4	70.4	74.9	79.6	84.1	82.8	87.3	67.8	72.3	79.4
Acres of ROW with forest within 31-100 feet of wetlands or hydric soils (acres)	4.6	4.6	4.8	4.5	4.1	6.0	4.8	6.7	5.7	7.7	6.2	8.2	8.3	33.5	33.9	34.6	34.3	32.2	37.0	34.0	38.8	37.2	42.0	38.2	43.0	45.7
Area of 100-year floodplain (acres)	1.6	1.7	1.7	1.7	3.6	3.6	3.6	3.6	3.6	3.6	2.0	2.0	1.9	14.7	16.2	16.2	16.2	29.2	29.2	29.2	29.2	29.2	29.2	19.8	19.8	17.6
Area of 500-year floodplain (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 100-year floodplain crossings (count) required	2	2	2	2	4	4	4	4	4	4	1	1	1	2	2	2	2	4	4	4	4	4	4	1	1	1
Number of potential power poles required within 500-year floodplain crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wildlife Habitat																										
Area of suitable nesting habitat for RCW (acres)	6.5	6.5	7.9	9.0	9.9	9.1	8.1	7.3	8.1	7.3	9.9	9.1	35.5	67.7	67.9	72.3	72.8	74.6	78.3	69.4	73.2	69.4	73.2	87.7	91.5	306.9
Area of suitable foraging habitat for RCW (acres)	1.8	1.8	1.8	1.8	1.8	0.0	1.8	0.0	1.8	0.0	2.8	1.0	0.0	13.2	13.2	13.2	13.2	13.2	0.0	13.2	0.0	13.2	0.0	18.4	5.2	0.0
Area of forest (acres)	31.8	31.6	34.5	33.6	33.1	36.6	31.6	35.0	35.5	39.0	38.8	42.2	68.2	241.9	242.3	257.7	250.9	248.2	271.4	242.6	265.8	261.1	284.2	271.8	295.0	454.0

Table 5 (continued). Raw calculations of routing factors for the proposed corridors in the Shulerville subarea

Routing Factor	75-ft Wide (ROW)													600-ft Wide (Corridor)												
Corridor	A	B	C	D	E	F	G	H	I	J	K	L	M (EIS)	A	B	C	D	E	F	G	H	I	J	K	L	M (EIS)
Area of NWI wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays (acres)	2.6	3.4	4.4	4.3	2.1	1.9	2.3	2.1	3.1	3.0	4.1	3.9	6.1	31.7	35.1	42.4	42.9	26.1	24.2	29.9	28.0	36.2	34.3	33.7	31.8	51.4
Cultural Resources																										
Area of listed, eligible, or undetermined archaeological sites (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.2
Number of listed, eligible, or undetermined historic structures (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of cemeteries (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	1	2	1	2	1	1	0	0
Built Environment																										
Number of parcels (count)	37	35	36	33	21	19	21	19	18	16	28	26	26	61	53	53	47	33	25	32	23	31	22	55	46	52
Number of unique landowners (count)	33	32	33	30	19	17	19	17	16	14	25	23	23	48	44	44	39	27	21	26	19	26	19	44	37	41
Number of parcels <10 acres in size (count)	21	19	19	14	5	3	5	3	4	2	12	10	11	39	31	31	23	12	6	12	6	11	5	31	25	31
Length NOT parallel to an existing corridor (miles)	1.1	1.1	1.2	1.3	0.7	1.4	1.1	1.8	0.9	1.6	0.6	1.2	0	1.1	1.1	1.2	1.3	0.7	1.4	1.1	1.8	0.9	1.6	0.6	1.2	0
Length NOT parallel to an existing corridor (percent)	23%	25%	26%	28%	13%	27%	22%	37%	18%	32%	10%	23%	0%	23%	25%	26%	28%	13%	27%	22%	37%	18%	32%	10%	23%	0%
Number of residences (count)	1	1	1	1	0	0	0	0	0	0	0	0	0	13	12	13	14	10	9	9	8	4	3	15	14	17
Number of non-residential buildings (count)	1	1	1	1	1	1	1	1	1	1	1	1	1	10	9	9	7	5	2	5	2	7	4	16	13	16
Land Use/Land Cover																										
Length within forest and NOT adjacent to land cover edges, existing corridors (openings), or parcel boundaries	0.5	0.6	0.9	0.9	0.4	0.8	0.8	1.2	0.8	1.1	0.5	0.8	0.0	0.5	0.6	0.9	0.9	0.4	0.8	0.8	1.2	0.8	1.1	0.5	0.8	0.0
Area of pavement and other impervious surfaces (acres)	1.4	1.1	1.1	1.6	1.2	1.2	0.7	0.7	0.3	0.3	0.6	0.5	0.9	14.8	12.5	12.7	13.2	12.4	7.3	11.5	6.4	11.0	6.0	23.5	18.5	31.1
Area of cropland crossed (acres)	4.4	4.4	2.4	2.0	0.6	0.6	1.4	1.4	1.3	1.3	0.0	0.0	0.7	32.1	30.9	21.8	24.2	12.0	12.0	8.2	8.2	9.8	9.8	3.9	3.9	10.4
Area of prime farmland crossed (acres)	22.3	21.9	23.6	24.2	29.7	21.4	28.3	20.0	28.0	19.7	29.0	20.8	17.4	192.6	189.5	198.2	205.4	241.1	178.0	233.8	170.7	232.7	169.6	237.0	173.4	149.0
Area of scrub/shrub thicket crossed (acres)	2.3	2.3	2.3	2.0	8.8	6.5	8.8	6.5	6.8	4.6	7.3	5.0	0.7	22.0	22.0	22.0	19.7	73.8	52.0	73.8	52.0	59.6	37.8	61.5	39.2	14.4
Area of barren/grass/pasture crossed (acres)	1.6	1.6	1.6	2.5	3.5	1.3	3.5	1.3	2.3	0.1	3.5	1.3	0.3	15.3	15.3	15.3	19.3	18.6	7.7	18.4	7.6	16.1	5.3	27.7	16.8	14.4
Area of Town of Jamestown parcels crossed (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of NFS lands crossed (acres)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	8.7	8.7	36.6	64.4	64.4	64.4	64.4	68.2	74.0	68.2	74.0	69.1	75.0	84.6	90.4	313.3
Area of FMNF recreation areas crossed (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Area of TNC land crossed (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Honey Hill East Subarea (Honey Hill Study Area)

