Southeastern Regional TRANSMISSION PLANNING

SERTP – 4th Quarter Meeting

Annual Transmission Planning Summit & Assumptions Input Meeting

December 13th, 2018

GTC Headquarters

Tucker, GA

Original Posted: 11/29/2018

Updated Posted: 12/5/2018

Process Information

- The SERTP process is a transmission planning process.
- Please contact the respective transmission provider for questions related to real-time operations or Open Access Transmission Tariff (OATT) transmission service.
- SERTP Website Address:
  - www.southeasternrtp.com

Agenda

- **Economic Planning Studies**
  - Final Results
- **Ten (10) Year Regional Transmission Plan**
  - Planning Horizon 2019-2028
- **2019 Preliminary Modeling Input Assumptions**
  - Planning Horizon 2020-2029
- **SERTP Regional Transmission Analyses**
- **Miscellaneous Updates**
- **Upcoming 2019 SERTP Process**

SERTP

Economic Planning Studies

Economic Planning Studies

Economic Planning Studies Process

- Economic Planning Studies were chosen by the Regional Planning Stakeholder Group "RPSG" in March at the 2018 SERTP 1st Quarter Meeting.

- Key study criteria, methodologies, and input assumptions were finalized in May.

- These studies represent analyses of hypothetical scenarios requested by the stakeholders and **do not** represent an actual transmission need or commitment to build.

Economic Planning Studies

Economic Planning Studies Process

- **SERTP Sponsors identify the transmission requirements needed to move large amounts of power above and beyond existing long-term, firm transmission service commitments**
  - Analysis are consistent with NERC standards and company-specific planning criteria

- **Models used to perform the analysis incorporate the load forecasts and resource decisions as provided by LSEs**
  - Power flow models are made available to stakeholders to perform additional screens or analysis

Economic Planning Studies

Economic Planning Studies

- **Southern BAA to Santee Cooper Border**
  - 1000 MW (2021 Summer Peak)
- **Santee Cooper Border to Duke Energy Carolinas and Duke Energy Progress**
  - 1000 MW (2021 Summer Peak)
- **Duke Energy Carolinas and Duke Energy Progress to Santee Cooper Border**
  - 1000 MW (2021 Summer Peak)

Economic Planning Studies

Power Flow Cases Utilized

- **Study Years:**
  - 2021

- **Load Flow Cases:**
  - 2018 Series Version 2 SERTP Regional Models
  - Summer Peak
    - Additional load levels evaluated as appropriate

Economic Planning Studies

Final Report Components

- **The SERTP reported, at a minimum, results on elements of 115 kV and greater:**
  - Thermal loadings greater than 90% for facilities that are negatively (+5% ~ Significant Constraints) impacted by the proposed transfers
  - Voltages appropriate to each participating transmission owner's planning criteria
  - Overloaded facilities that had a low response to the requested transfer were excluded and issues identified that are local in nature were also excluded

- **For each economic planning study request, the results of that study include:**
  1. Limit(s) to the transfer
  2. Potential transmission enhancement(s) to address the limit(s)
  3. Planning-level cost estimates and in-service dates for the selected transmission enhancement(s)

Economic Planning Studies

Process Information

- The following information depicts recommended enhancements for the proposed transfer levels above and beyond existing, firm commitments. Therefore, this information does not represent a commitment to proceed with the recommended enhancements nor implies that the recommended enhancements could be implemented by the study dates (2021).

- These potential solutions only address constraints identified within the SERTP Sponsors' areas that are associated with the proposed transfers. Other Balancing Authority Areas were not monitored which could result in additional limitations and required system enhancements.

Economic Planning Studies

Economic Planning Studies

Southern BAA to Santee Cooper Border 1000 MW

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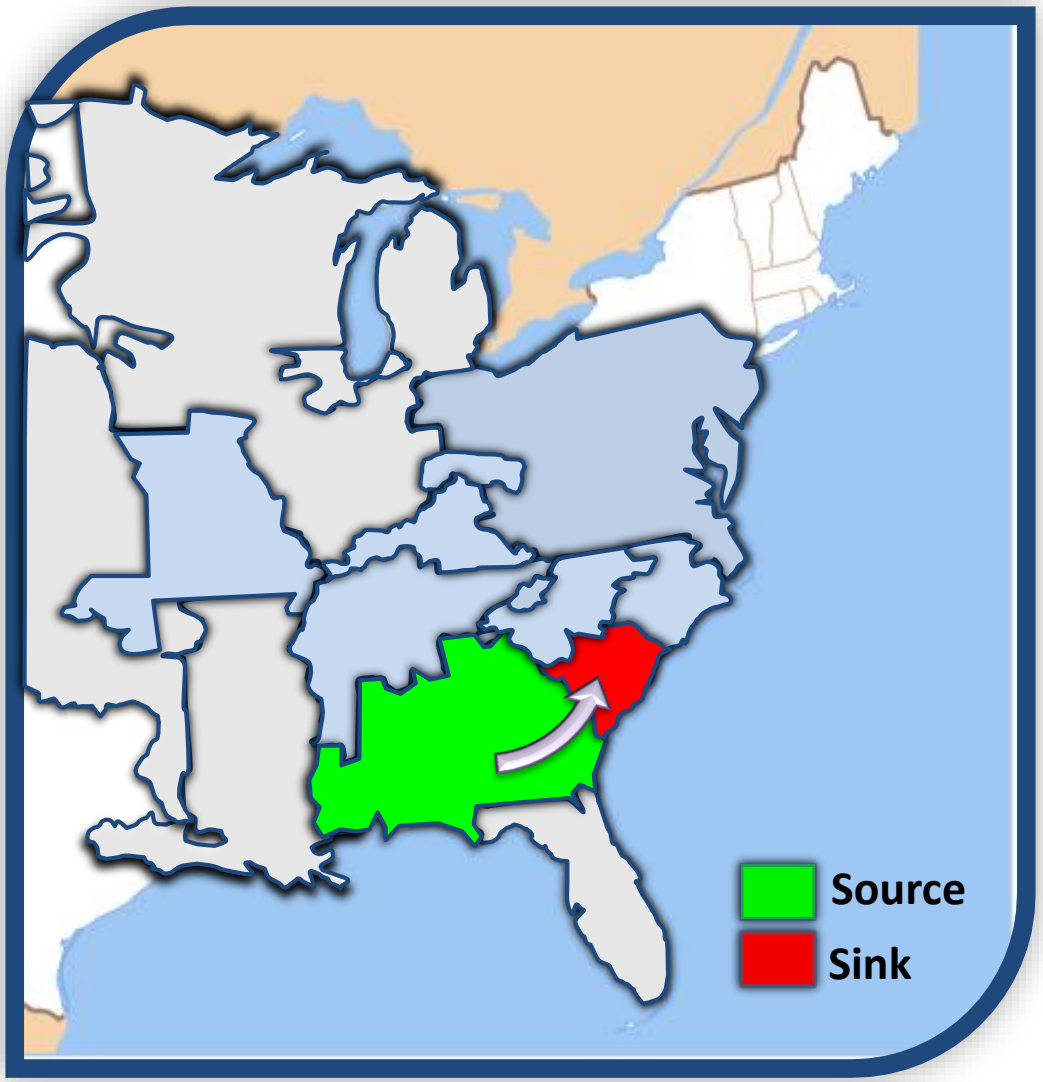
Southern BAA to Santee Cooper – 1000 MW

Study Assumptions

- **Transfer Type:** Generation to Load (2021 Summer Peak)
- **Source:** Generation within Southern BAA
- **Sink:** Uniform load scale within Santee Cooper



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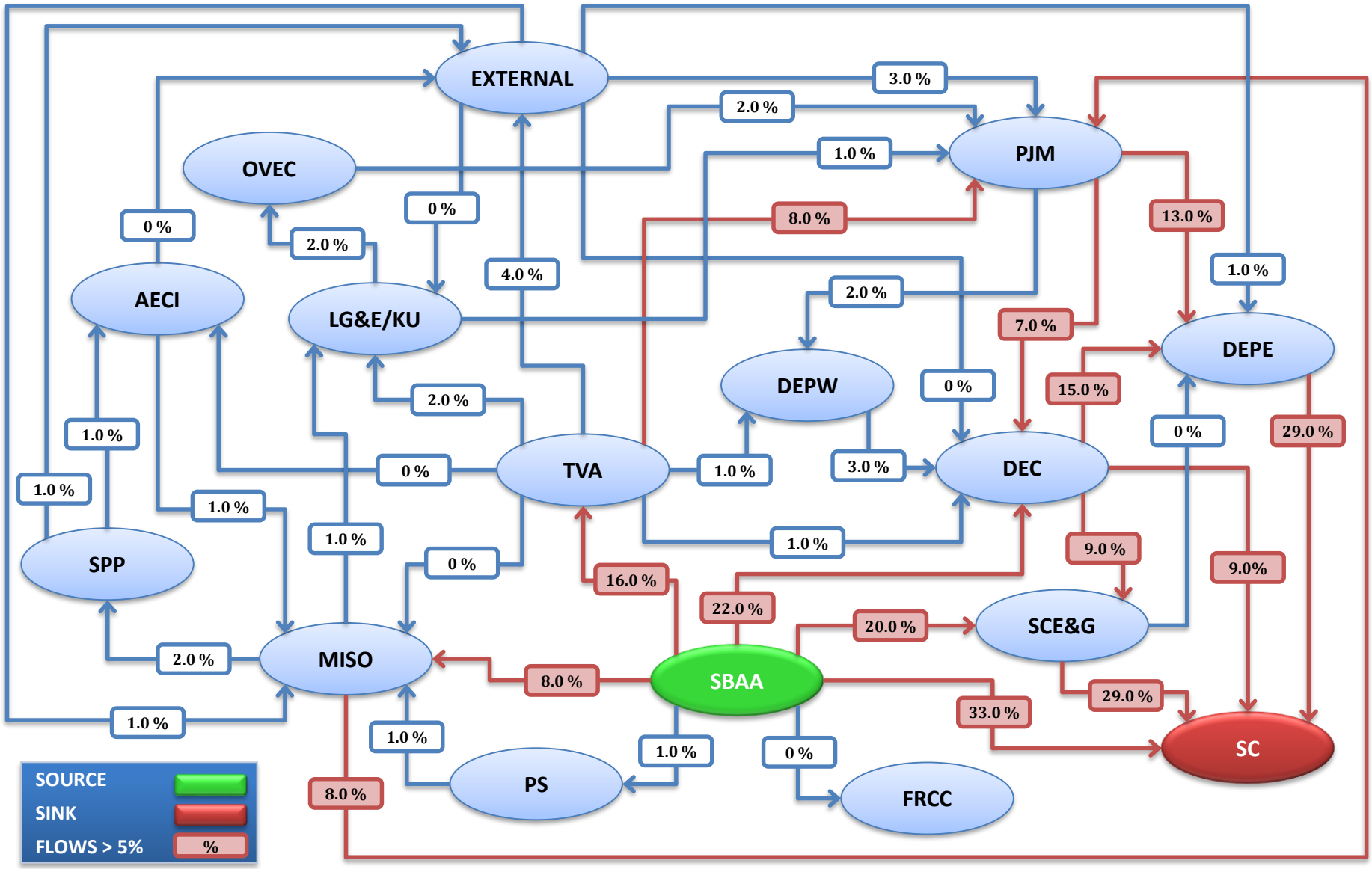
Southern BAA to Santee Cooper – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Southern BAA to Santee Cooper – 1000 MW

Transmission System Impacts

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***SBAA***

- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEC) One (1) Capacitor Bank Installation
  - (SBAA) One (1) 115kV Transmission Line Upgrade

SERTP TOTAL ($2018) = $42,480,000

Southern BAA to Santee Cooper – 1000 MW

Significant Constraints Identified – *DEC*

Table 1: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8
P2, P3	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9

Southern BAA to Santee Cooper – 1000 MW

Potential Enhancements Identified – *DEC*

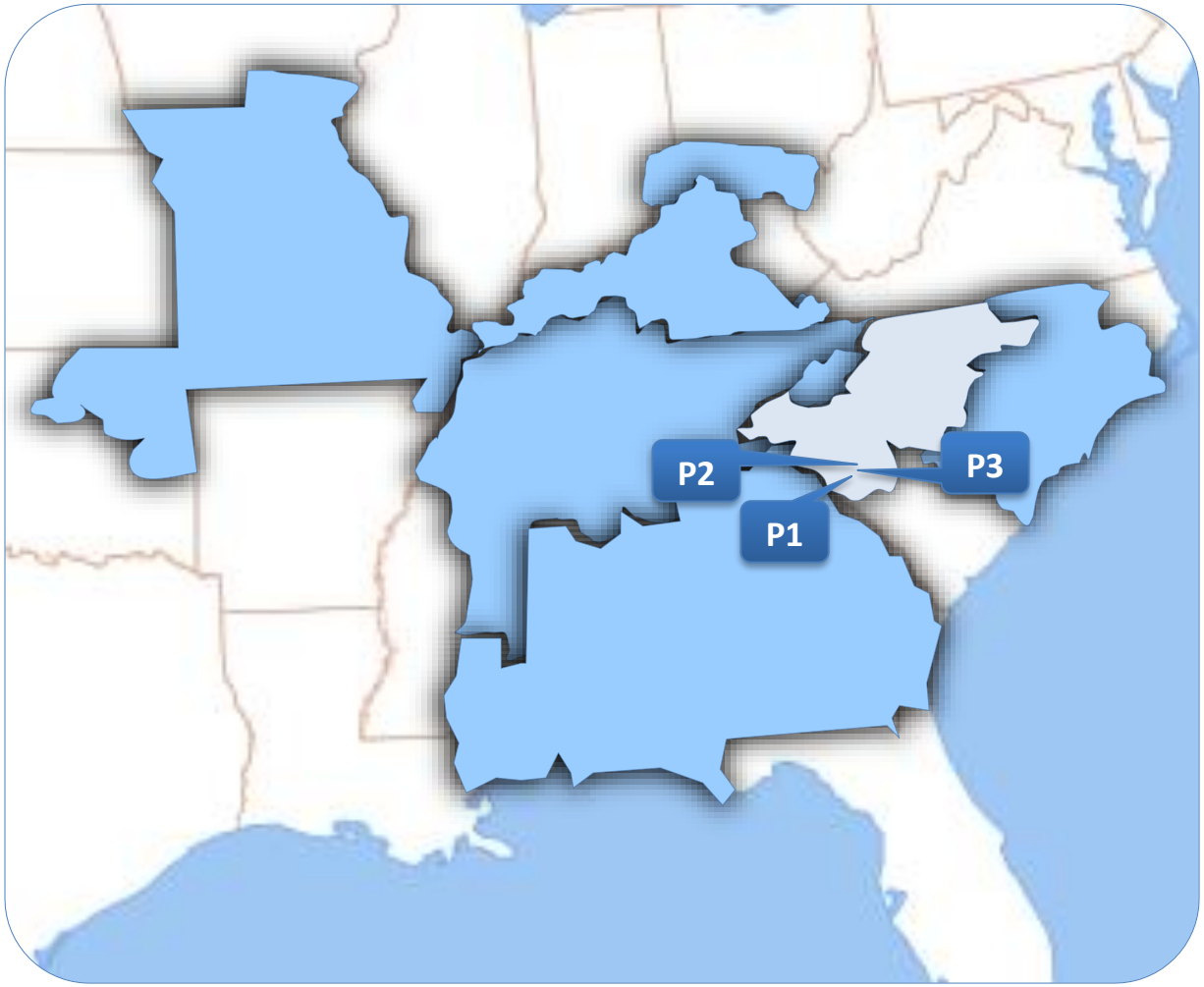
Table 2: Potential Enhancements - DEC

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Hodges Tie – Coronaca Tie 100kV double circuit** T.L. • Rebuild the entire 9.2 mile Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$12,700,000**
P2	**Laurens Tie** • Install a 28.8 MVAR capacitor bank at Laurens Tie.	**$900,000**
P3	**Laurens Tie – Bush River Tie 100kV double circuit T.L.** • Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$12,800,000**
DEC TOTAL ($2018)		**$26,400,000**(1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

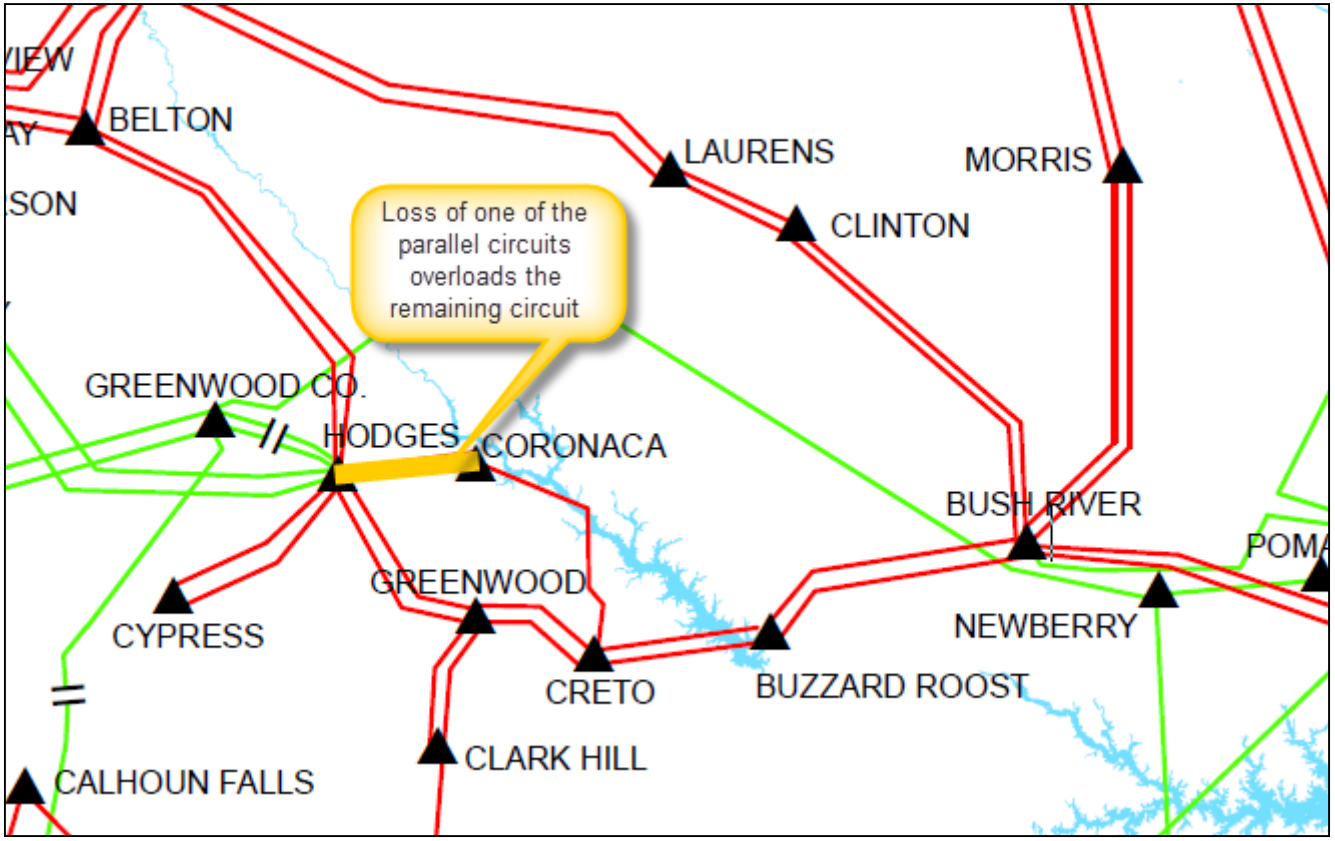
Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement Locations – *DEC*



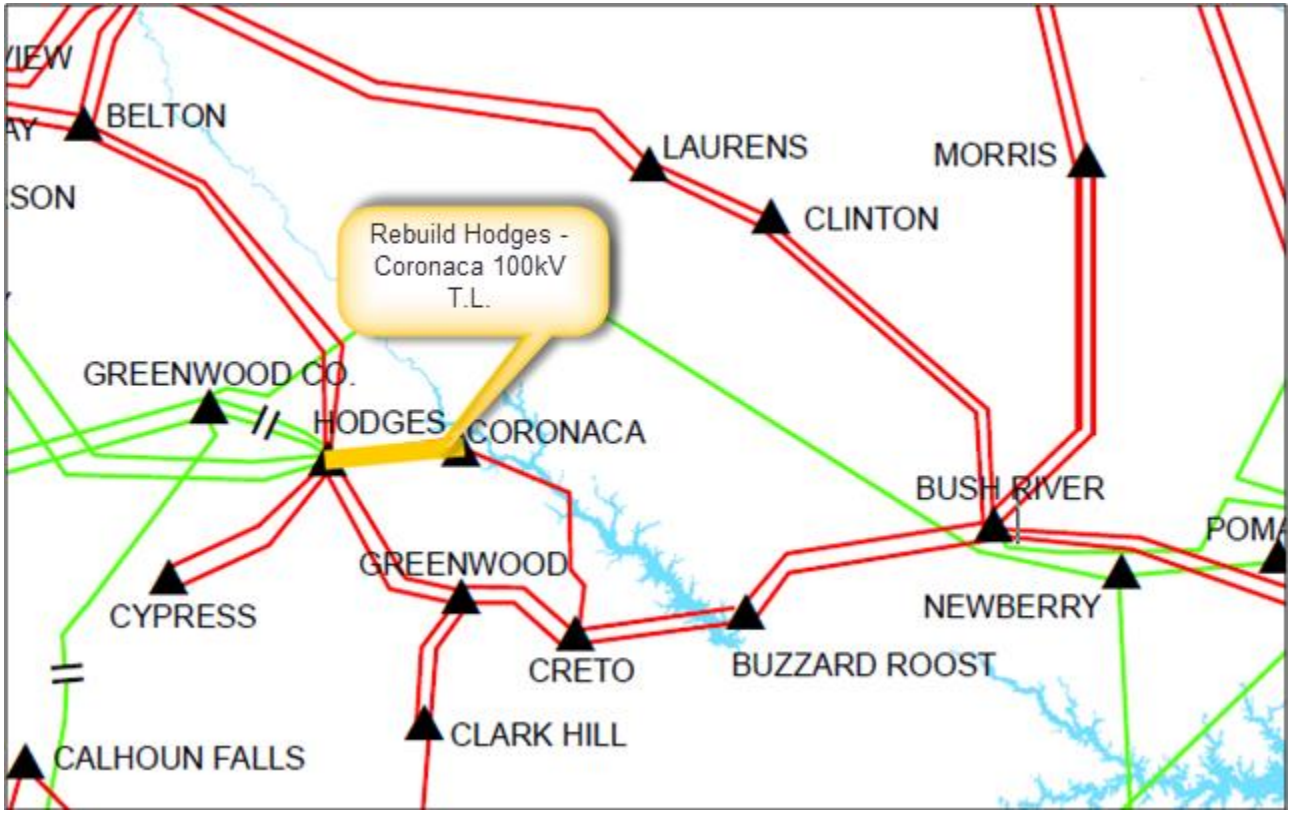
Southern BAA to Santee Cooper – 1000 MW

Significant Constraint (P1) – *DEC*



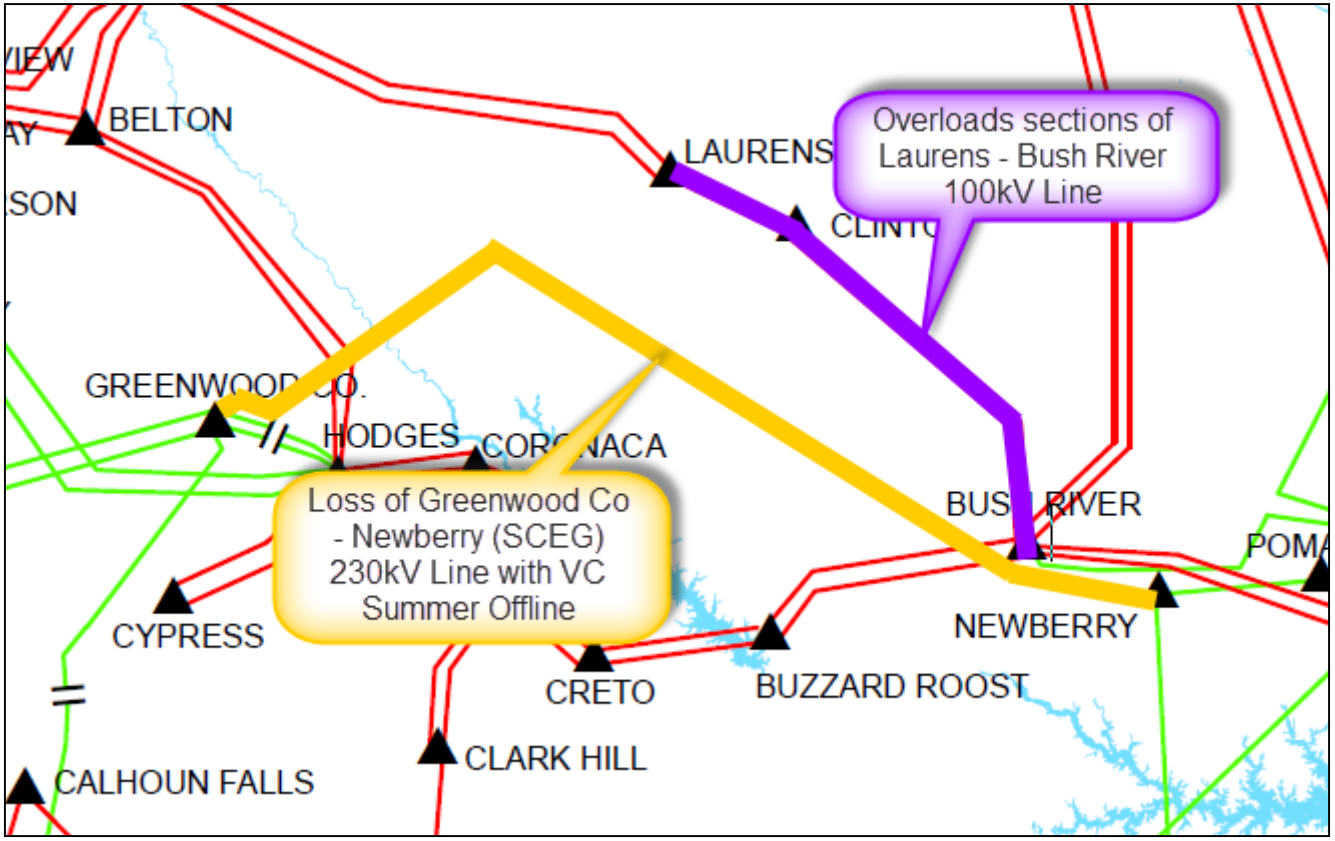
Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *DEC*



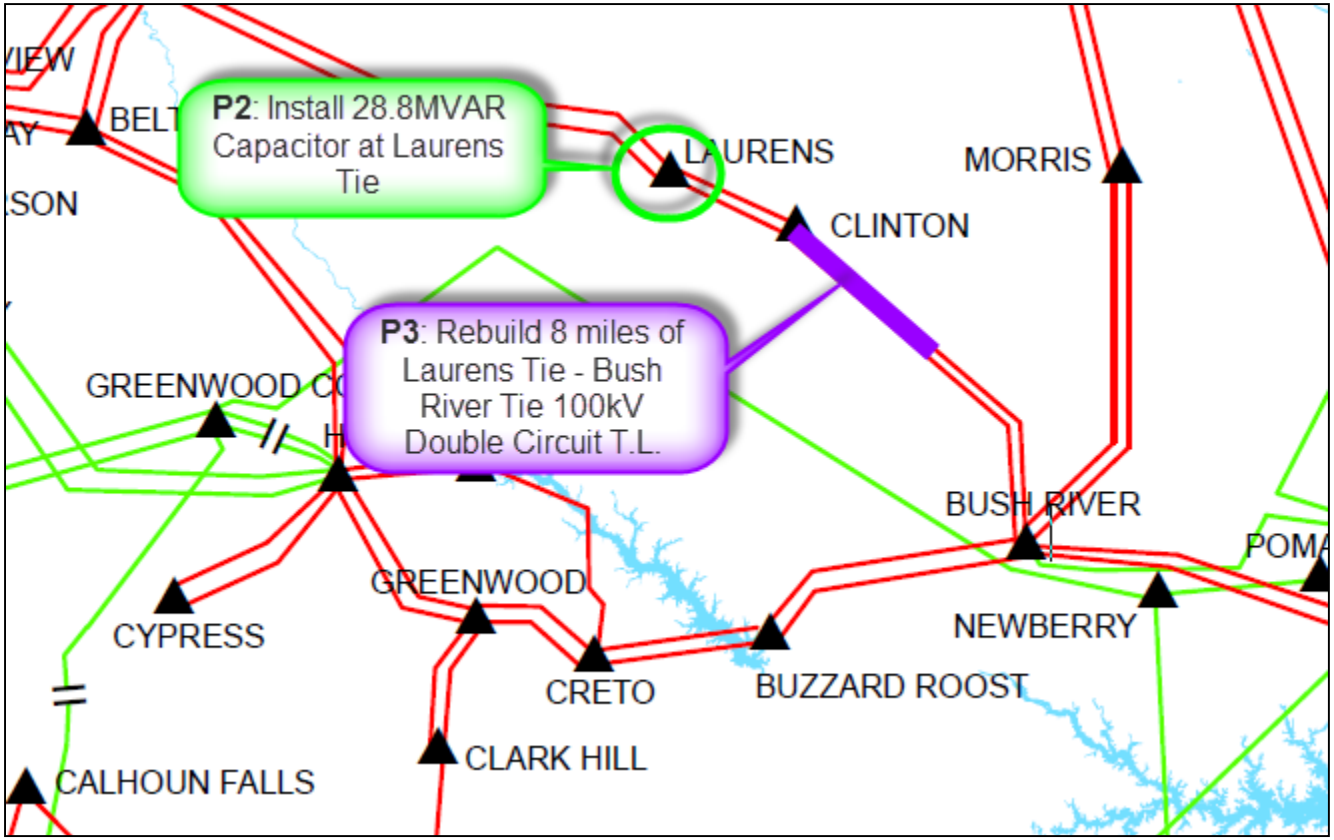
Southern BAA to Santee Cooper – 1000 MW

Significant Constraint (P2 & P3) – *DEC*



Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P2 & P3) – *DEC*



Significant Constraints Identified – *SBAA*

Table 3: Significant Constraints - SBAA

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	OFFERMAN – SCREVEN 115kV T.L. Section	91	98.5	107.5

Potential Enhancements Identified – *SBAA*

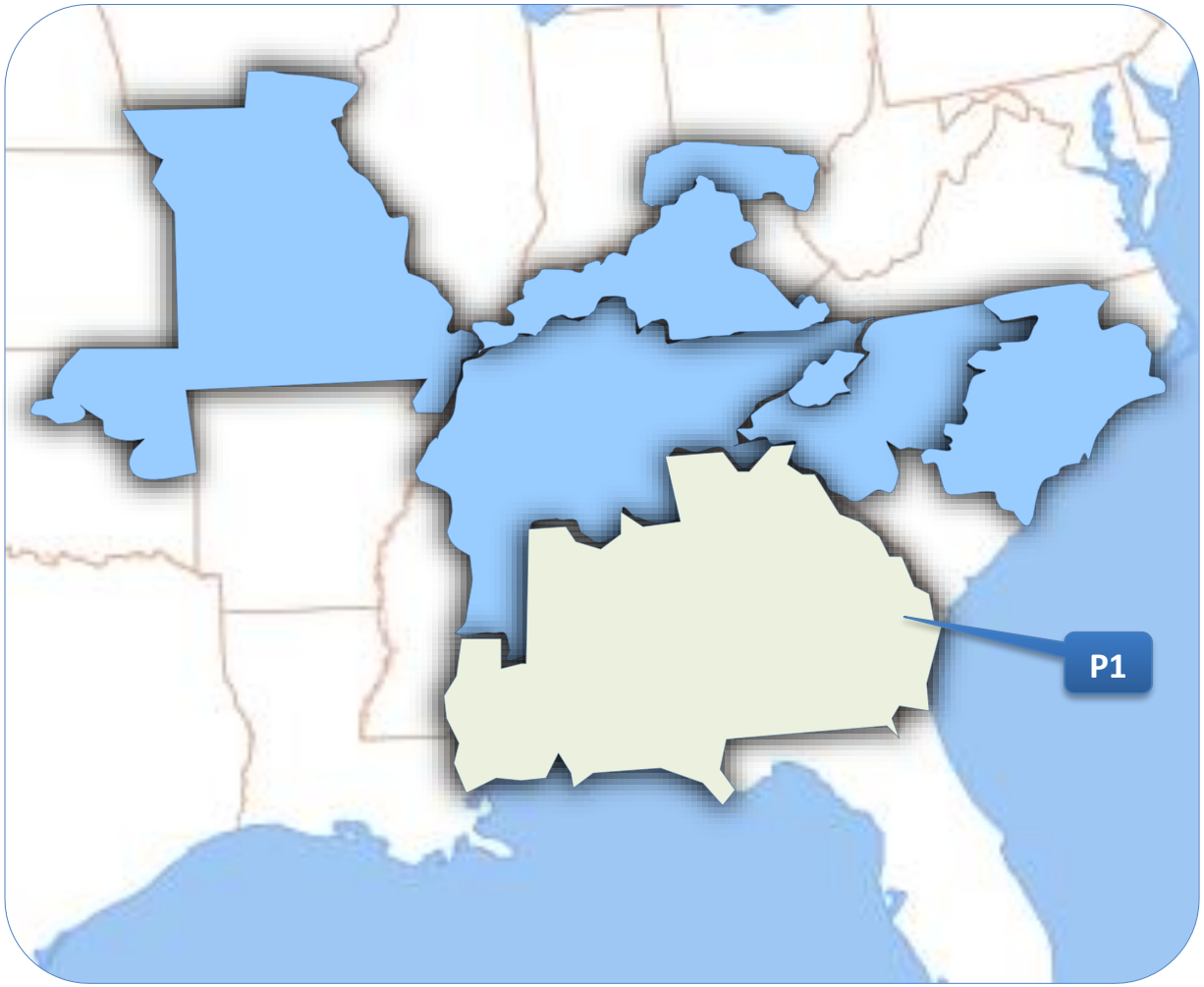
Table 4: Potential Enhancement (P1) - SBAA

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**OFFERMAN – JESUP 115kV Transmission Line Rebuild** • Rebuild approximately 20.1 miles of the Offerman – Jesup 115kV Transmission Line with 100°C 795 ACSR.	**$16,080,000**
SBAA TOTAL ($2018)		**$16,080,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P1) Location – *SBAA*