In the Honey Hill subarea, corridors B, D, and F have considerably lower overall scores (i.e., fewer constraints and more opportunities) than corridors C, E, G, or the original EIS corridor (A) (Figure 26). The alignment of these proposed corridors is shown in Figure 27. There is not a wide differentiation among the results for these corridors, and an exploration of the raw calculations and underlying GIS is necessary to identify the best option (Table 6).

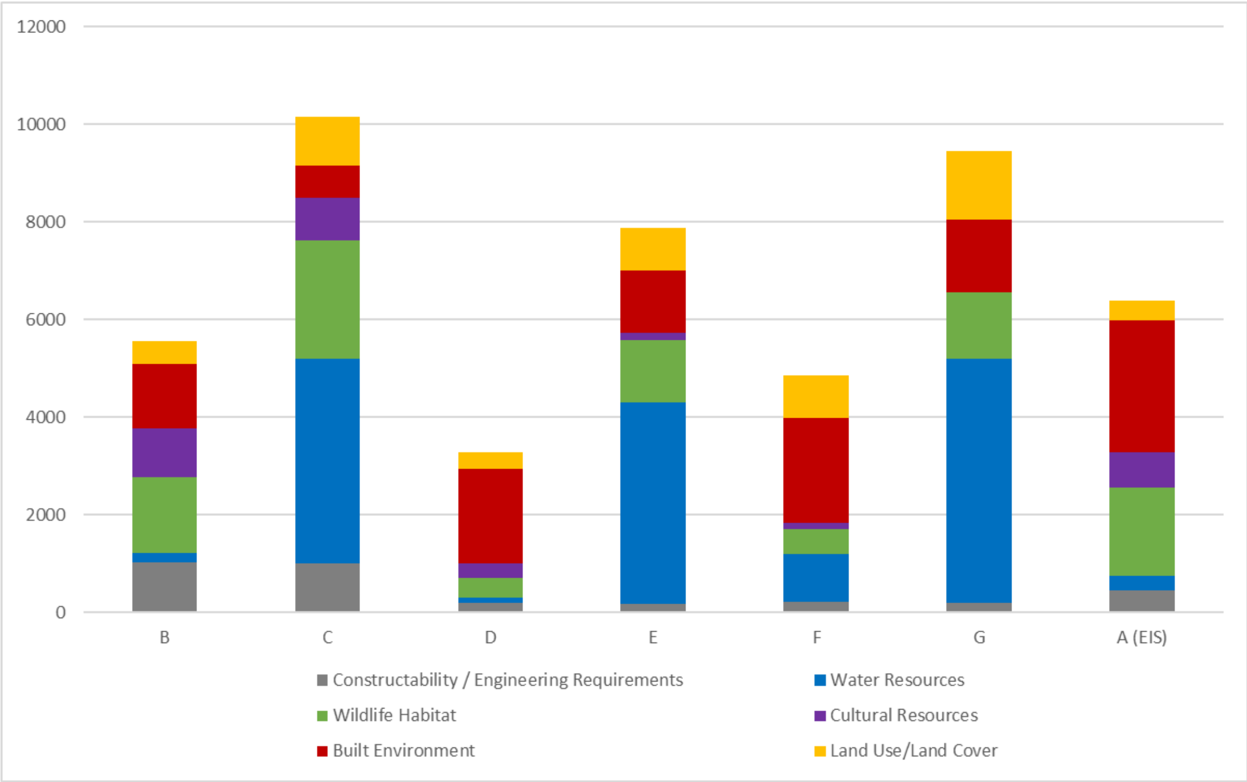


Figure 26. Total scores calculated for corridors in the Honey Hill East subarea

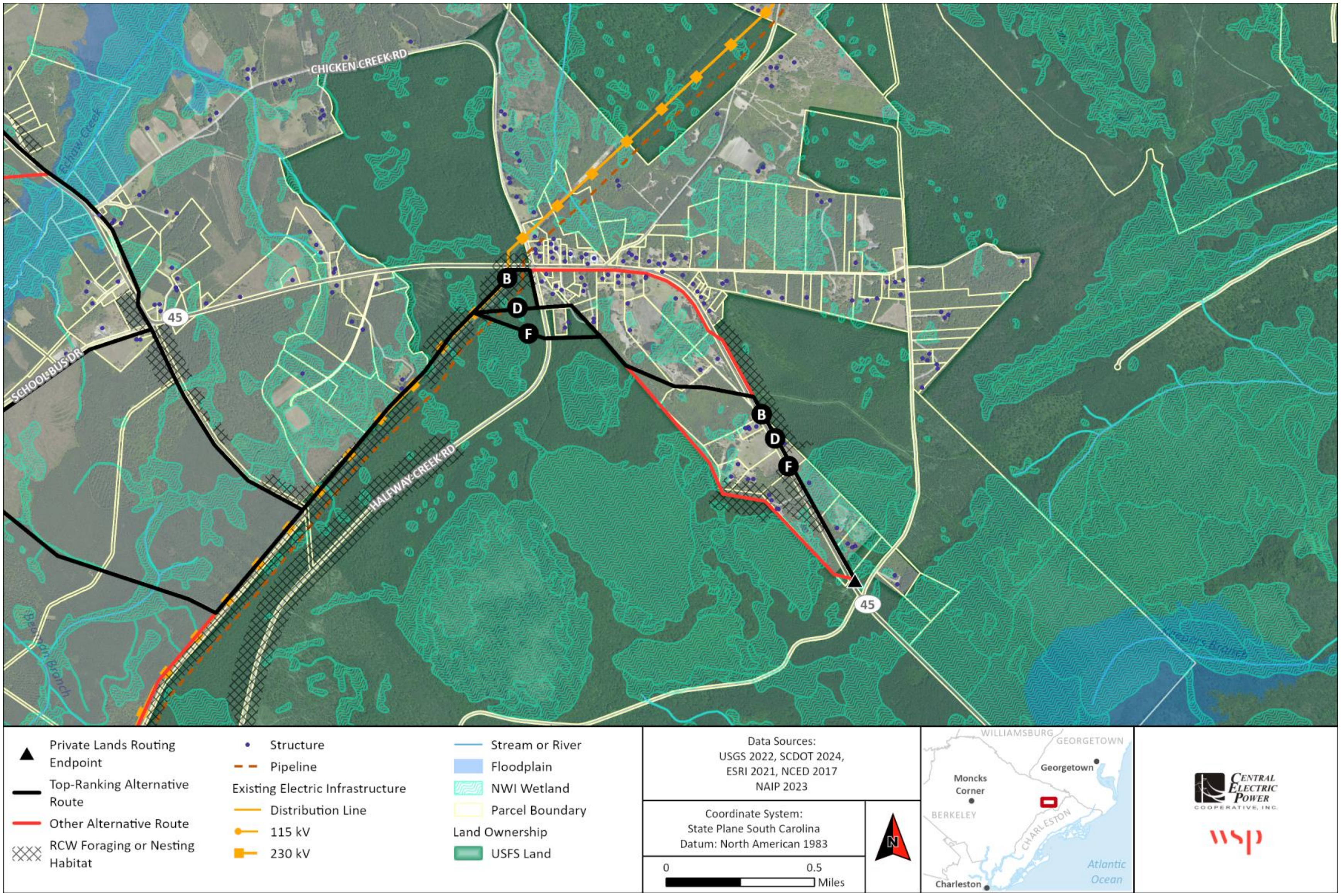


Figure 27. Top-ranking corridors (B, D, and F) in the Honey Hill East subarea

Table 6. Raw calculations of routing factors for the proposed corridors in the Honey Hill East subarea

Routing Factor	75-ft Wide (ROW)							600-ft Wide (Corridor)						
Corridor	B	C	D	E	F	G	A (EIS)	B	C	D	E	F	G	A (EIS)
Constructability / Engineering Requirements														
Length (miles)	1.9	1.9	1.8	1.7	1.7	1.7	1.9	1.9	1.9	1.8	1.7	1.7	1.7	1.9
Angles 0-15 degrees	2	1	2	1	2	1	4	2	1	2	1	2	1	4
Angles 15-40 degrees	2	3	2	3	3	4	3	2	3	2	3	3	4	3
Angles >40 degrees	6	6	2	2	2	2	2	6	6	2	2	2	2	2
Number of state highways crossings (count)	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of county/local/USFS road crossings (count)	2	1	2	1	1	0	1	2	1	2	1	1	0	1
Number of railroads crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of airports and runways within 8,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of oil and gas pipeline crossings (count)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of communication towers within 1,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of existing transmission line crossings (count)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Water Resources														