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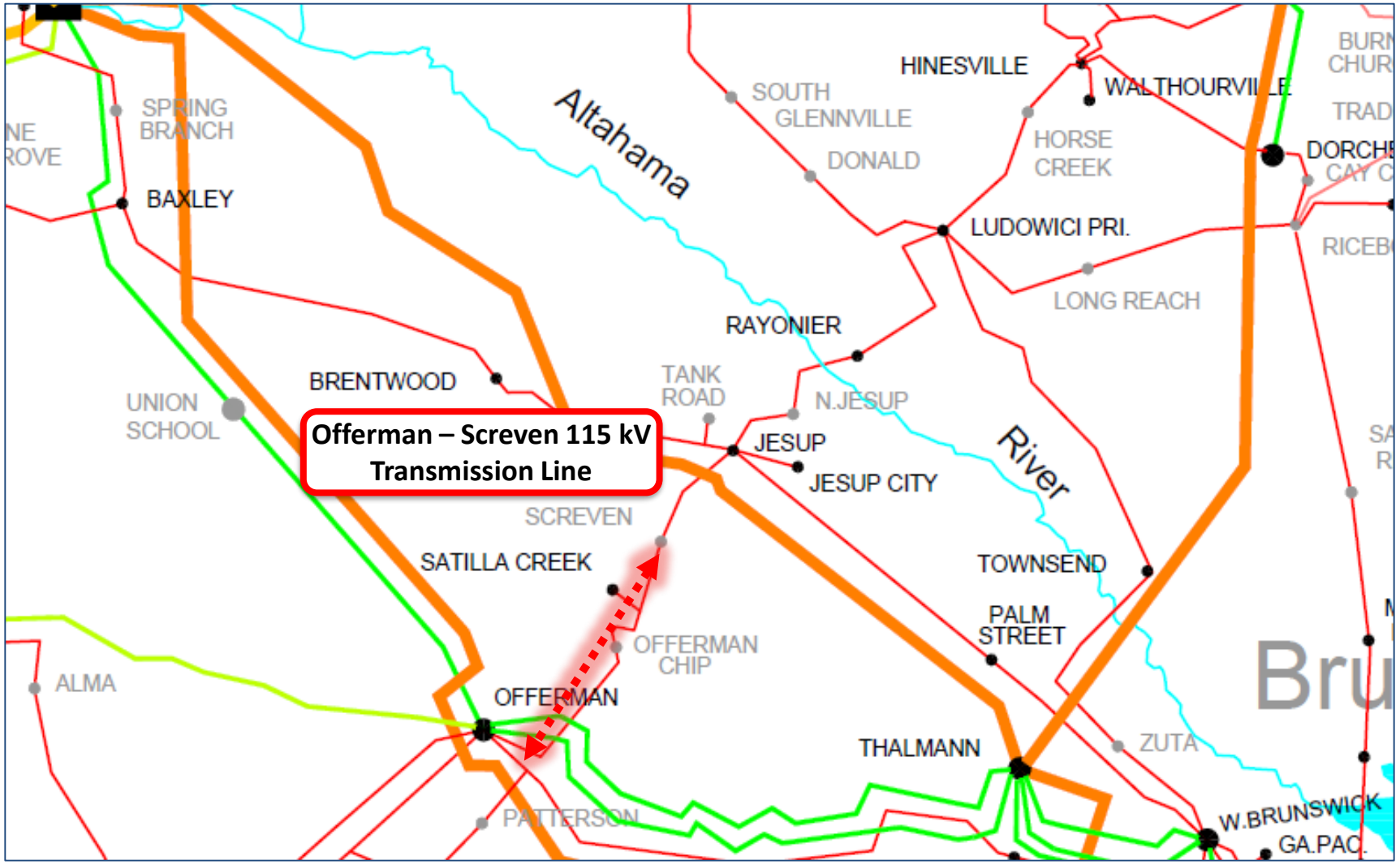
Southern BAA to Santee Cooper – 1000 MW

Significant Constraint (P1) – *SBAA*



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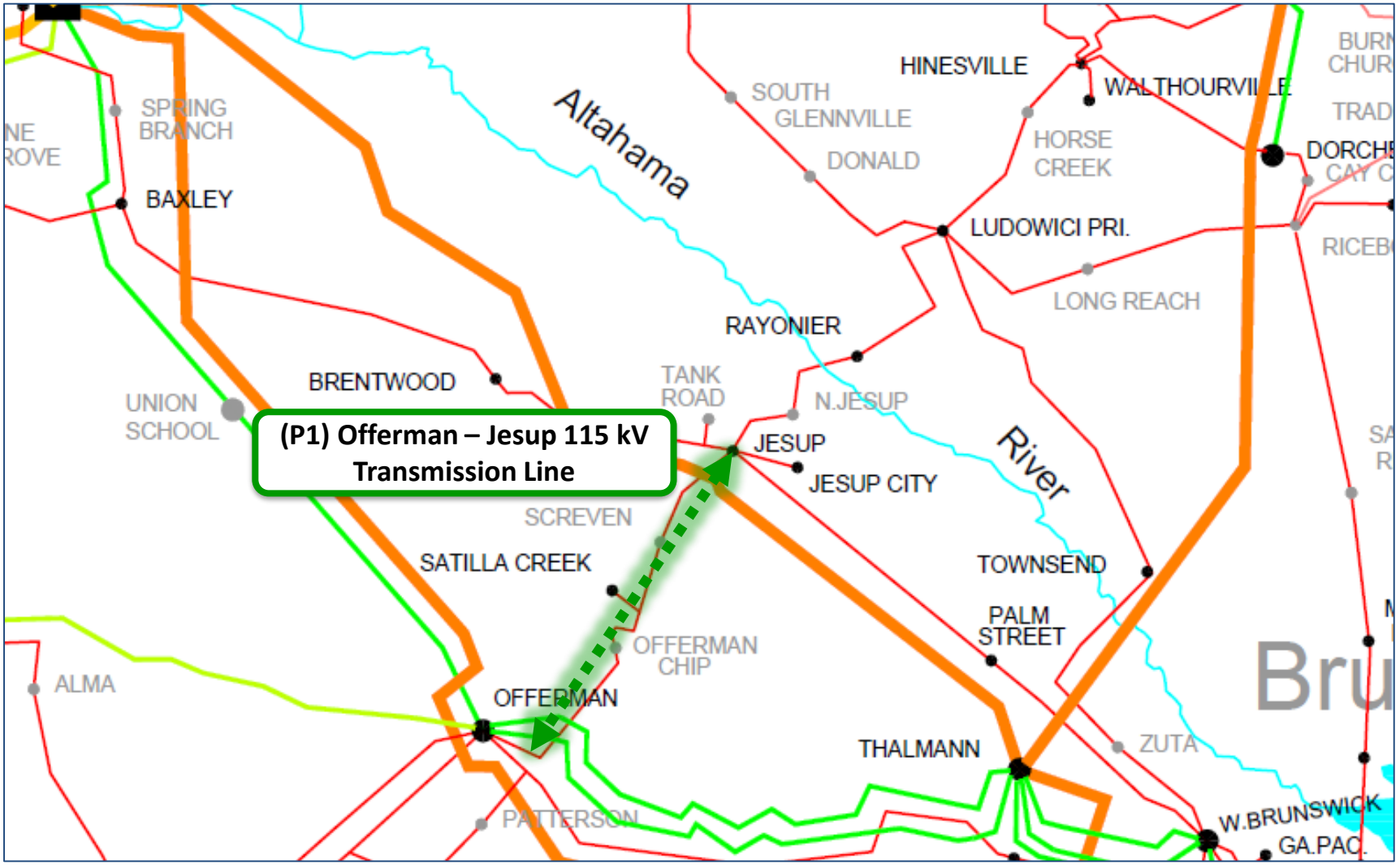
Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *SBAA*



Southern BAA to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

Table 5: Transmission System Impacts - SERTP

Balancing Authority	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$26,400,000
Duke Progress East (DEPE)	$0
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$16,080,000
Tennessee Valley Authority (TVA)	$0
SERTP TOTAL ($2018)	**$42,480,000**

Economic Planning Studies

Economic Planning Studies

Santee Cooper Border to Duke Energy Progress and Duke Energy Carolinas 1000 MW

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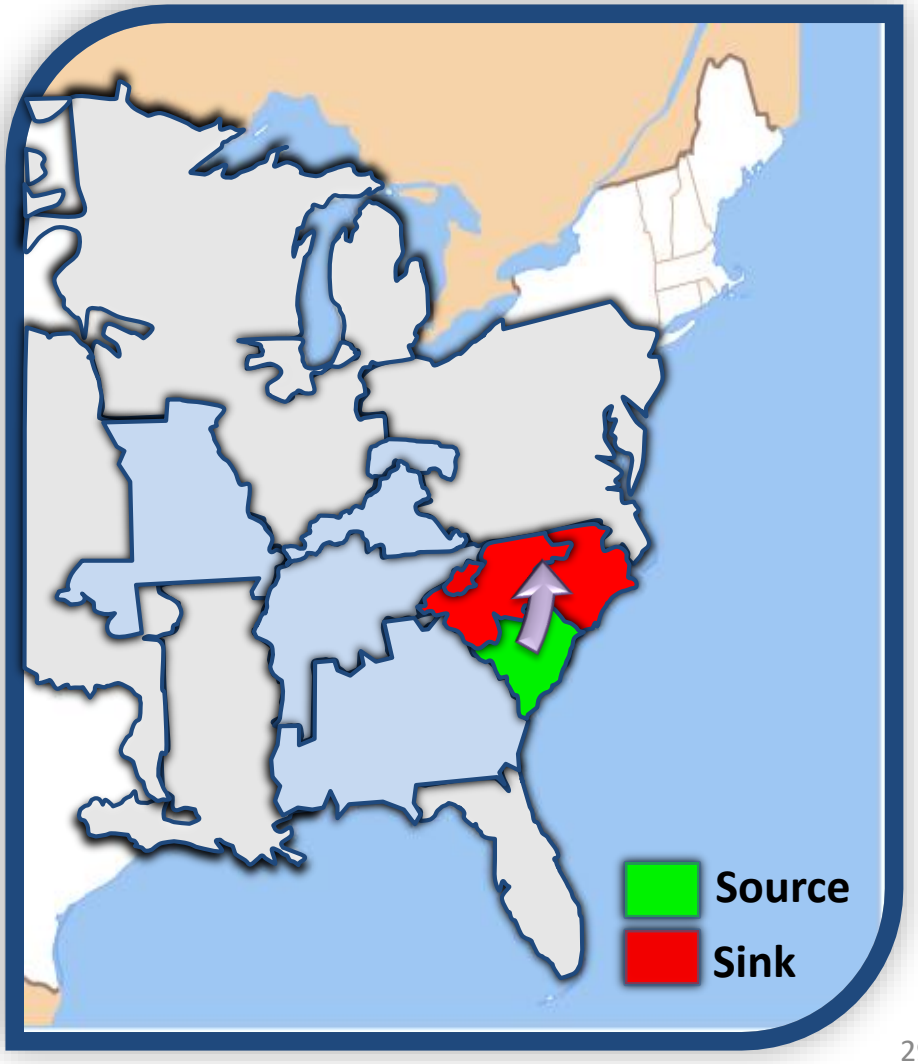
Santee Cooper to Duke Energy – 1000 MW

Study Assumptions

- **Transfer Type:** Load to Generation (2021 Summer Peak)
- **Source:** Uniform load scale within Santee Cooper
- **Sink:** Generation scale within Duke Energy as shown in Table 6 below:

Table 6: Generation Scale within Duke Energy

Balancing Authority Area	Area #	MW Allocation
Duke Energy Carolinas	342	-500
Duke Energy Progress	340, 341	-500
Total		-1000



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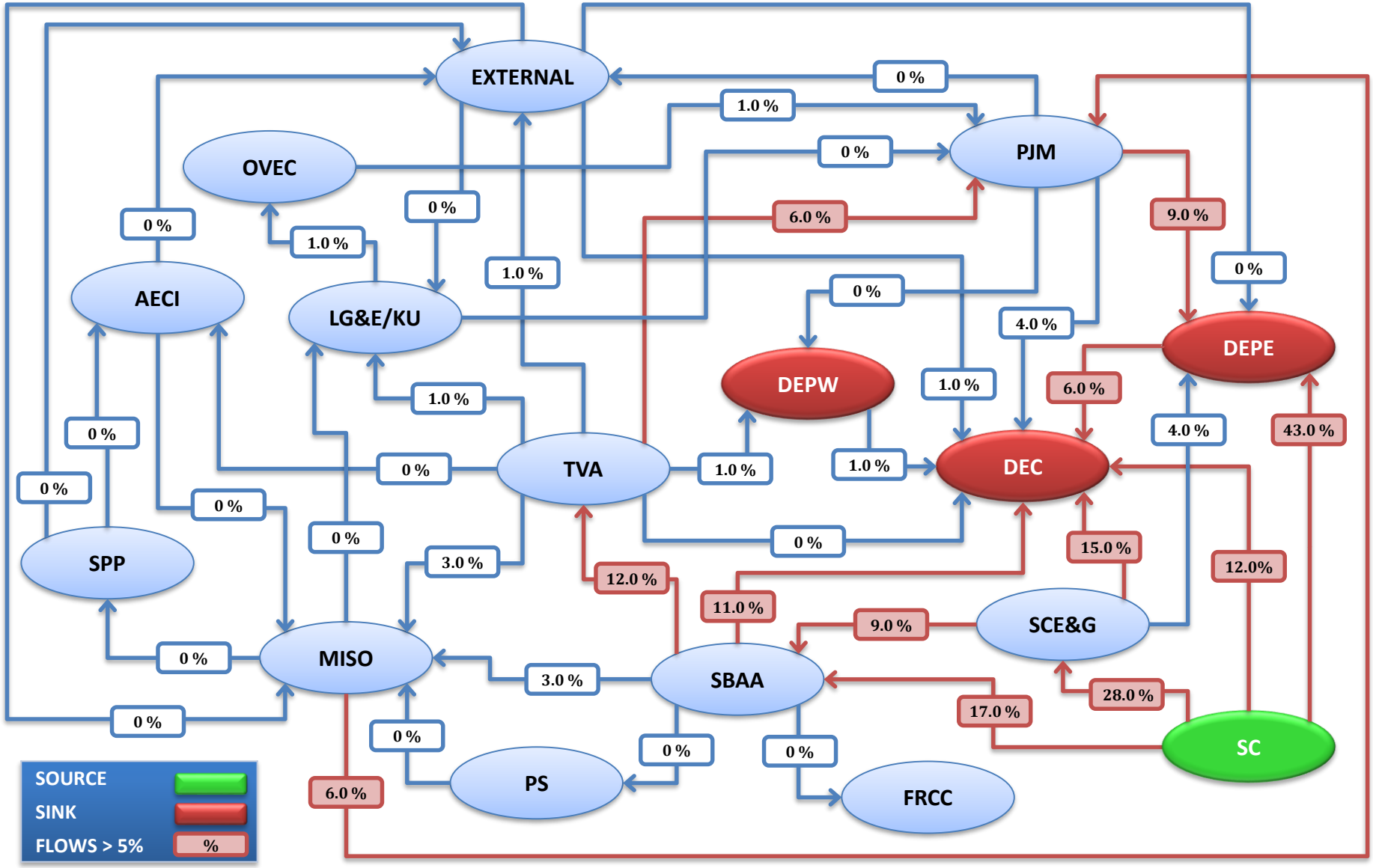
Santee Cooper to Duke Energy – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Santee Cooper to Duke Energy – 1000 MW

Transmission System Impacts – *SERTP*

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***DEPE***

- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEPE) One (1) Substation Upgrade
  - (DEPE) One (1) New 230kV Transmission Line

SERTP Total ($2018) = $57,800,000

Santee Cooper to Duke Energy – 1000 MW

Significant Constraints Identified – *DEC*

Table 7: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Lee Steam – Shady Grove Tie 100kV T.L.	120	94.3	100.5

Santee Cooper to Duke Energy – 1000 MW

Potential Enhancements Identified – *DEC*

Table 8: Potential Enhancements - DEC

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Lee Steam – Shady Grove Tie 100kV double circuit Transmission Lines** • Rebuild both double circuit transmission lines (4 circuits) between Lee Steam and Shady Grove Tie with 1158 ACSS conductors rated to 200˚C. Total of 20.5 miles of line upgrades.	**$32,800,000**
DEC TOTAL ($2018)		**$32,800,000**(1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