Area of surface waters (acres)	0	2.4	0	2.4	0	2.4	0	0.0	13.6	0.0	13.6	0.0	13.6	0.0
Area of wetlands (acres)	1.1	4.6	1.1	4.6	1.8	5.2	1.2	17.6	33.4	18.8	34.5	22.4	38.1	17.8
Number of wetlands crossed with span length >500 feet (count)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	1	2	1	2	1	2	1
Area of PFO wetlands (acres)	1.1	4.6	1.1	4.6	1.8	5.2	1.2	16.5	32.5	17.6	33.6	21.2	37.2	17.0
Area of ROW with forest within 30 feet of wetlands or hydric soils (acres)	1.9	5.4	1.8	5.4	2.7	6.3	2.2	18.0	35.7	19.2	36.9	23.7	41.4	19.8
Acres of ROW with forest within 31-100 feet of wetlands or hydric soils (acres)	1.8	1.8	1.6	1.7	2.0	2.1	1.9	11.5	15.1	12.0	15.6	12.9	16.5	11.2
Area of 100-year floodplain (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Area of 500-year floodplain (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 100-year floodplain crossings (count) required	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 500-year floodplain crossings (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wildlife Habitat														
Area of suitable nesting habitat for RCW (acres)	2.6	2.6	0.6	0.6	0.3	0.3	2.2	19.3	19.3	6.4	6.4	4.6	4.6	19.1
Area of suitable foraging habitat for RCW (acres)	1.0	2.0	1.0	2.0	1.0	2.0	1.5	17.5	16.7	17.5	16.7	17.5	16.7	25.1
Area of forest (acres)	14.6	16.2	12.9	14.5	13.3	14.9	11.9	108.3	122.5	102.8	116.9	105.4	119.6	83.6
Area of NWI wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays (acres)	1.1	4.5	1.1	4.5	1.7	5.1	1.2	15.6	31.8	16.8	32.9	20.1	36.2	15.9