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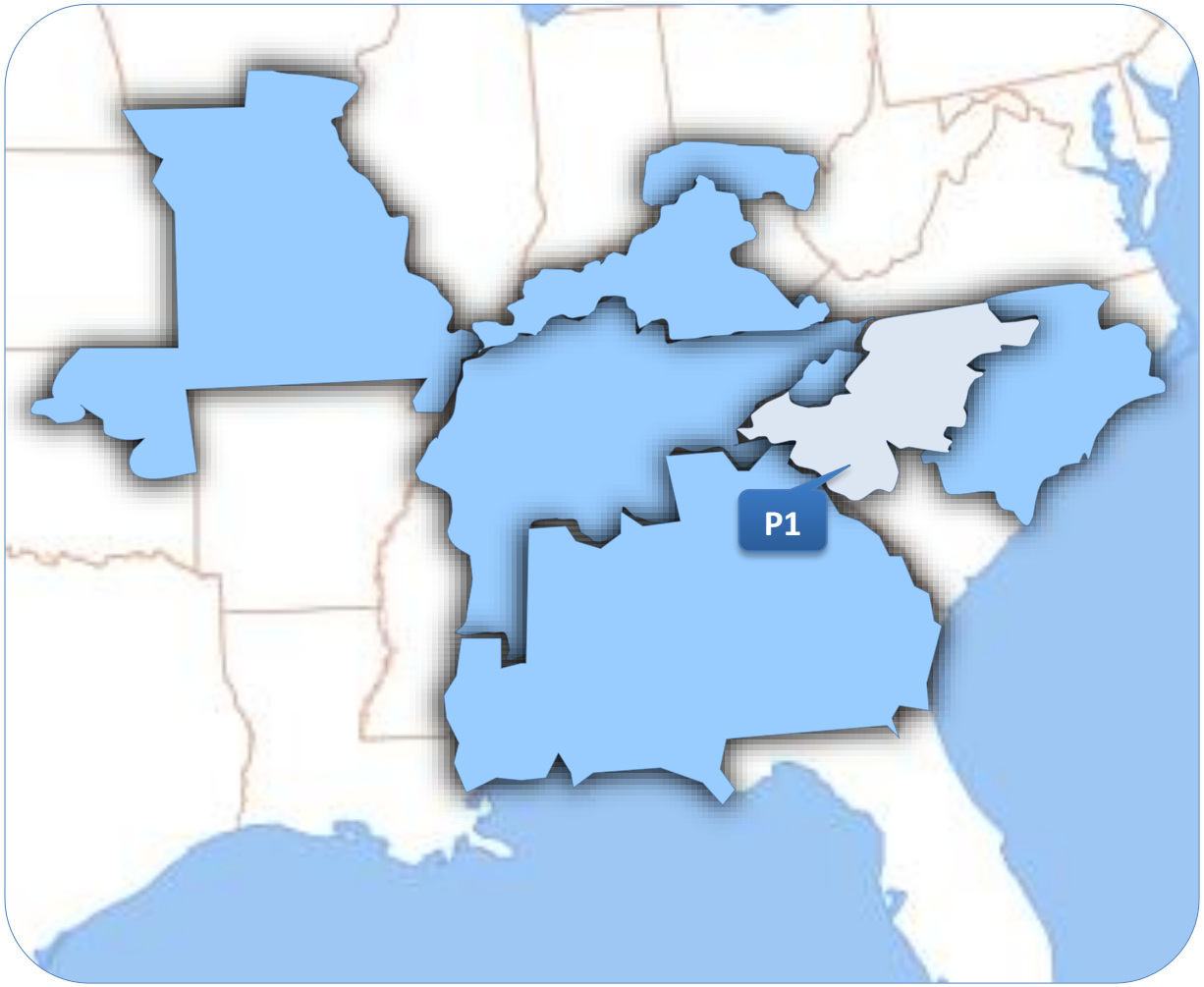
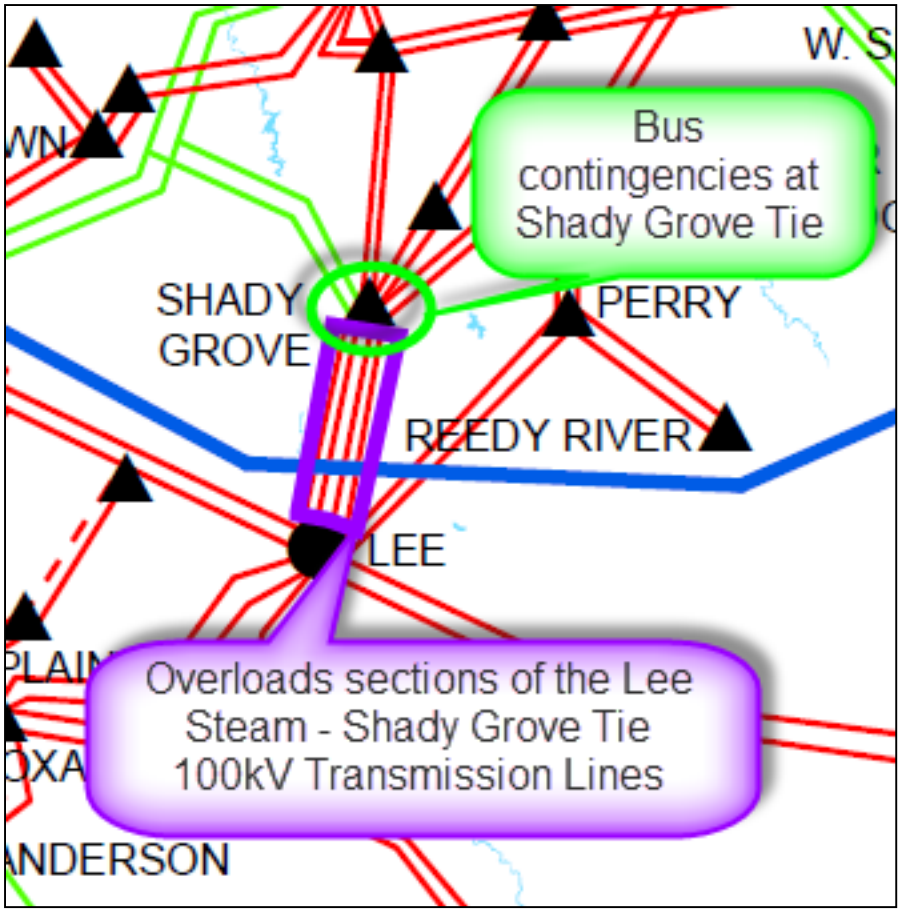
Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement Locations – *DEC*



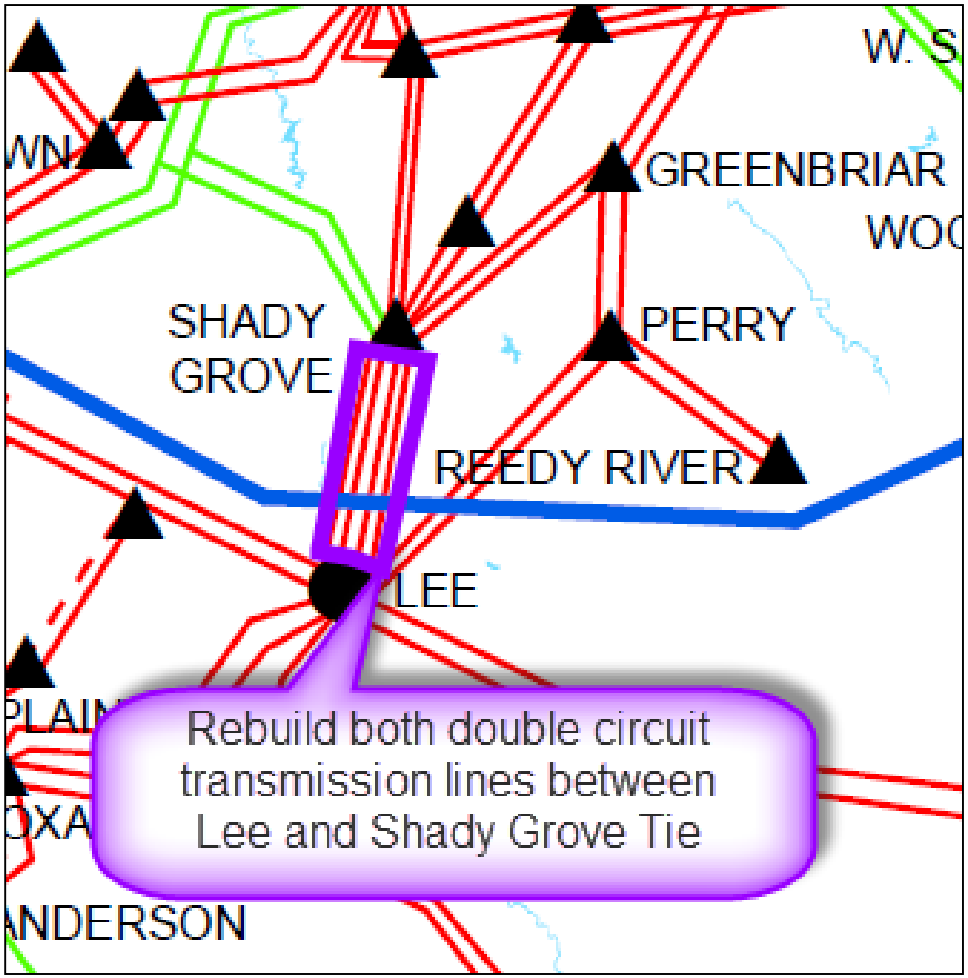
Santee Cooper to Duke Energy – 1000 MW

Significant Constraint (P1) – *DEC*



Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement (P1) – *DEC*



Santee Cooper to Duke Energy – 1000 MW

Significant Constraints Identified – *DEPE*

Table 8: Significant Constraints - DEPE

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Camden-Camden Tap 115kV T.L.	107	96.3	104.5
P1	Camden-Camden Ind 115kV T.L.	107	94.5	102.3
P1	Camden Tap-Camden City 115kV T.L.	107	<85	90.8

Santee Cooper to Duke Energy – 1000 MW

Potential Enhancements Identified – *DEPE*

Table 9: Potential Enhancements - DEPE

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Camden-Camden Tap 115kV Transmission Line Section** **Camden-Camden Ind 115kV Transmission Line Section** **Camden Tap-Camden City 115kV Transmission Line Section** • Upgrade Camden Junction 115kV Switching Station to 230kV Substation, Construct Camden Junction - (SCPSA) Camden 230kV Transmission Line.	**$25,000,000**
DEPE TOTAL ($2018)		**$25,000,000**(1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

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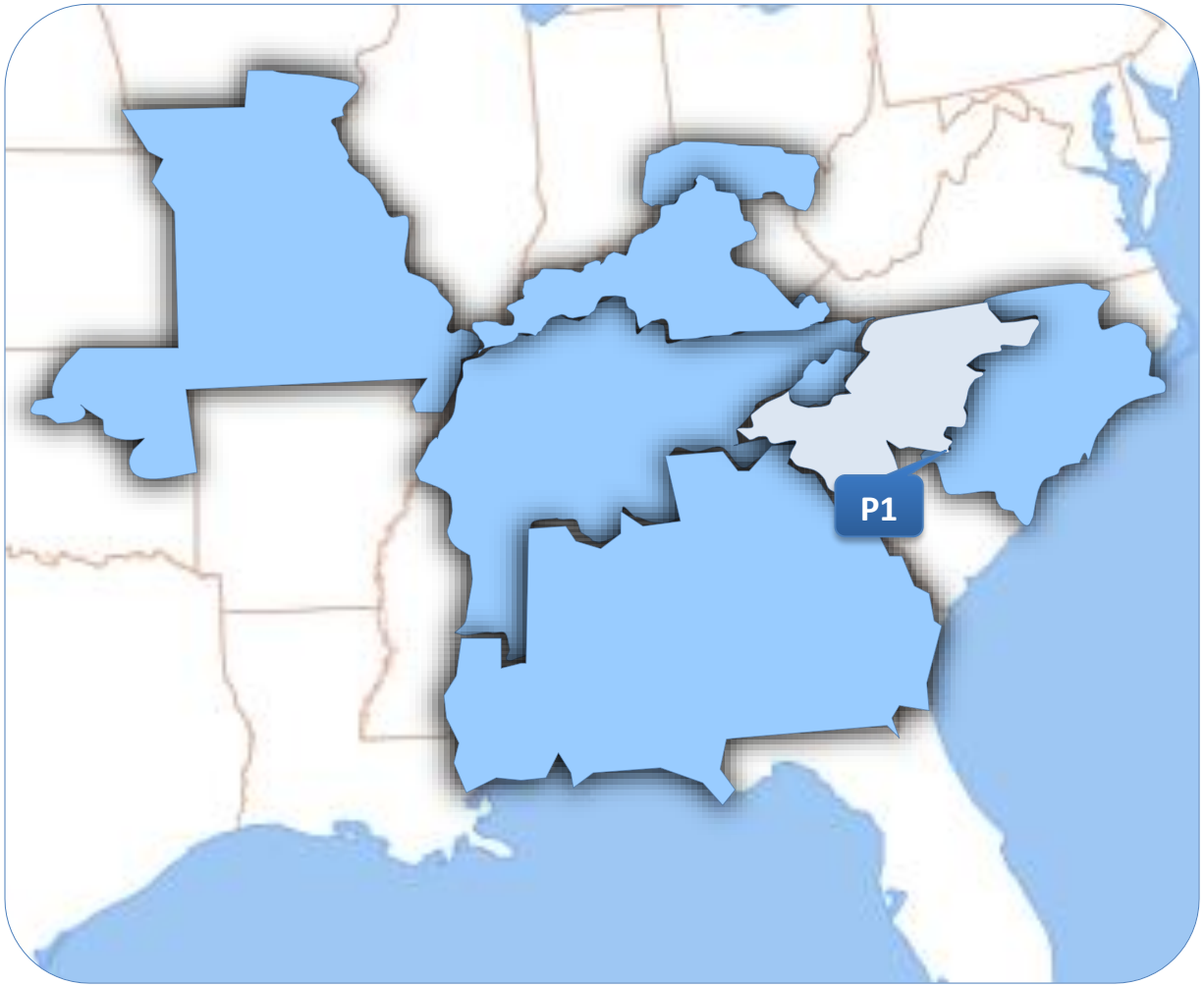
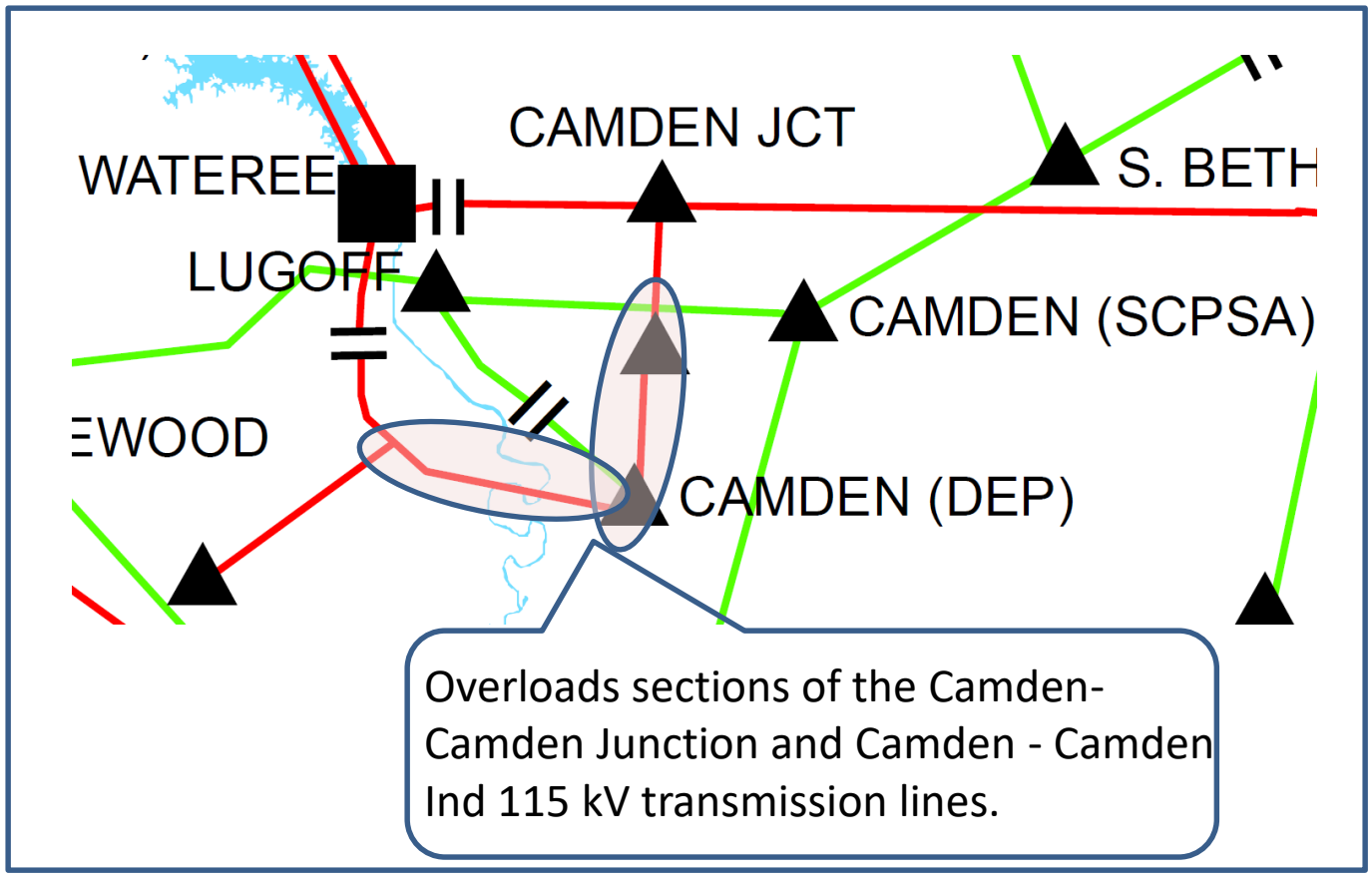
Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement Locations – *DEPE*



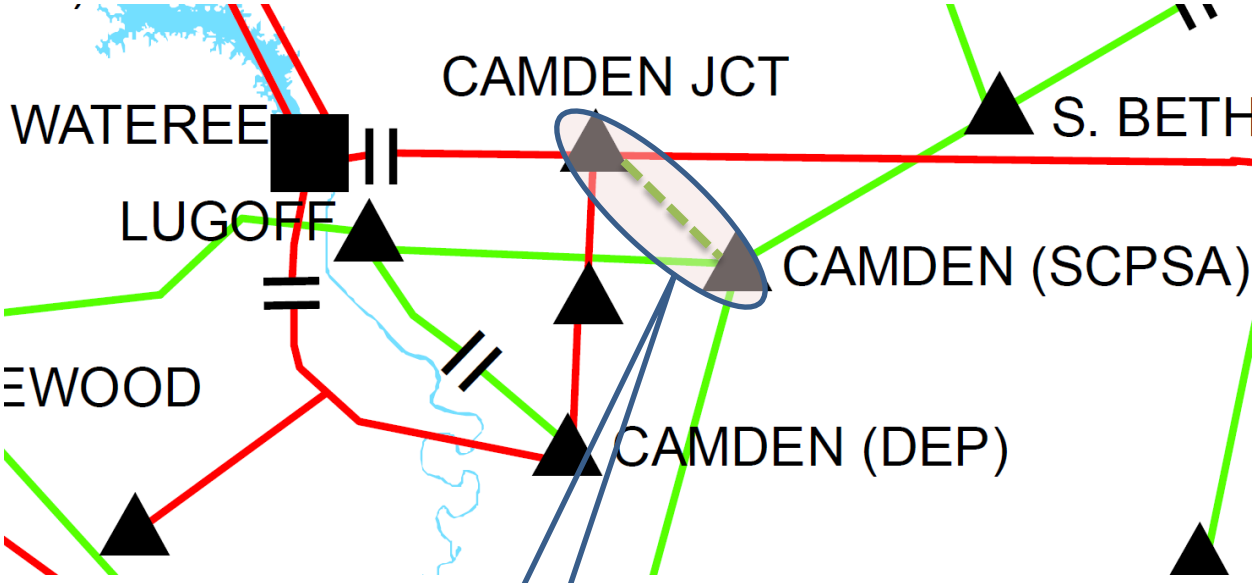
Santee Cooper to Duke Energy – 1000 MW

Significant Constraints (P1) – *DEPE*



Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement (P1) – *DEPE*



Upgrade Camden Junction 115 kV Switching Station to 230 kV Substation, Construct Camden Junction-(SCPSA) Camden 230kV Transmission Line.

Santee Cooper to Duke Energy – 1000 MW

Transmission System Impacts – *SERTP*

Table 10: Transmission System Impacts - SERTP

Balancing Authority	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$32,800,000
Duke Progress East (DEPE)	$25,000,000
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$0
Tennessee Valley Authority (TVA)	$0
SERTP TOTAL ($2018)	**$57,800,000**

Economic Planning Studies

Economic Planning Studies – Preliminary Results

Duke Energy Progress and Duke Energy Carolinas to Santee Cooper Border
1000 MW

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Duke Energy to Santee Cooper – 1000 MW

Study Assumptions

- **Transfer Type:** Generation to Load (2021 Summer Peak)
- **Source:** Generation scale within Duke Energy as shown in Table 11 below
- **Sink:** Uniform load scale within Santee Cooper

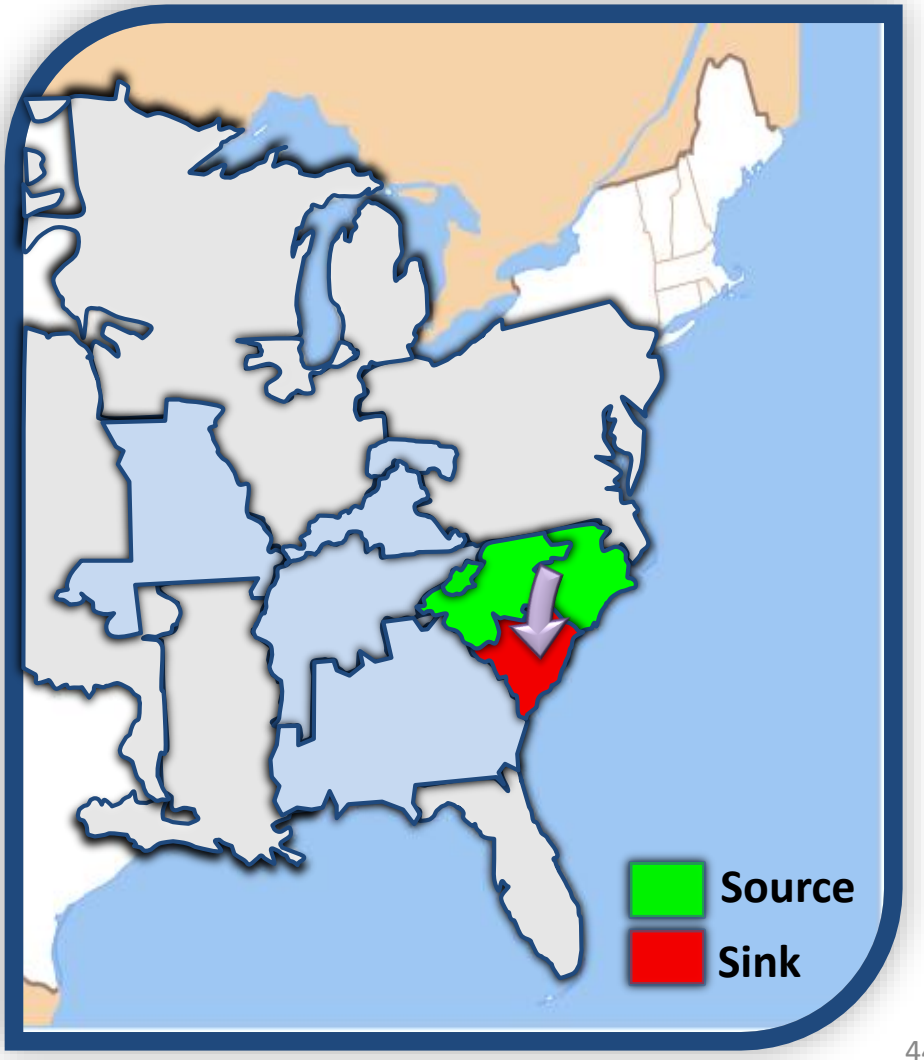

Table 11: Generation Scale within Duke Energy

Balancing Authority Area	Area #	MW Allocation
Duke Energy Carolinas	342	+500
Duke Energy Progress	340, 341	+500
Total		1000

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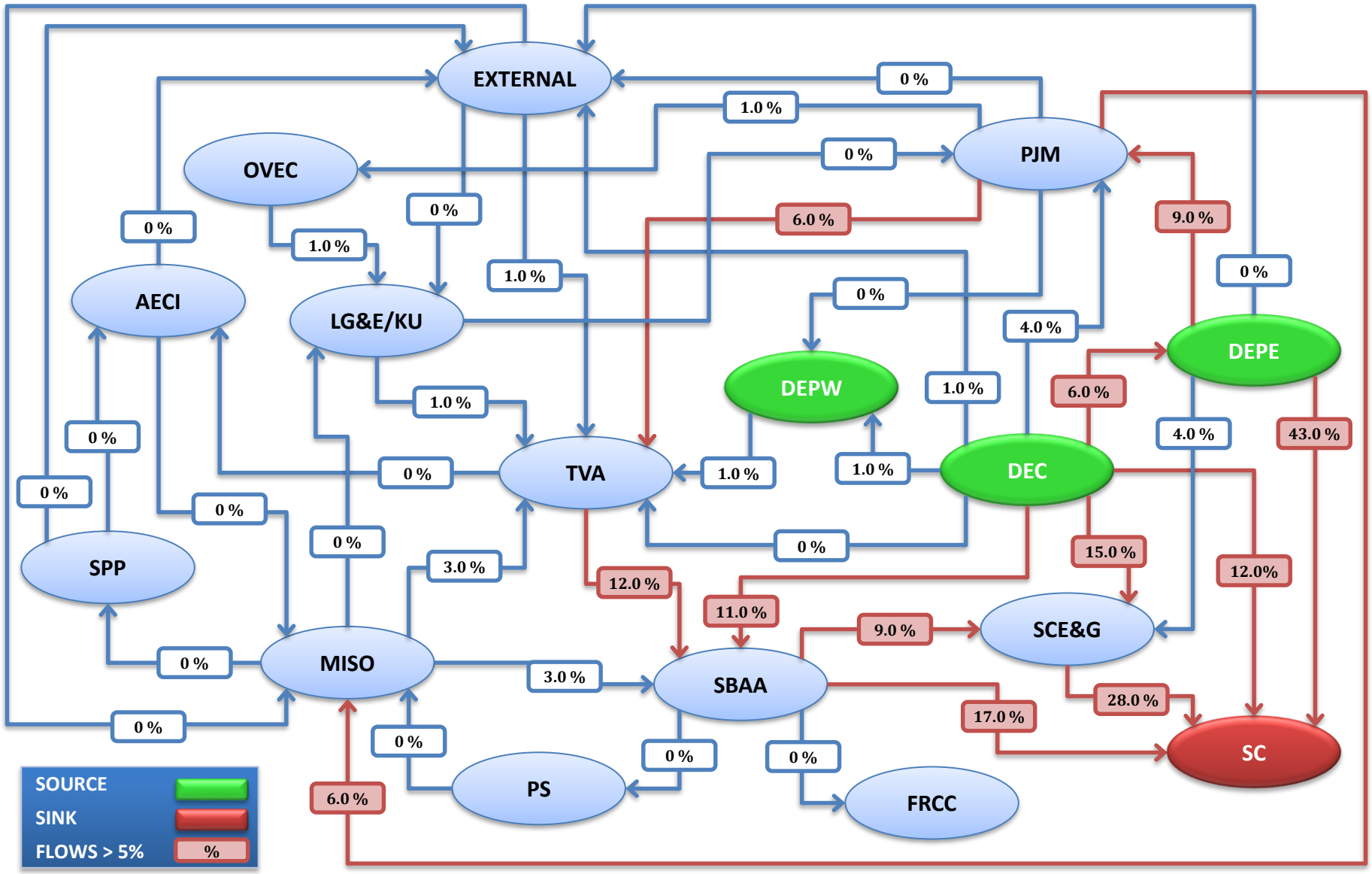
Duke Energy to Santee Cooper – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Duke Energy to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***SBAA***
- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEC) One (1) Capacitor Bank Installation
  - (SBAA) One (1) 115kV Transmission Line Upgrade

SERTP Total ($2018) = $42,480,000

Duke Energy to Santee Cooper – 1000 MW

Significant Constraints Identified – *DEC*

Table 12: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8
P2, P3	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9

Duke Energy to Santee Cooper – 1000 MW

Potential Enhancements Identified – *DEC*

Table 13: Potential Enhancements - DEC

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Hodges Tie – Coronaca Tie 100kV double circuit** T.L. • Rebuild the entire 9.2 mile Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$12,700,000**
P2	**Laurens Tie** • Install a 28.8 MVAR capacitor bank at Laurens Tie.	**$900,000**
P3	**Laurens Tie – Bush River Tie 100kV double circuit T.L.** • Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$12,800,000**
DEC TOTAL ($2018)		**$26,400,000**(1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

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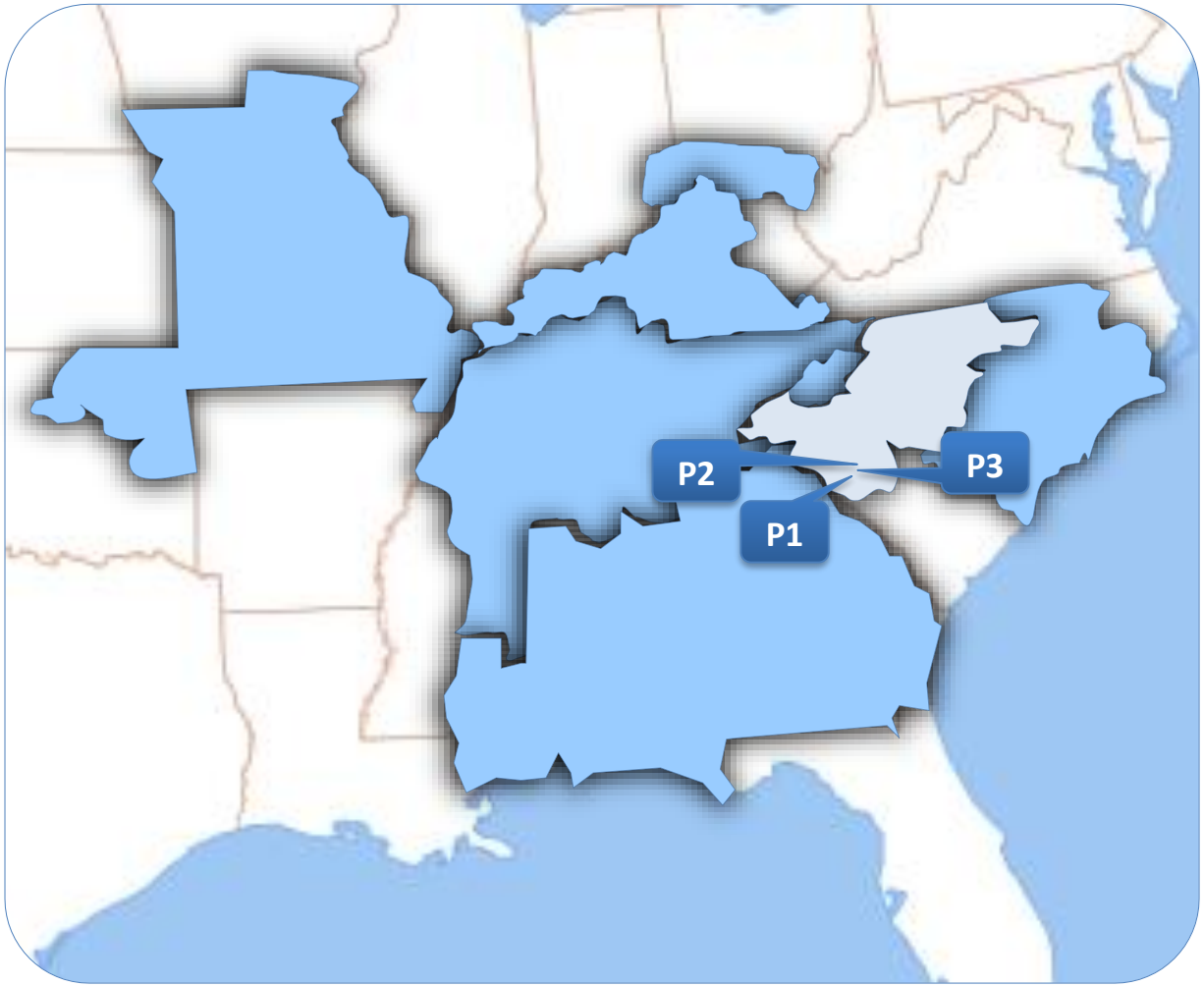
Duke Energy to Santee Cooper – 1000 MW

Potential Enhancement Locations – *DEC*



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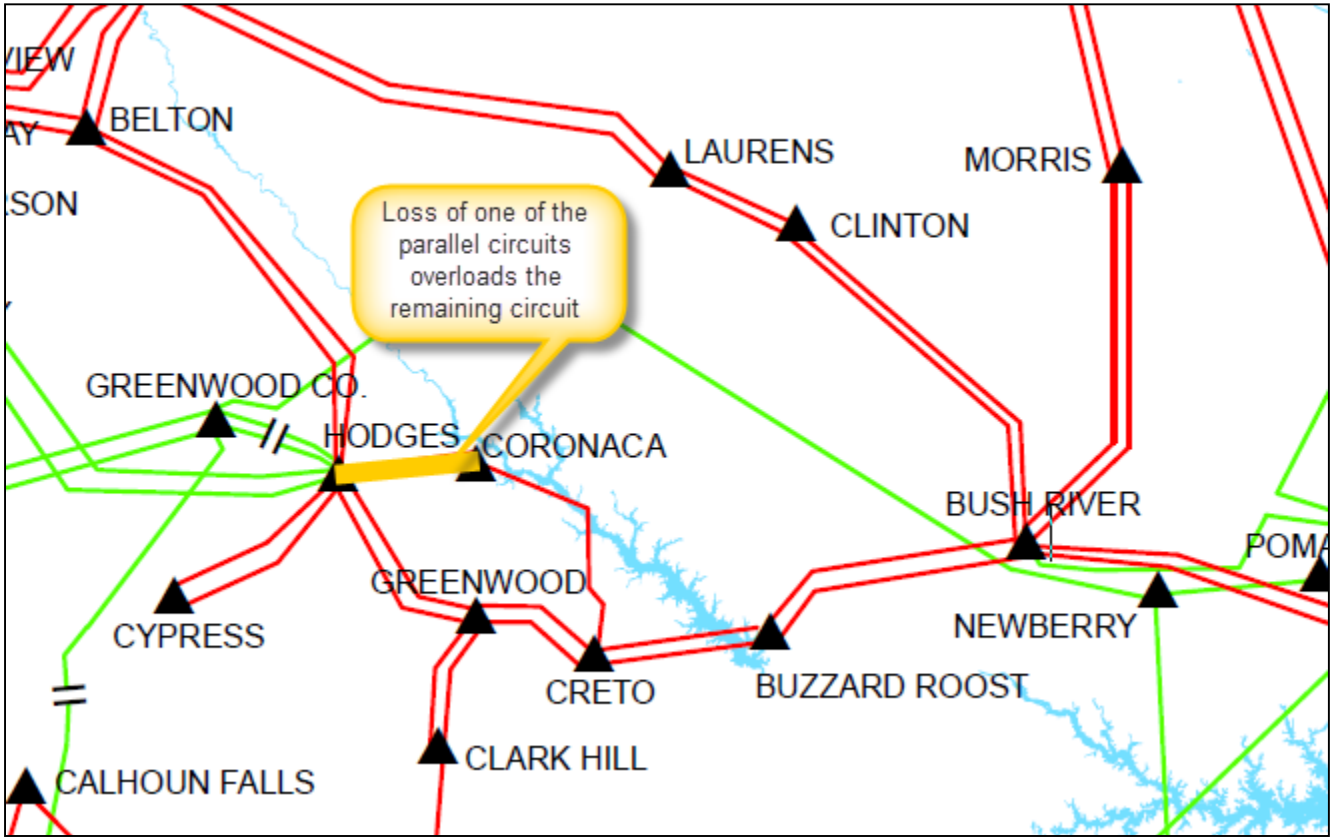
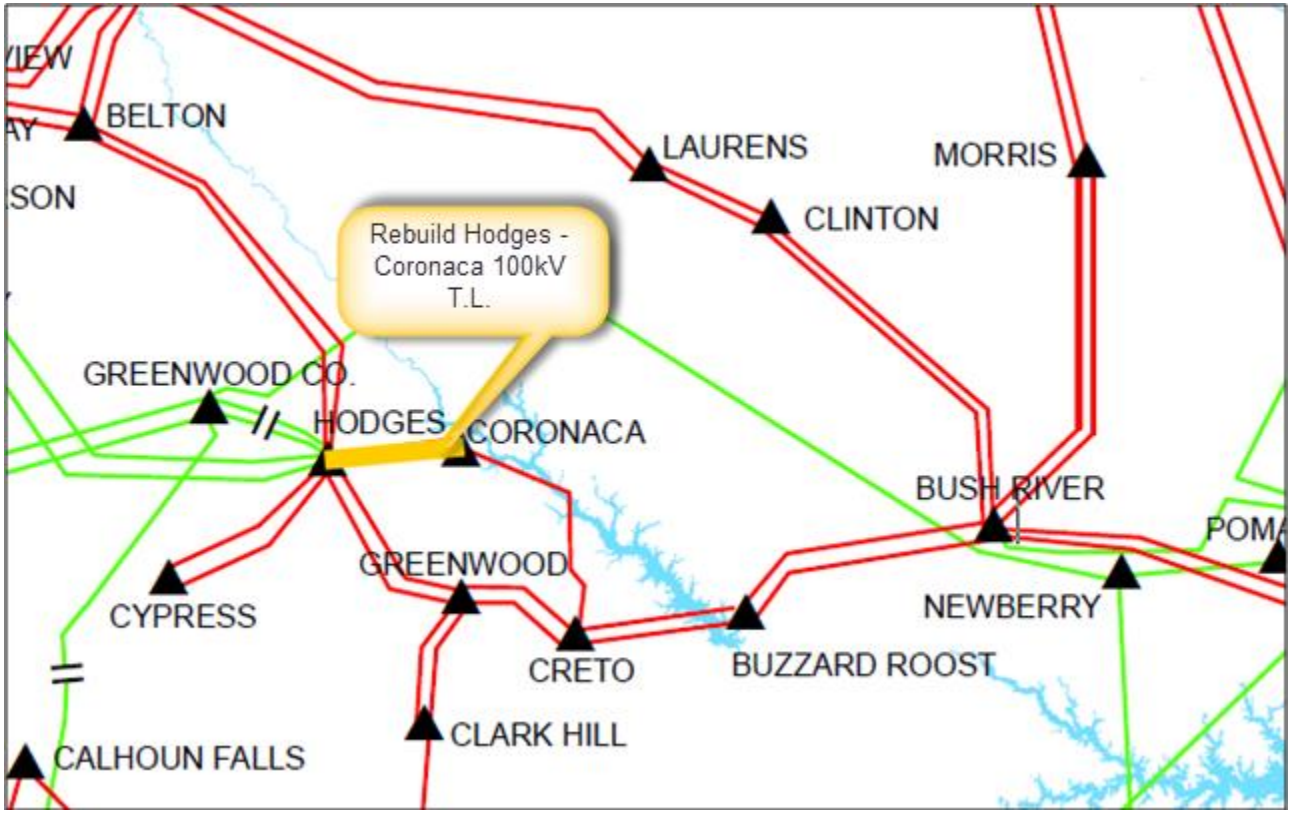
Duke Energy to Santee Cooper – 1000 MW