Table 6 (continued). Raw calculations of routing factors for the proposed corridors in the Honey Hill East subarea

Routing Factor	75-ft Wide (ROW)							600-ft Wide (Corridor)						
Corridor	B	C	D	E	F	G	A (EIS)	B	C	D	E	F	G	A (EIS)
Area of listed, eligible, or undetermined archaeological sites (acres)	0.5	0.5	0	0	0	0	0	3.4	2.9	1.0	0.5	0.5	0.0	2.4
Number of listed, eligible, or undetermined historic structures (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of cemeteries (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Built Environment														
Number of parcels (count)	13	8	13	8	9	4	16	25	18	21	14	16	9	45
Number of unique landowners (count)	13	8	13	8	9	4	14	23	17	19	13	15	9	36
Number of parcels < 10 acres in size (count)	9	5	9	5	5	1	14	19	14	15	10	10	5	38
Length NOT parallel to an existing corridor (miles)	0.0	0.0	0.2	0.2	0.4	0.4	0.0	0.0	0.0	0.2	0.2	0.4	0.4	0.0
Length NOT parallel to an existing corridor (percent)	0%	0%	13%	13%	26%	27%	0%	0%	0%	13%	13%	26%	27%	0%
Number of residences (count)	0	0	0	0	0	0	0	7	6	6	5	6	5	25
Number of non-residential buildings (count)	0	0	0	0	0	0	0	11	8	8	5	6	3	21
Land Use/Land Cover														
Length within forest and NOT adjacent to land cover edges, existing corridors (openings), or parcel boundaries (miles)	0.0	0.0	0.2	0.2	0.4	0.4	0.0	0.0	0.0	0.2	0.2	0.4	0.4	0.0
Area of pavement and other impervious surfaces (acres)	0.5	0.3	0.5	0.3	0.4	0.2	0.5	11.4	6.7	9.1	4.4	8.2	3.5	19.7
Area of cropland crossed (acres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of prime farmland crossed (acres)	0.8	0.8	0.0	0.0	0.0	0.0	0.8	7.7	7.7	0.3	0.3	0.3	0.3	7.7
Area of scrub/shrub thicket crossed (acres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	1.1	0.0	1.1	0.0	1.1
Area of barren/grass/pasture crossed (acres)	2.3	0.4	2.3	0.4	1.9	0.0	4.9	19.7	7.8	18.2	6.3	14.8	2.9	35.3
Area of Town of Jamestown parcels crossed (acres)	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of NFS lands crossed (acres)	6.2	12.9	4.6	11.3	5.6	12.3	5.3	53.1	85.8	46.4	79.1	52.0	84.7	43.2
Area of FMNF recreation areas crossed (acres)	0	0	0	0	0	0	0	0.7	1.6	0.7	1.6	0.7	1.6	0.7
Area of TNC land crossed (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Approximately 75 percent of corridors B, D, and F share the same alignment but differ in how they connect from their common point of intersection near Mount Zion Church Road west to the existing Winyah-Charity 230-kV transmission line ROW. Once they intersect with the existing ROW, all proposed corridors are routed follow south using the 230-kV-ROW Option as analyzed in the draft final EIS. Among the three top Honey Hill East options analyzed, corridor D has the lowest (best) overall score. Both corridors D and F are shorter than corridor B and include fewer major angles. Corridor B extends north to Highway 45 before connecting to the 230-kV ROW and crosses just as much unevaluated NFS lands as corridors D and F. The differences among constraints/opportunities for corridors D and F are otherwise small, and the data do not clearly indicate that one is preferable over the other. Corridor D is better in one respect because its 600-foot-wide buffer includes less acreage of unevaluated NFS lands, and the final ROW could be placed on private land for a large portion of the area where unevaluated NFS lands could be affected. Based on this discussion, the routing team determined that corridor D is the best option to minimize impacts within the Honey Hill East subarea.

McClellanville Study Area

In the McClellanville study area, corridors D, E, and F have considerably lower overall scores (i.e., fewer constraints and more opportunities) than corridors A, B, and C (Figure 28). Figure 29 shows the alignment of these proposed corridors. The original EIS corridor (Z) also has a total score comparable to corridors D, E, and F.

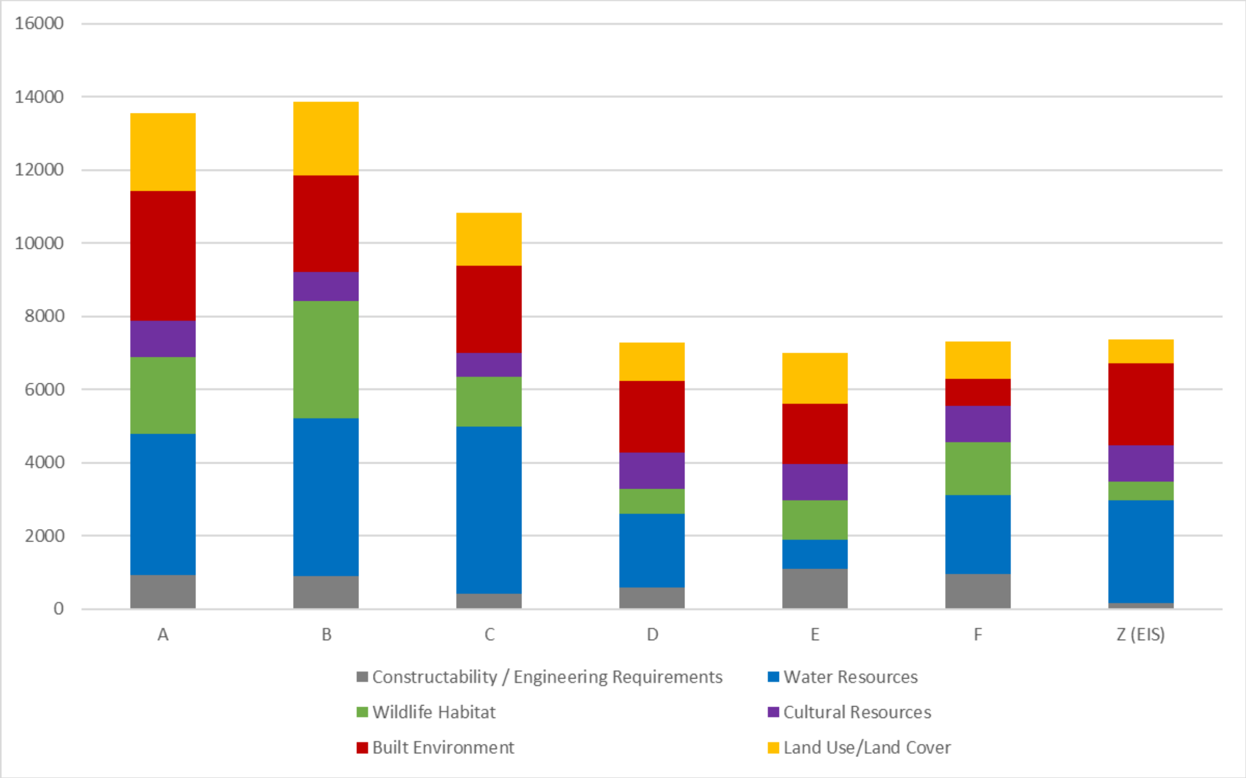


Figure 28. Total scores calculated for corridors in the McClellanville study area

Corridor D, at 2.4 miles, is the shortest of the corridors evaluated, compared to 2.9 and 2.7 miles for corridors E and F, respectively (Table 7). Corridor D requires five major angles, while corridors E and F require eight.