Significant Constraint (P1) – *DEC*



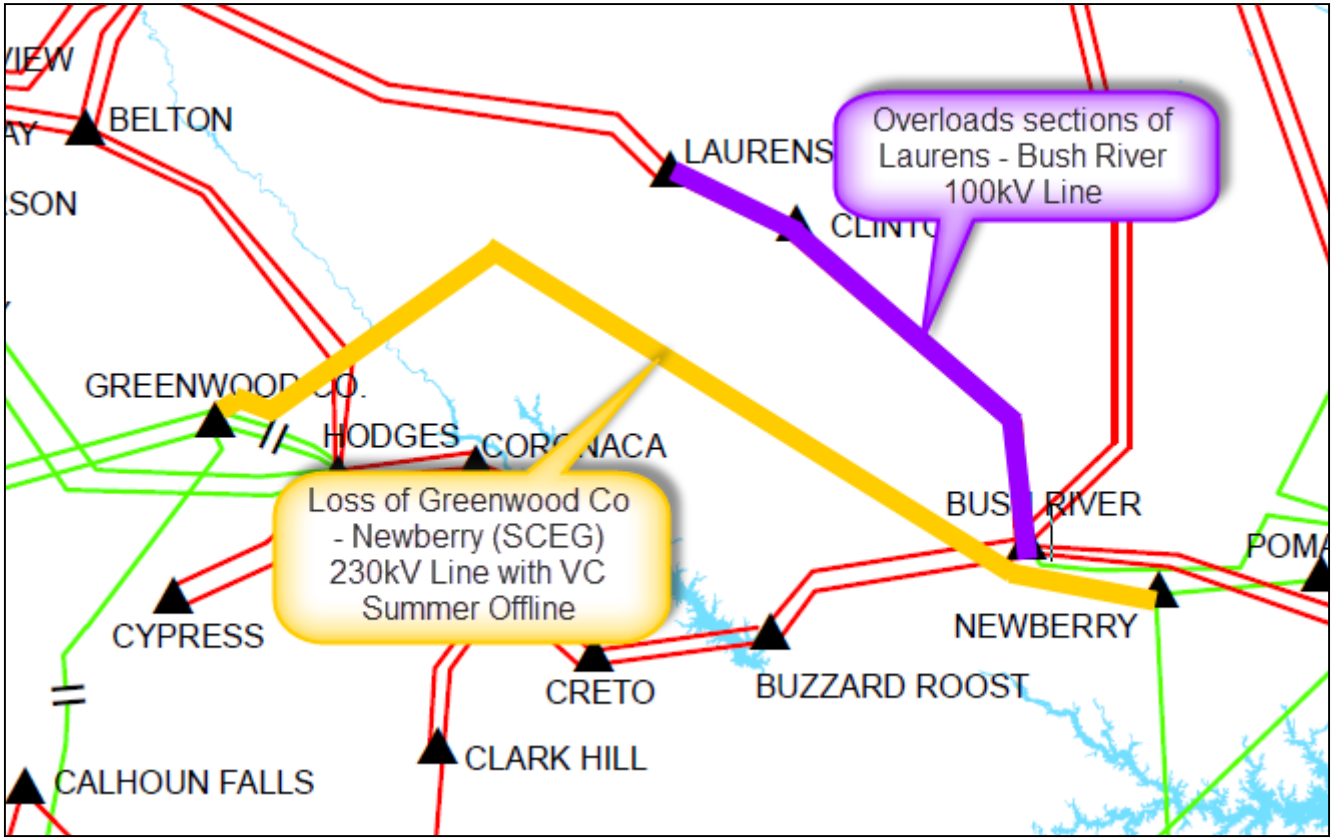
Duke Energy to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *DEC*



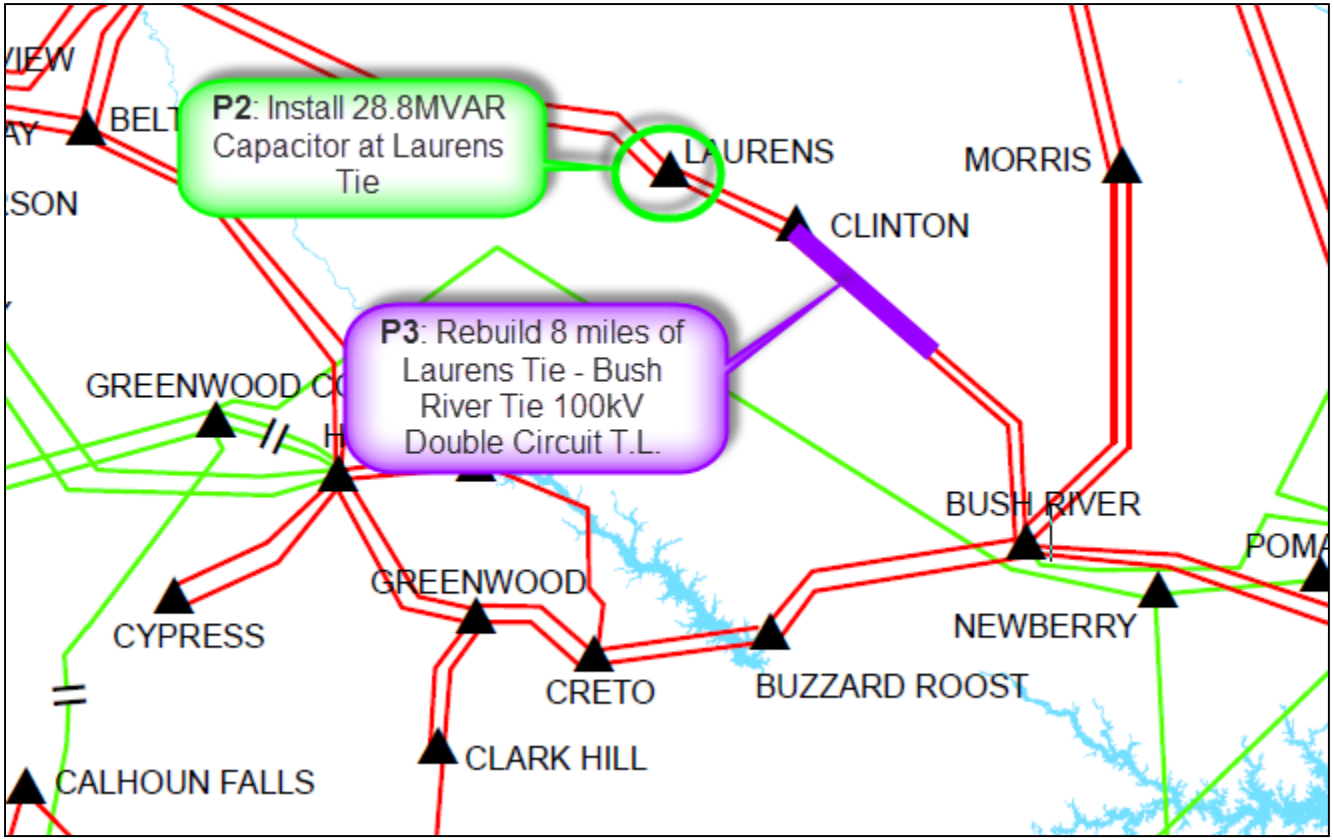
Duke Energy to Santee Cooper – 1000 MW

Significant Constraint (P2 & P3) – *DEC*



Duke Energy to Santee Cooper – 1000 MW

Potential Enhancement (P2 & P3) – *DEC*



Duke Energy to Santee Cooper – 1000 MW

Significant Constraints Identified – *SBAA*

Table 14: Significant Constraints (P1) - SBAA

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	OFFERMAN – SCREVEN 115kV T.L. Section	91	98.5	104.1

Duke Energy to Santee Cooper – 1000 MW

Potential Enhancements Identified – *SBAA*

Table 15: Potential Enhancement (P1) - SBAA

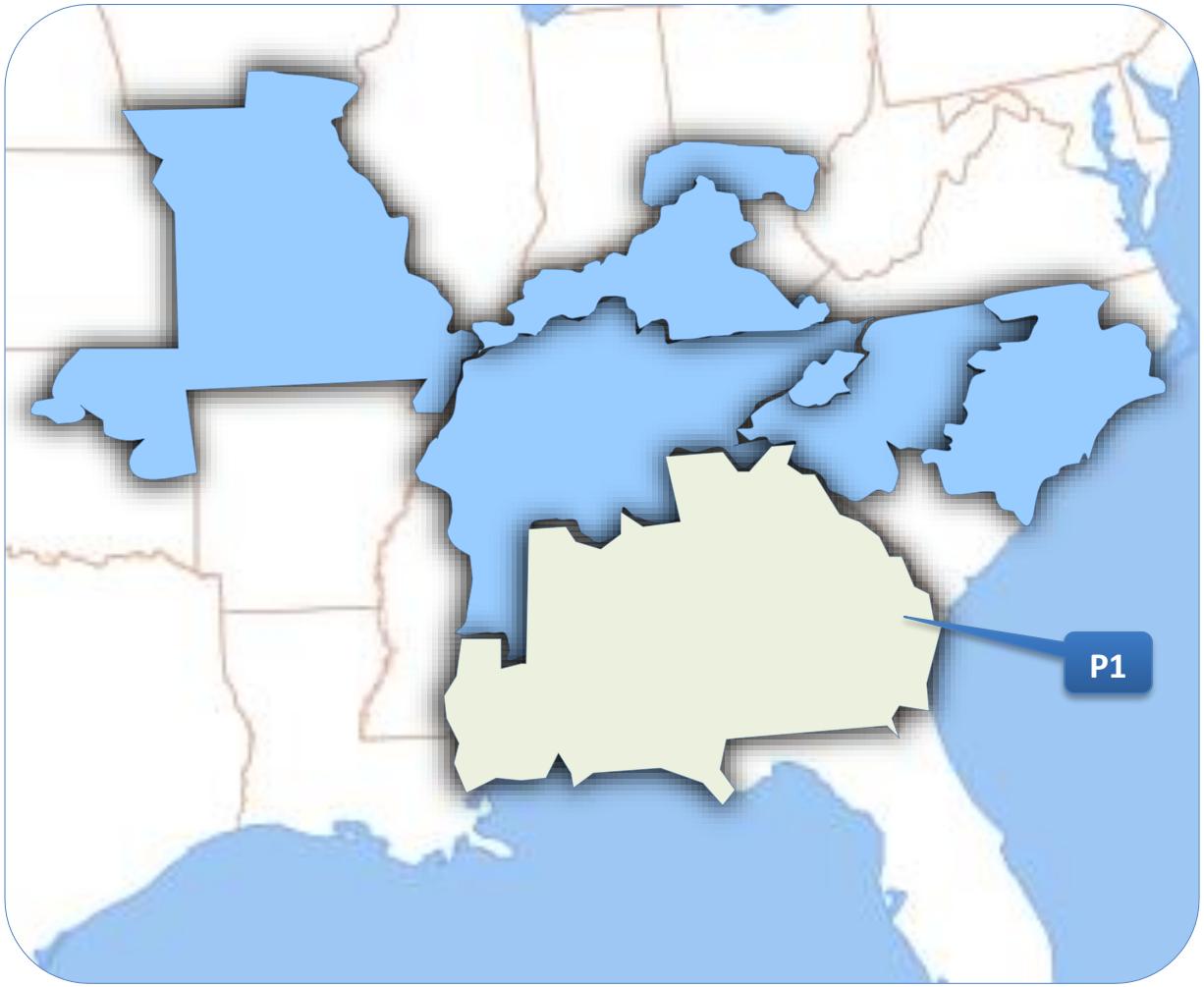
Item	Potential Enhancement	Planning Level Cost Estimate
P1	**OFFERMAN – JESUP 115kV Transmission Line Rebuild** • Rebuild approximately 20.1 miles of the Offerman – Jesup 115kV Transmission Line with 100°C 795 ACSR.	**$16,080,000**
SBAA TOTAL ($2018)		**$16,080,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

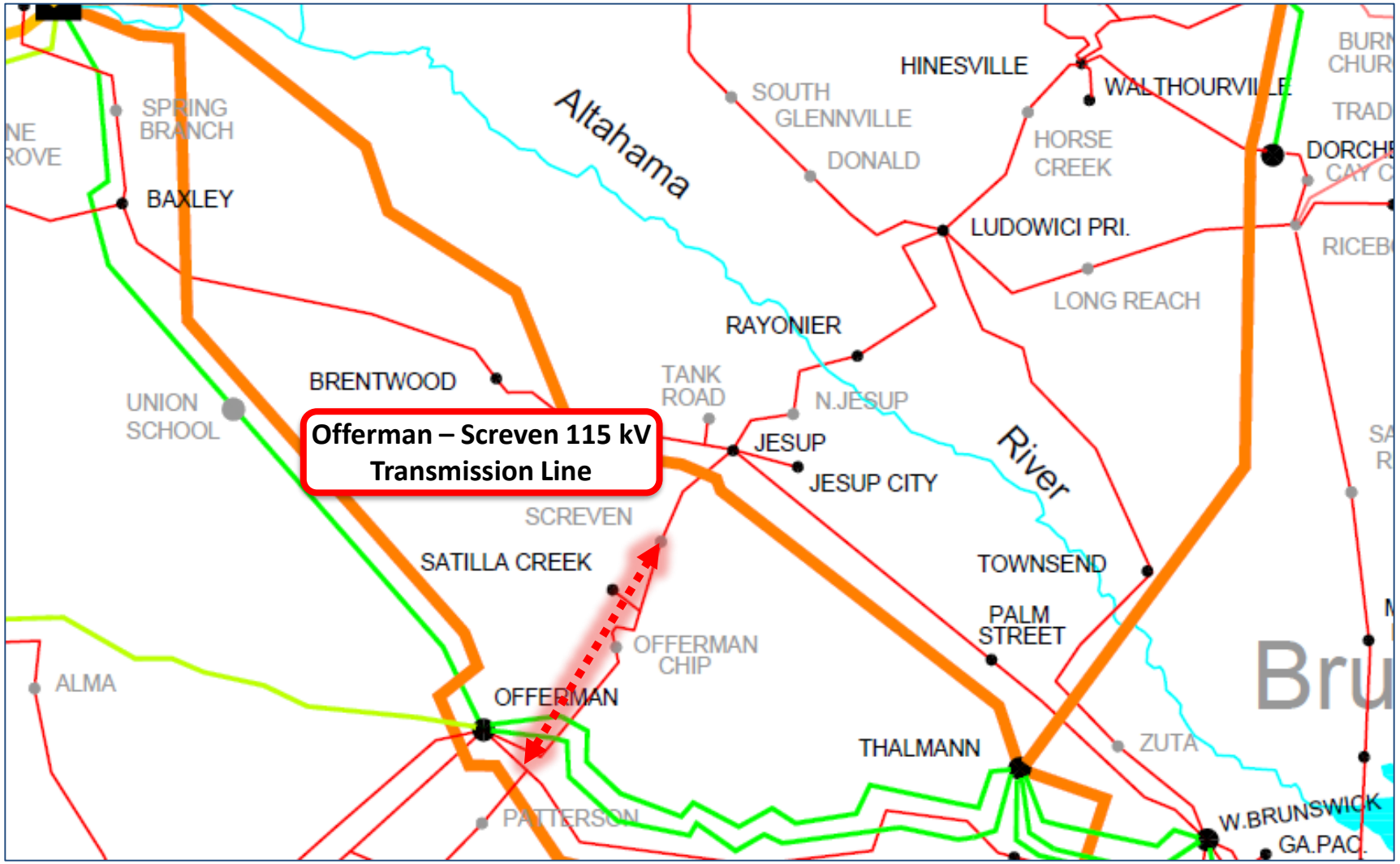
Potential Enhancement (P1) Location – *SBAA*



Southeastern Regional TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

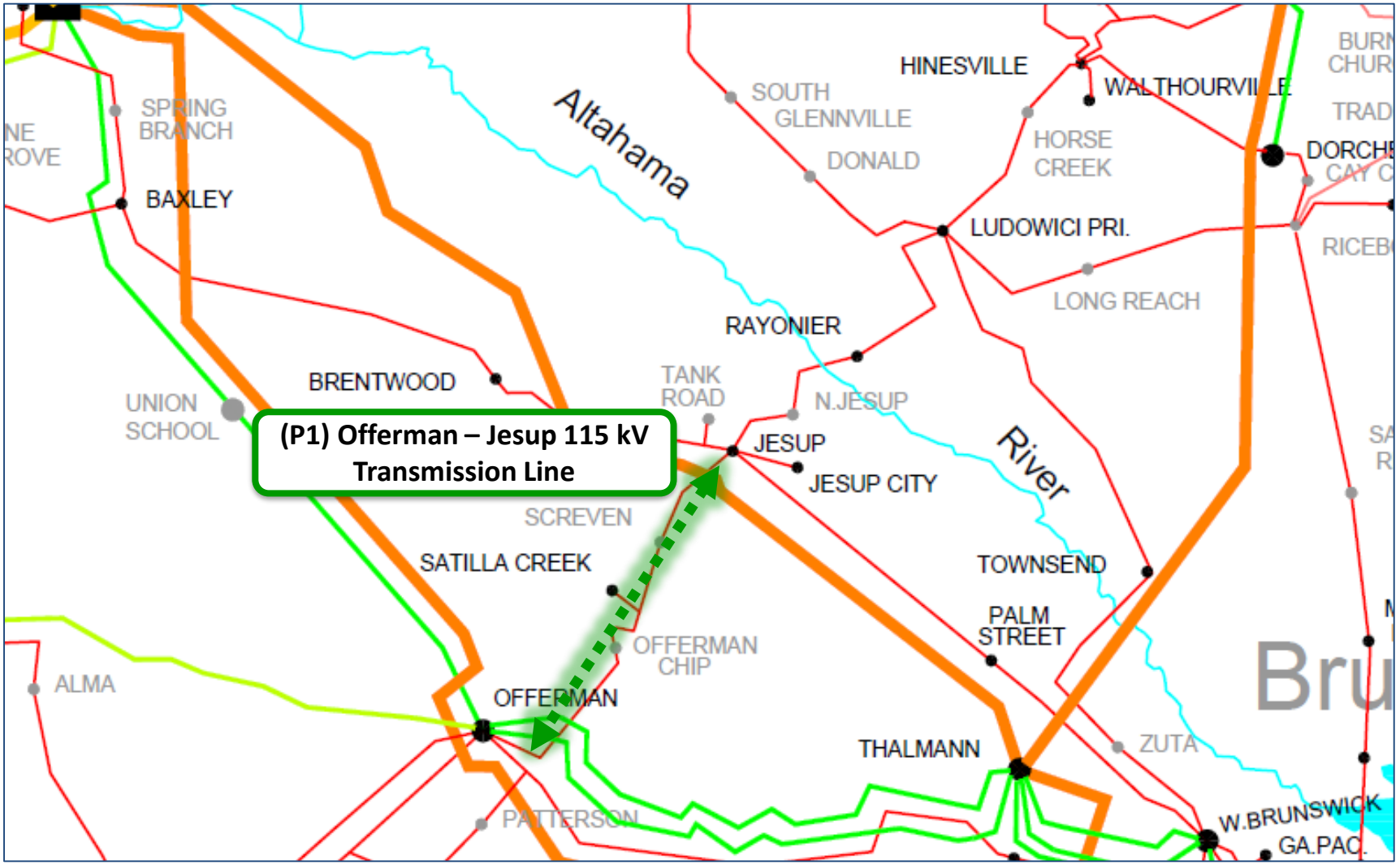
Significant Constraint (P1) – *SBAA*



Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *SBAA*



Duke Energy to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

Table 16: Transmission System Impacts - SERTP

Balancing Authority	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$26,400,000
Duke Progress East (DEPE)	$0
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$16,080,000
Tennessee Valley Authority (TVA)	$0
SERTP TOTAL ($2018)	**$42,480,000**

SERTP

Regional Modeling Assumptions

SERTP

Regional Transmission Plan

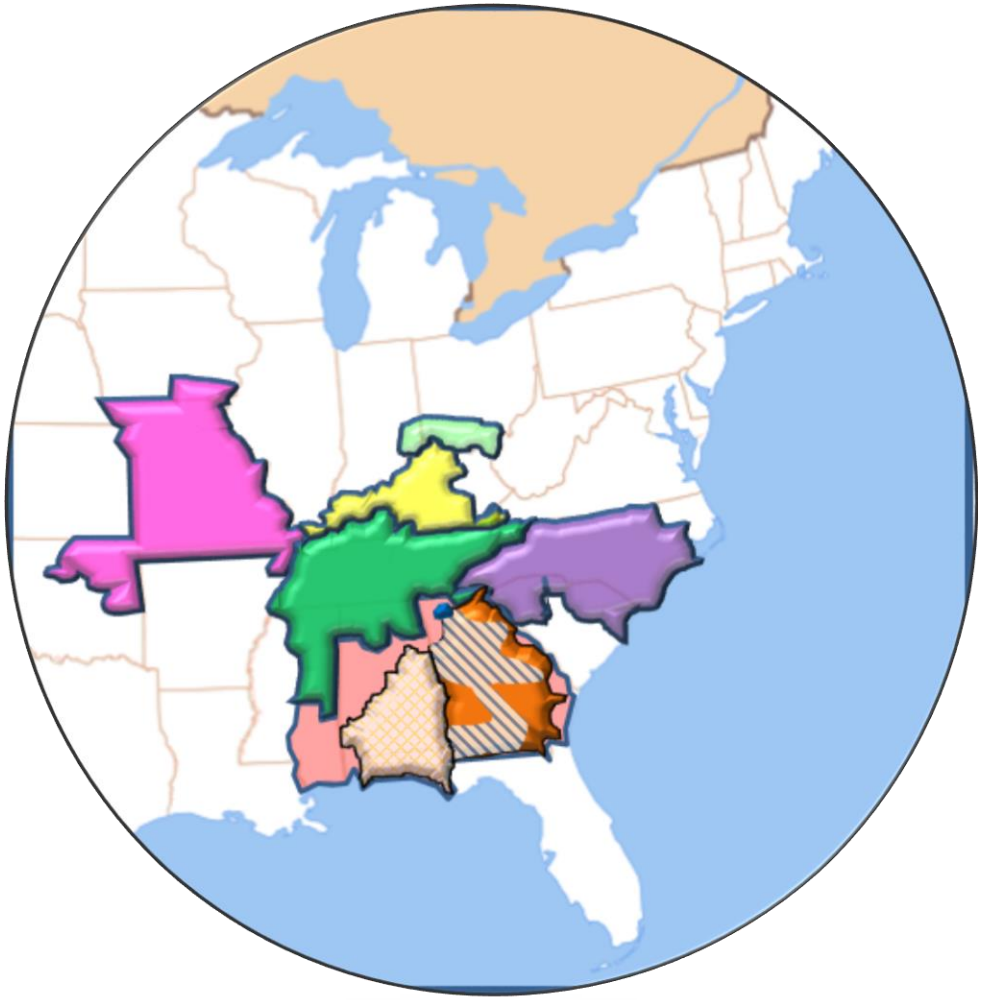
OVEC Integration into PJM

- Ohio Valley Electric Corporation ("OVEC") provided notice of its intention to withdraw from the SERTP - **December 15, 2017**.

- OVEC obtained the necessary corporate approvals and approval of the Federal Energy Regulatory Commission("FERC") to integrate into PJM. OVEC became a member of PJM Interconnection, L.L.C. ("PJM") effective December 1, 2018.

- Effective **December 1, 2018**, the Open Access Transmission Tariffs of the FERC jurisdictional SERTP entities were amended to provide for the withdrawal of OVEC, including its wholly owned subsidiary Indiana-Kentucky Electric Corporation, from the SERTP process.

Southeastern Regional Transmission Planning (SERTP)



SERTP Sponsors

- Associated Electric Cooperative Inc.
- Dalton Utilities
- Duke Energy
- Georgia Transmission
- LG&E KU
- MEAG Power
- OVEC IKEC
- PowerSouth Energy Cooperative
- Southern Company
- TVA

Southeastern Regional Transmission Planning (SERTP)

Balancing Authority Areas

- AECI
- DUKE – Carolinas
- DUKE – Progress East
- DUKE – Progress West
- LG&E/KU
- OVEC
- PowerSouth
- Southern
- TVA

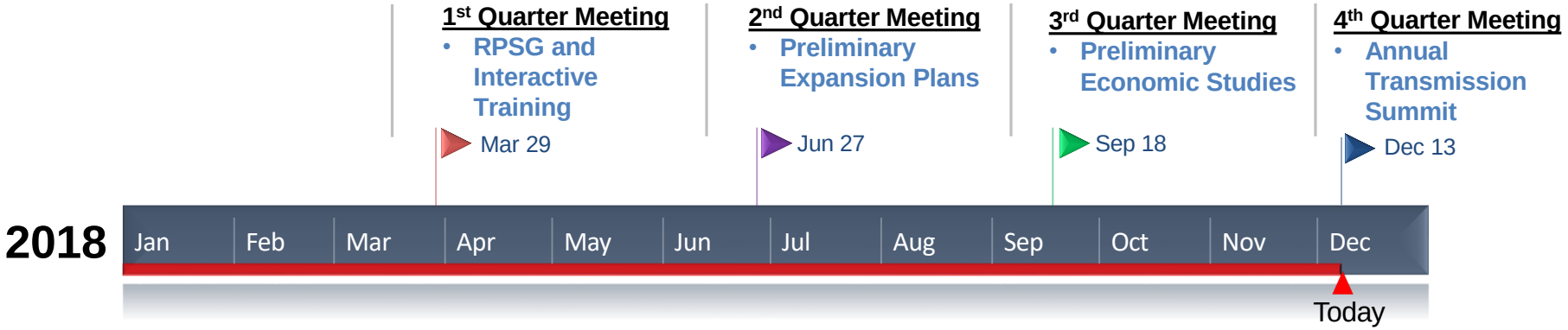
SERTP

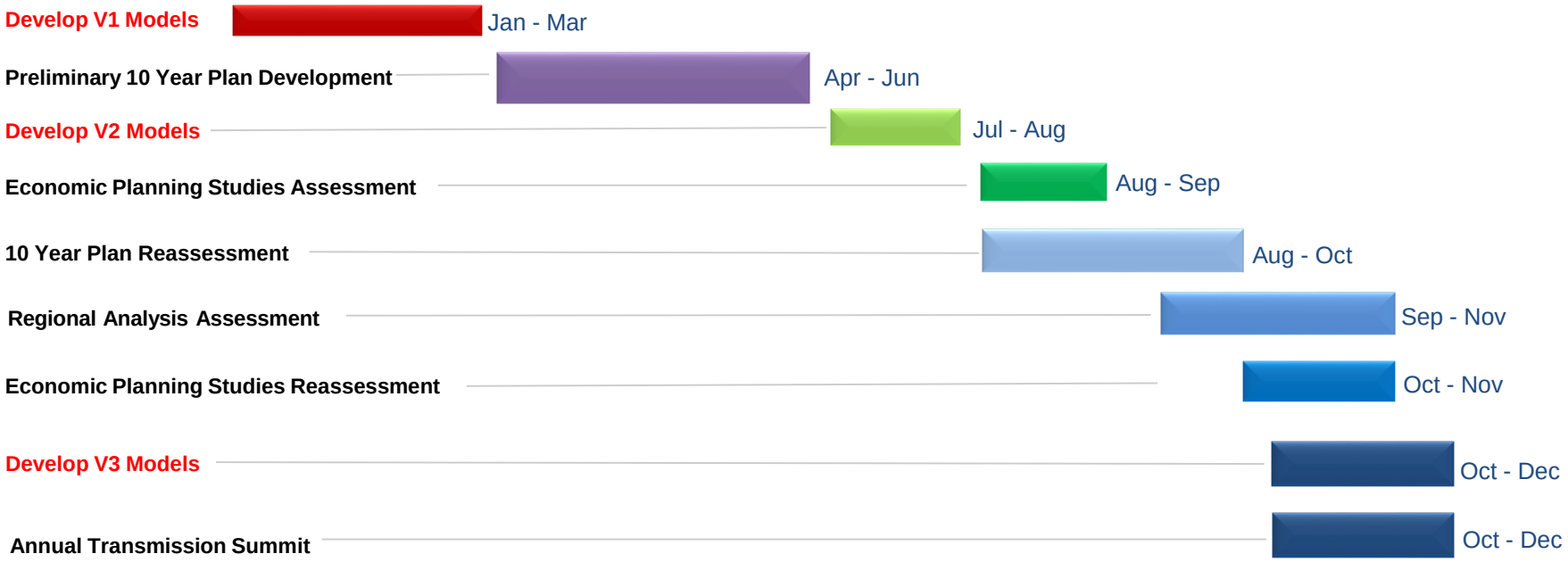
Regional Transmission Expansion Plan Process

Southeastern Regional TRANSMISSION PLANNING

2018 SERTP

10 Year SERTP Regional Transmission Expansion Plan Process



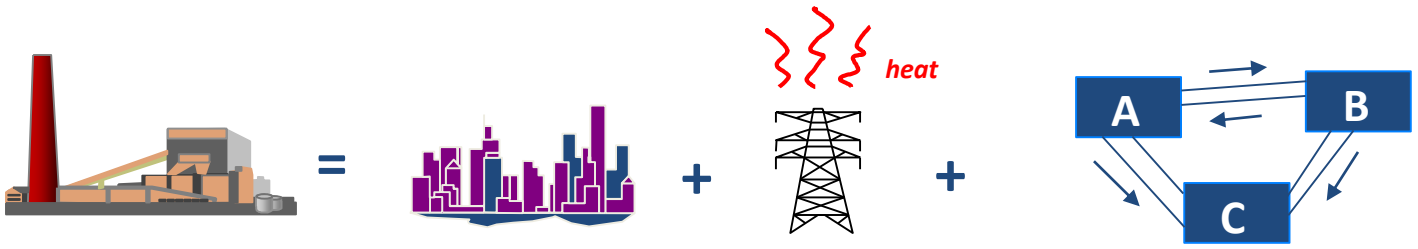


SERTP

Regional Model Assumptions

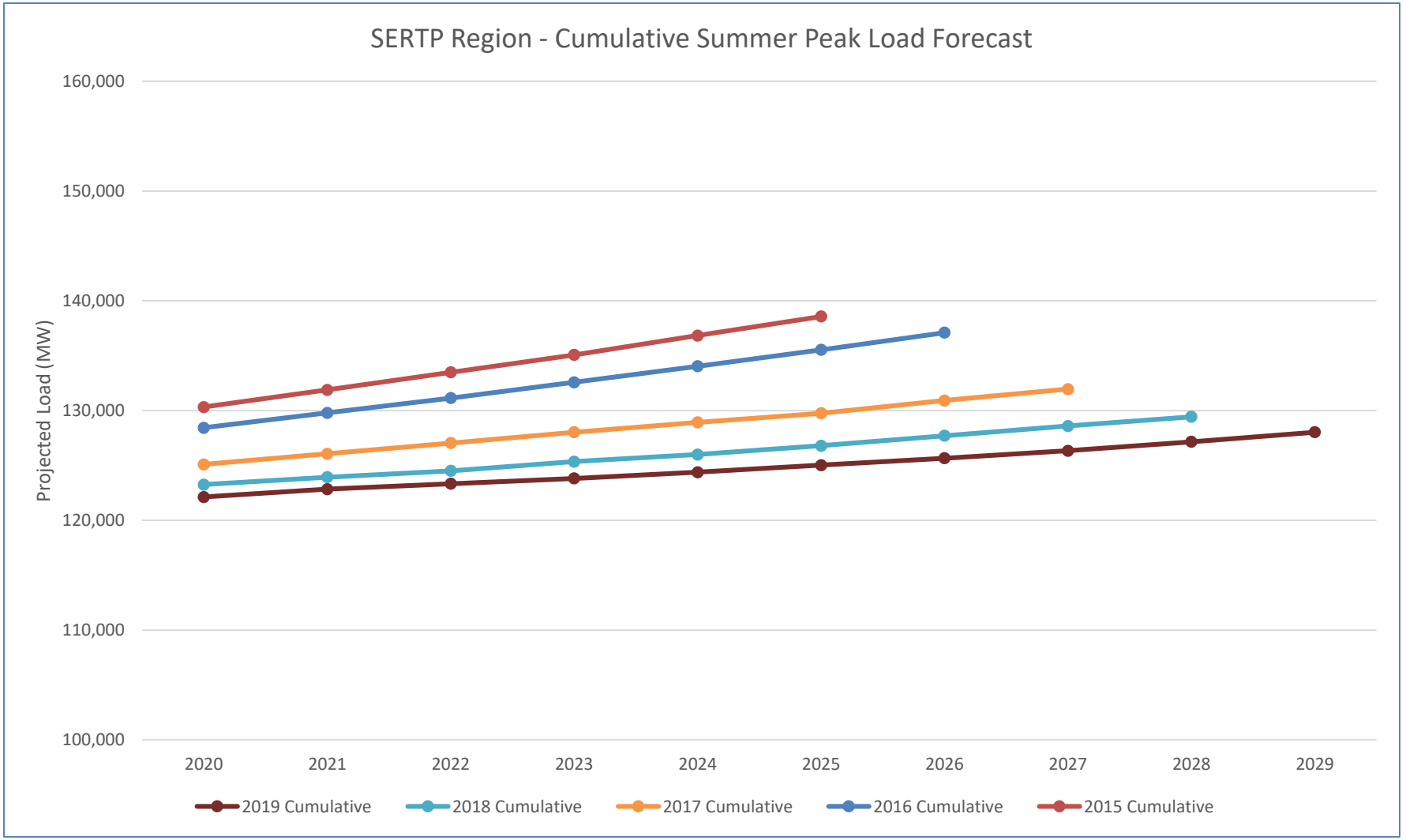
Regional Model Assumptions

Generation = Load + Losses (Topology) + Net Interchange



- Projected load for each year and season
- Losses produced in serving that load
  - Transmission Lines & Transformers
    - 10 Year Transmission Expansion Plan
- Area Interchange of long-term firm commitments across the interface
- Generation needed to balance all of the above

SERTP Cumulative Summer Peak Load Forecast



Regional Transmission Expansion Plan

The projects described in this presentation represent the regional ten (10) year transmission expansion plan. The transmission expansion plan is periodically reviewed and may be revised due to changes in assumptions. This presentation does not represent a commitment to build for projects listed in the future.