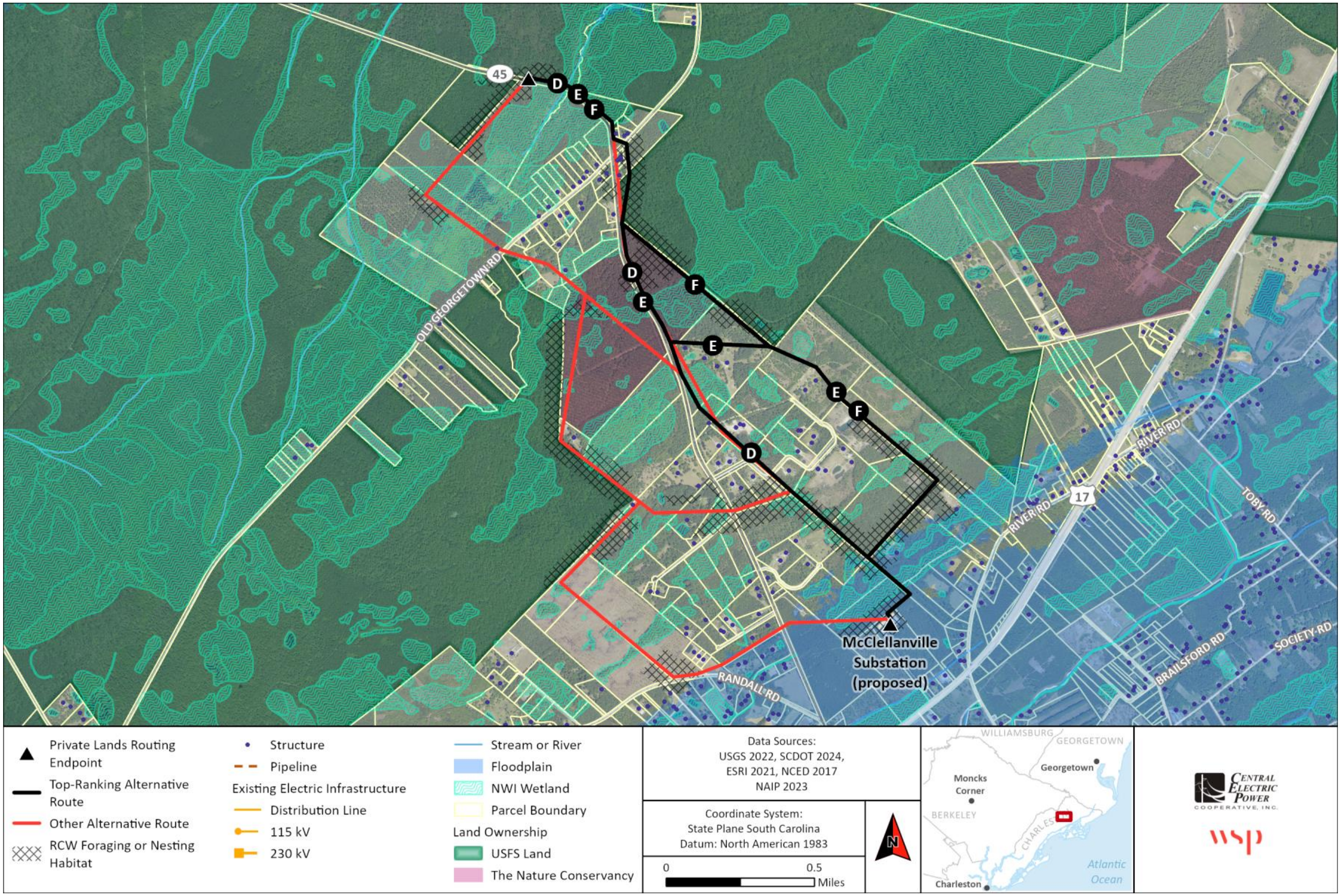


Figure 29. Top-ranking corridors (D, E, and F) in the McClellanville study area

Table 7. Raw calculations of routing factors for the proposed corridors in the McClellanville study area

Routing Factor		75-ft Wide (ROW)							600-ft Wide (Corridor)						
	Corridor	A	B	C	D	E	F	Z (EIS)	A	B	C	D	E	F	Z (EIS)
Constructability / Engineering Requirements															
Length (miles)		3.6	3.2	2.8	2.5	2.9	2.7	2.4	3.6	3.2	2.8	2.5	2.9	2.7	2.4
Angles 0-15 degrees		2	0	1	9	7	4	7	2	0	1	9	7	4	7
Angles 15-40 degrees		3	4	4	3	4	3	2	3	4	4	3	4	3	2
Angles >40 degrees		6	6	3	5	8	8	3	6	6	3	5	8	8	3
Number of state highways crossings (count)		3	3	3	0	0	0	0	3	3	3	0	0	0	0
Number of county/local/USFS road crossings (count)		0	1	1	2	1	1	2	0	1	1	2	1	1	2
Number of railroads crossings (count)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of airports and runways within 8,000 feet (count)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of oil and gas pipeline crossings (count)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of communication towers within 1,000 feet (count)		1	0	0	0	0	0	0	1	0	0	0	0	0	0
Number of existing transmission line crossings (count)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Resources															
Area of surface waters (acres)		2.4	1.7	1.5	1.9	1.9	3.6	2.2	23.7	18.0	14.1	19.2	18.0	30.0	20.2
Area of wetlands (acres)		6.8	6.7	7.3	4.2	2.7	3.7	5.1	57.1	65.1	65.0	49.0	40.3	43.1	50.6
Number of wetlands crossed with span length >500 feet (count)		3.0	2.0	3.0	1.0	1.0	2.0	2.0	3	2	3	1	1	2	2
Area of PFO wetlands (acres)		6.8	6.7	7.3	4.2	2.7	3.3	5.1	55.5	63.3	63.9	48.7	40.1	41.6	50.3
Area of ROW with forest within 30 feet of wetlands or hydric soils (acres)		7.5	9.0	9.3	6.2	4.2	5.1	6.9	60.5	76.4	74.7	57.2	44.5	44.3	59.0
Acres of ROW with forest within 31-100 feet of wetlands or hydric soils (acres)		3.4	6.1	5.1	4.9	3.7	3.3	4.8	24.5	34.5	30.2	23.7	17.9	16.3	23.7
Area of 100-year floodplain (acres)		0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of 500-year floodplain (acres)		4.2	2.6	2.6	2.6	2.7	2.7	2.6	4.2	2.6	2.6	2.6	2.7	2.7	2.6
Number of potential power poles required within 100-year floodplain crossings (count)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of potential power poles required within 500-year floodplain crossings (count)		3	4	4	4	4	4	4	3	4	4	4	4	4	4
Wildlife Habitat															
Area of suitable nesting habitat for RCW (acres)		7.5	11.1	7.9	9.7	9.7	12.6	8.4	70.5	91.0	60.2	70.4	74.0	87.8	66.5
Area of suitable foraging habitat for RCW (acres)		3.8	2.7	0.8	0.0	1.7	1.7	0.0	26.1	19.8	6.0	0.0	13.2	13.2	0.0
Area of forest (acres)		23.9	27.8	24.1	20.9	21.2	21.6	20.4	201.6	217.2	184.5	155.6	163.8	163.7	152.5
Area of NWI wetlands that intersect Wet Pine Savanna and Flatwoods, Upland Longleaf Pine Woodlands and Forests, or Depressional Wetlands and Carolina Bays (acres)		2.3	2.6	2.8	1.0	0.4	0.2	1.3	25.0	30.9	31.5	16.8	11.9	8.3	17.1
Cultural Resources															
Area of listed, eligible, or undetermined archaeological sites (acres)		0.2	0.1	0.1	0	0	0	0	3.6	2.9	2.3	0.0	0.0	0.0	0.0
Number of listed, eligible, or undetermined historic structures (count)		0	0	0	1	1	1	1	0	0	0	1	1	1	1
Number of cemeteries (count)		0	0	0	0	0	0	0	1	1	1	1	1	1	1

Table 7 (continued). Raw calculations of routing factors for the proposed corridors in the McClellanville study area

Routing Factor		75-ft Wide (ROW)							600-ft Wide (Corridor)						
	Corridor	A	B	C	D	E	F	Z (EIS)	A	B	C	D	E	F	Z (EIS)
Built Environment															
Number of parcels (count)		25	27	24	22	19	19	23	45	42	42	46	38	37	49
Number of unique landowners (count)		21	24	22	18	14	14	19	37	33	36	39	29	28	41
Number of parcels <10 acres in size (count)		8	10	8	10	6	6	11	25	22	22	27	18	18	30
Length NOT parallel to an existing corridor (miles)		1.5	1.4	1.1	0.4	1.0	0.6	0.3	1.5	1.4	1.1	0.4	1.0	0.6	0.3
Length NOT parallel to an existing corridor (percent)		42%	43%	40%	17%	34%	23%	14%	42%	43%	40%	17%	34%	23%	14%
Number of residences (count)		0	0	0	1	1	1	3	12	3	6	10	7	5	12
Number of non-residential buildings (count)		2	1	1	0	0	0	0	5	3	4	6	6	4	6
Land Use/Land Cover															
Length within forest and NOT adjacent to land cover edges, existing corridors (openings), or parcel boundaries (miles)		1.3	1.3	1.1	0.4	0.7	0.4	0.3	1.3	1.3	1.1	0.4	0.7	0.4	0.3
Area of pavement and other impervious surfaces (acres)		0.6	0.6	0.7	0.6	0.5	0.4	0.9	9.2	6.0	8.9	14.1	10.9	8.1	13.9
Area of cropland crossed (acres)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of prime farmland crossed (acres)		4.1	4.4	4.5	3.9	3.8	3.8	3.8	36.8	39.4	40.8	33.1	33.8	33.8	32.9
Area of scrub/shrub thicket crossed (acres)		7.2	0.0	0.0	0.0	2.4	2.4	0.0	44.9	0.7	0.0	0.0	17.7	17.7	0.0
Area of barren/grass/pasture crossed (acres)		1.3	0.6	0.6	0.8	2.0	0.5	0.8	12.1	10.7	13.0	13.1	18.7	12.4	14.0
Area of Town of Jamestown parcels crossed (acres)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Area of NFS lands crossed (acres)		2.0	2.0	0.1	4.0	4.0	4.0	3.4	41.8	32.0	12.1	26.0	28.1	44.3	22.5
Area of FMNF recreation areas crossed (acres)		0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of TNC land crossed (acres)		4.6	4.6	3.7	3.7	3.8	3.8	3.5	31.3	31.3	28.5	26.7	26.8	16.7	26.4

With respect to water resources, corridor E crosses the fewest acres of wetlands (40 acres) but only 3 acres fewer than corridor F, and 9 acres fewer than corridor D. For surface waters, the acreage crossed is similar for corridors D and E, which is 10 acres fewer than corridor F. Corridors D and E span only one wetland greater than 500 feet wide where a pole is required within the wetland; all other corridors, including wetland F, require crossing two to four wetland spans greater than 500 feet.

With respect to wildlife habitat, corridor D has the lowest (best) score followed by corridor E, driven largely by its 600-foot-wide buffer intersecting 17 acres of less suitable RCW habitat. Corridors E and F are similar in terms of overall wildlife habitat.

These top scoring corridors are equal in terms of the potential constraints imposed by cultural resources. For built environment factors, corridor F scores better than corridor E because its 600-foot-wide buffer intersects the fewest number of residences and has the longest length parallel to an existing corridor. The 75-foot-wide ROW for corridors D, E, and F intersects one residence, while the other three evaluated corridors do not intersect any. Corridor F is less preferable because it follows the boundary of approximately 3,300 feet of unevaluated NFS lands.

Based on this discussion, the best scoring corridor, E, is the best option to minimize impacts within the McClellanville study area. Although its advantages over corridor D are not substantial, it crosses fewer parcels and be closer to fewer buildings.

CONCLUSION

This supplemental analysis of alternative corridors across private lands for the proposed McClellanville 115-kV Transmission Line Project has led to the identification of a preferred option based on a comprehensive evaluation of environmental, engineering, and community impact criteria. The routing team from WSP and Central Electric identified feasible transmission line corridors within three study areas: Jamestown, Honey Hill, and McClellanville. An initial set of 103 study segments was reviewed and those with unacceptable constraints were eliminated, while others were refined them based on avoidance criteria such as unevaluated NFS lands, buildings, cemeteries, historic sites, and residences. Fifty-nine segments were carried forward for further evaluation, which were linked to form end-to-end alternative corridors. The original Honey Hill study area was divided into two smaller subareas for easier evaluation: Shulerville and Honey Hill East.

In the Jamestown study area, corridors A and C have the fewest constraints compared to the original EIS corridor (V) and other options (B and D). While both have similar constructability and minimal cultural resource concerns, corridor A crosses the least acreage of NFS lands and sensitive wildlife habitat. Although corridor A intersects several residences and other buildings, the actual impact would be mitigated by the separation of the transmission line by roads or existing ROWs. Therefore, corridor A is the preferred option due to its minimized environmental impacts and better alignment with existing infrastructure.

In the Shulerville subarea [of the Honey Hill study area], all alternative corridors have significantly fewer constraints and much lower total scores compared to the original EIS corridor (M). There was not enough differentiation to conclusively identify the best option among the 12 corridors and a review of the raw calculations and GIS data was necessary. The normalization of water resources metrics exaggerated differences among corridors. When considering other routing factors, corridor J would have the least potential direct impacts to residents. Given environmental justice considerations, corridor J is the preferred option despite greater wetland impacts.

In the Honey Hill East subarea [of the Honey Hill study area], corridors B, D, and F have fewer constraints and more opportunities than corridors C, E, G, or the original EIS corridor (A). Approximately 75 percent of corridors B, D, and F share the same alignment but differ in how they would connect from the vicinity of Mount Zion Church Road to the existing Winyah-Charity 230-kV transmission line ROW. Among these, corridor D has the lowest overall score and is the best option because it would cross less unevaluated NFS lands.

In the McClellanville study area, corridors D, E, and F have lower overall scores and fewer constraints compared to corridors A, B, and C. Corridor D is the shortest and has the fewest major angles. Corridor E crosses the fewest acres of wetlands and surface waters, while corridors D and E span fewer large wetlands than corridor F. Corridor D scores best for wildlife habitat, with corridor E closely following. For built environment factors, corridor F intersects fewer residences but follows the boundary of unevaluated NFS lands. Corridor E is the best option to minimize impacts, as it crosses fewer parcels and is closer to fewer buildings than corridor D.

The RCW analysis found areas of suitable both foraging and nesting habitats, particularly in the Jamestown and Honey Hill study areas. While much of the habitat was confirmed as suitable during the field survey, several areas were downgraded due to the lack of pine tree dominance. Overall, forest stands on private lands that meet the USFWS definition of RCW nesting or foraging habitat were in poor condition and not likely to be used by RCW due to the lack of active management (e.g., prescribed fire, thinning) and a resulting dense understory and/or midstory.

REFERENCES

Burns & McDonnell. 2020. McClellanville Battery Energy Storage Study. Prepared for Central Electric Power Cooperative, Inc., Columbia, SC. Revision A, dated May 1 2020. Prepared by Burns & McDonnell Engineering Company, Inc. Kansas City, MO. 32 pp.

Burns & McDonnell. 2022. McClellanville Battery Energy Storage Study. Letter from Kieran McInerney, Project Manager, Energy Storage Development, to Scott Motsinger, Director, Reliability and Asset Management, Central Electric Power Cooperative, Inc. Dated November 1, 2022. 12 pp.

Central Electric (Central Electric Power Cooperative, Inc.). 2005a. McClellanville Power Supply Alternatives Evaluation. June 22, 2005. 26 pp. https://www.rd.usda.gov/sites/default/files/UWP_SC50cepci_alteval.pdf. Accessed May 20, 2024.

Central Electric. 2005b. Macro-Corridor Study Report for the McClellanville 115-kV Transmission Line. Prepared by Mangi Environmental Group, Inc. for the Central Electric Power Cooperative, Inc. 46 pp. November 2005. https://www.rd.usda.gov/sites/default/files/UWP_SC50cepci_macrocorridor.pdf. Accessed May 20, 2024.

Central Electric. 2010a. McClellanville Power Supply Alternatives Evaluation Study. September 2010. 15 pp.

Central Electric. 2010b. Revised Macro-Corridor Study Report for the McClellanville 115-kV Transmission Line. Prepared by Mangi Environmental Group, Inc. for the Central Electric Power Cooperative, Inc. September 2010. 64 pp.

Cleland, D.T.; Avers, P.E.; McNab, W.H.; Jensen, M.E.; Bailey, R.G., King, T.; Russell, W.E. 1997.National Hierarchical Framework of Ecological Units. Published in, Boyce, M. S.; Haney, A., ed. 1997.Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT. pp. 181-200.

EPRI-GTC (Electric Power Research Institute, and Georgia Transmission Corporation). 2006. Overhead Electric Transmission Line Siting Methodology. EPRI, Palo Alto, CA; and GTC, Tucker. Final Report, Number GA1013080. February 2006 https://www.epri.com/research/products/000000003002017601. Accessed May 20, 2024.

McGavran (McGavran Engineering, P.C.). 2017. McClellanville 115 kV Transmission Line. Independent Engineering Study for Central Electric Power Cooperative, Inc., Columbia, SC. February 2017. https://www.rd.usda.gov/sites/default/files/McClellanville_TransmissionLine_INDEPENDENTSTUDY.pdf. Accessed May 20, 2024.

NCDWR (North Carolina Division of Water Resources). 2021. Accuracy of National Wetland Inventory (NWI) Maps in North Carolina. Published by the North Carolina Division of Water Resources, Water Sciences Section. https://www.ncwetlands.org/project/nwi_accuracy/. Accessed May 20, 2024.

NatureServe. 2009. Descriptions of Ecological Systems for Modeling of LANDFIRE Biophysical Settings. NatureServe Central Databases, Arlington, VA.

RUS (U.S. Department of Agriculture, Rural Utilities Service). 2016. RD Instruction 1970-O, Exhibit D, Guidance for Creating a Macro-Corridor Study. https://www.rd.usda.gov/sites/default/files/Macro-CorridorStudyGuidance.pdf. Accessed May 20, 2024.

RUS. 2015. Design Manual For High Voltage Transmission Lines. Bulletin 1724E-200 RD-GD-2015-78. U.S. Department Of Agriculture RUS Electric Staff Division. https://rd.usda.gov/files/UEP_Bulletin_1724E-200.pdf. Accessed May 21, 2024.

USFWS. 2003. Recovery Plan for the Red-cockaded Woodpecker (*Picoides borealis*): Second Revision. U.S. Fish and Wildlife Service, Atlanta, GA. 296 pp. https://ecos.fws.gov/docs/recovery_plan/030320_2.pdf. Accessed May 20, 2024.