SERTP

Regional Transmission Expansion Plans

AECI Balancing Authority Area

AECI Balancing Authority Area

2018 SERTP Regional Transmission Expansion Plan & Generation Assumptions

* AECI has no generation assumptions expected to change throughout the ten year planning horizon for the 2018 SERTP Planning Processes.

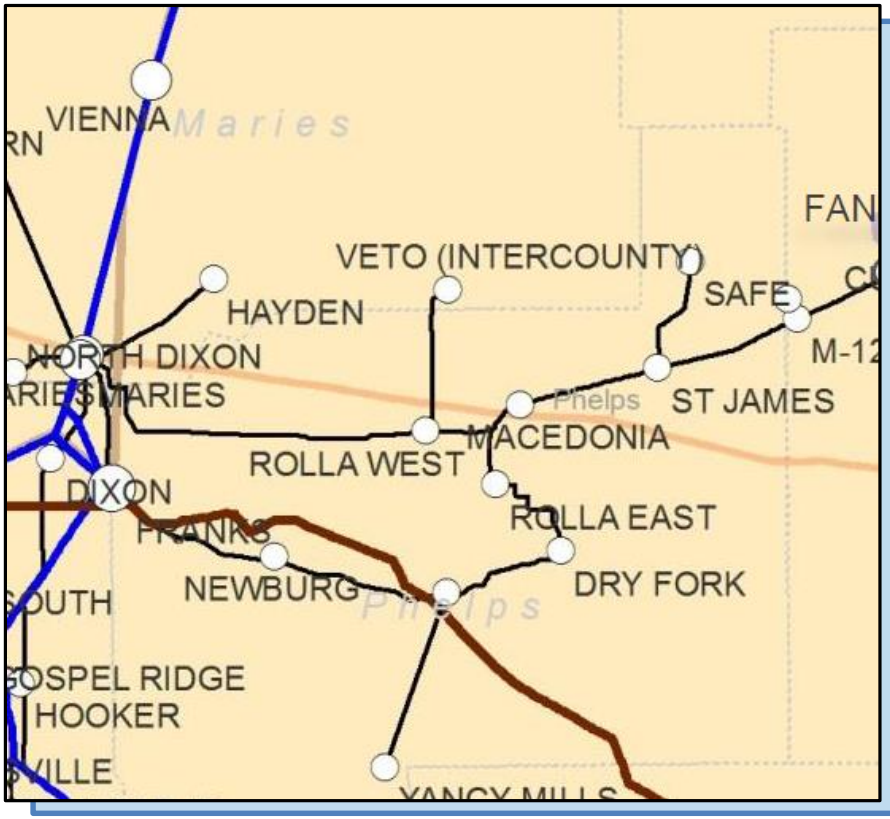
Southeastern Regional TRANSMISSION PLANNING

AECI Balancing Authority Area

AECI – 1

- **2020**

Macedonia – Dillon 138 kV T.L. & Macedonia 138 kV Substation

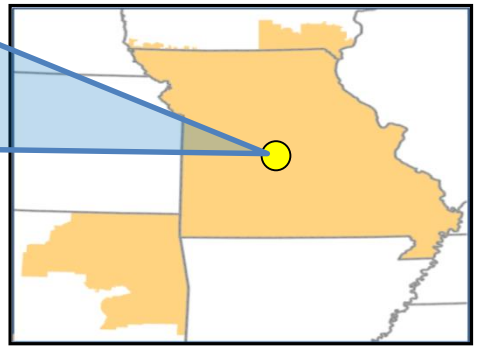


DESCRIPTION:

Construct approximately 1.1 miles of 138 kV transmission line from Macedonia to Dillon (Ameren) with 795 ACSR at 100°C and install a 56 MVA 138/69 kV transformer at Macedonia.

SUPPORTING STATEMENT:

The Maries – Rolla. West transmission line overloads under contingency and additional voltage support is needed in the Maries and Rolla areas under contingency



Southeastern Regional TRANSMISSION PLANNING

AECI Balancing Authority Area

AECI Balancing Authority

Upcoming 2019 Generation Assumptions

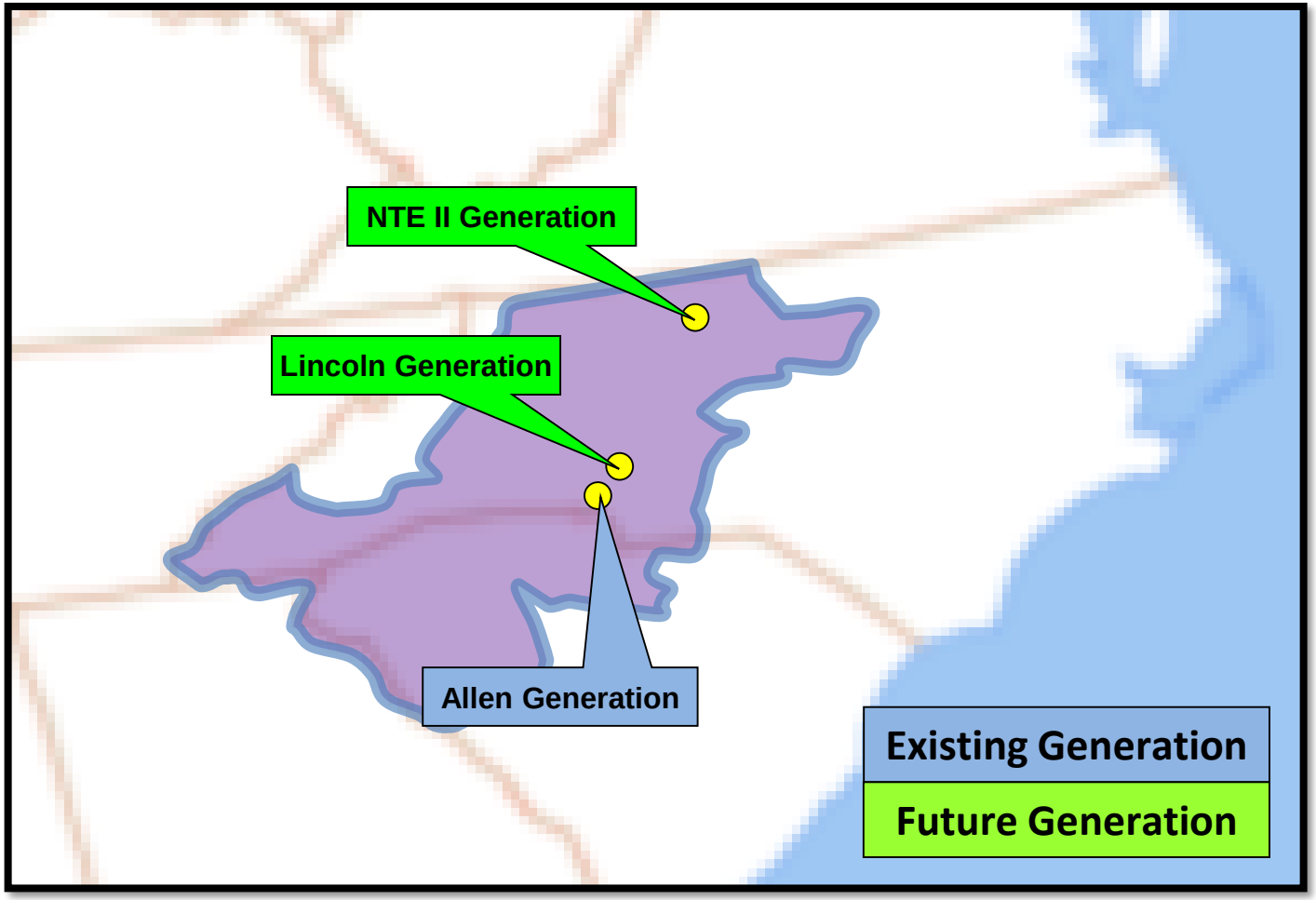
* AECI has no generation assumptions expected to change throughout the ten year planning horizon for the 2019 SERTP Process.

DUKE CAROLINAS Balancing Authority Area

2018 Generation Assumptions

DUKE CAROLINAS – Generation Assumptions

The following diagram depicts the location of generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2018 SERTP Process.



DUKE CAROLINAS – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
ALLEN 1	COAL	174	174	174	174	174	174	0	--	--	--
ALLEN 2	COAL	172	172	172	172	172	172	0	--	--	--
ALLEN 3	COAL	271	271	271	271	271	271	0	--	--	--
LINCOLN 17	GAS	--	--	--	525	525	525	525	525	525	525
NTE II	GAS	--	--	474	474	474	474	474	474	474	474

Duke Carolinas Balancing Authority Area

DUKE CAROLINAS – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BROAD RIVER	850	850	850	850	850	850	850	850	850	850
CATAWBA	155	155	155	155	155	155	155	155	155	155
ROWAN	150	150	150	150	150	150	150	150	150	150

DUKE CAROLINAS Balancing Authority Area

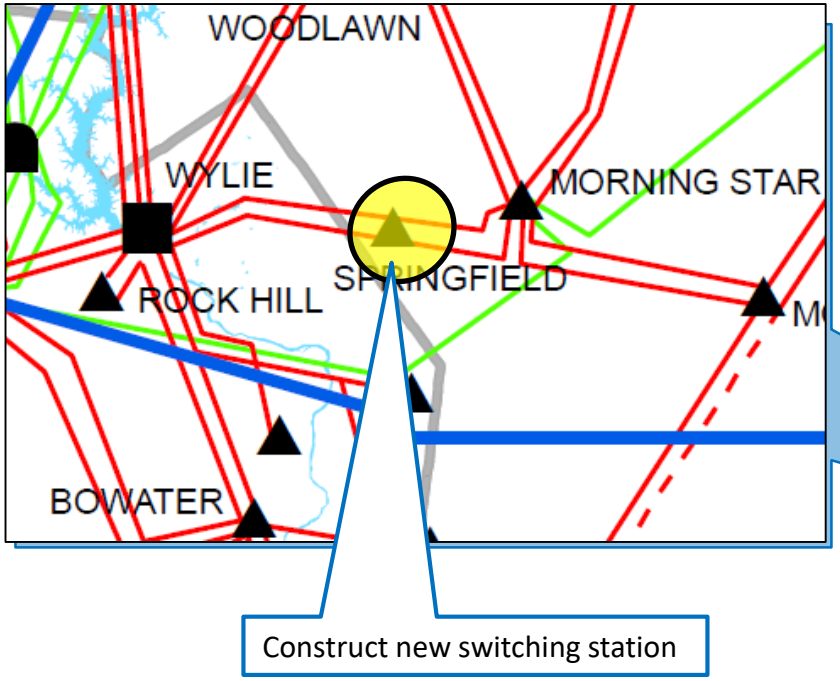
SERTP Regional Transmission Expansion Plan

Duke Carolinas Balancing Authority Area

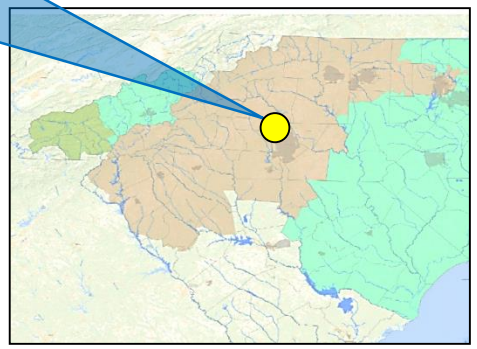
DUKE CAROLINAS – 1

• **2019**

BALLANTYNE SWITCHING STATION



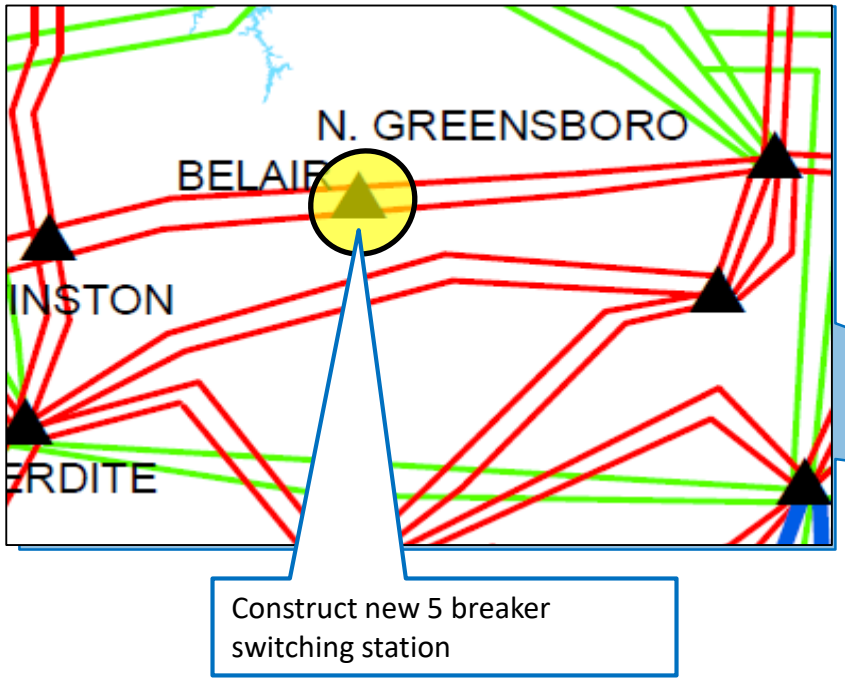
- **DESCRIPTION:**
  - Convert the Springfield Tap Station into Ballantyne switching station.
- **SUPPORTING STATEMENT:**
  - The Wylie Switching Station to Morning Star Tie 100 kV transmission line overloads under contingency.



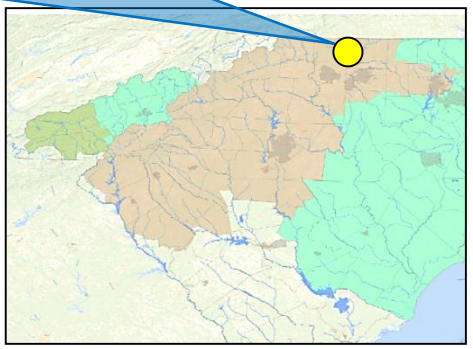
DUKE CAROLINAS – 2

• **2019**

BELAIR SWITCHING STATION



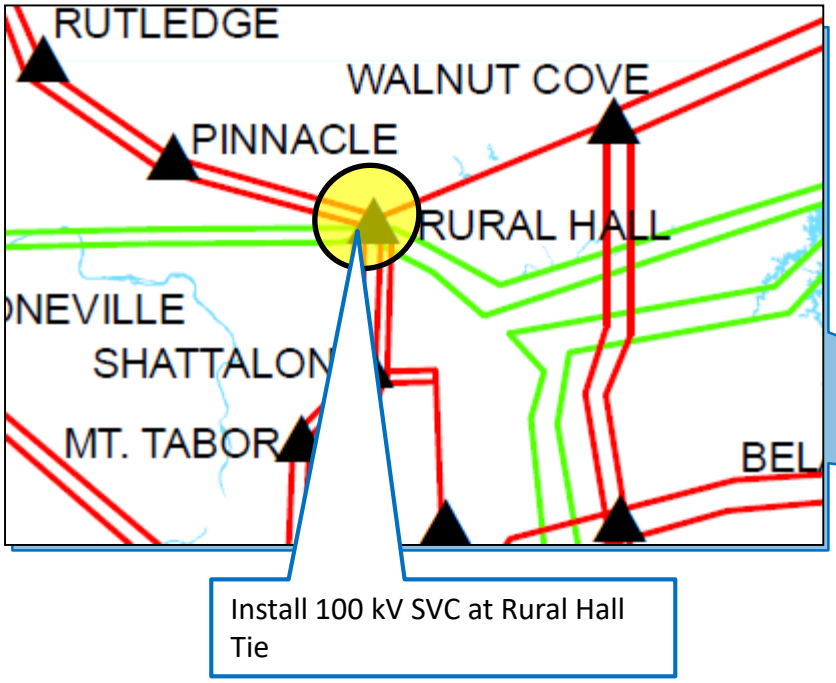
- **DESCRIPTION:**
  - Construct a new five breaker switching station on the North Greensboro to Robbins Road 100 kV double circuit transmission line.
- **SUPPORTING STATEMENT:**
  - The North Greensboro to Robbins Road 100 kV transmission line overloads under contingency.



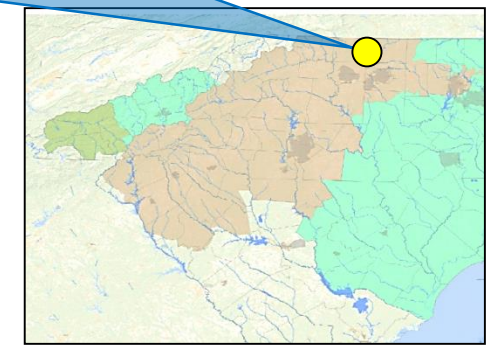
DUKE CAROLINAS – 3

• **2019**

RURAL HALL STATIC VAR COMPENSATOR (SVC)



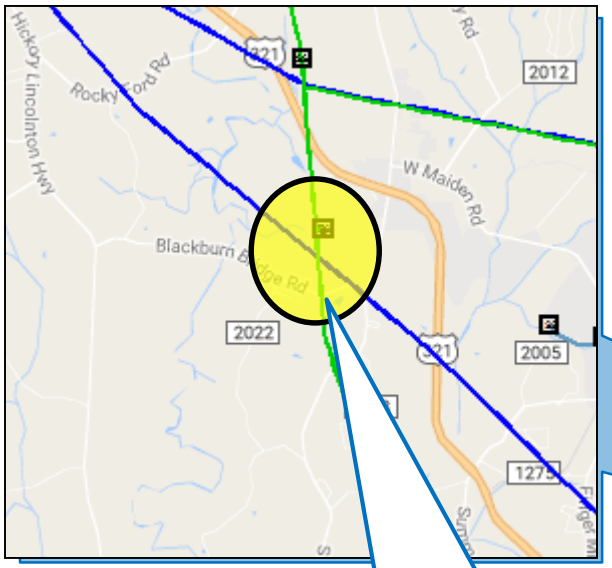
- **DESCRIPTION:**
  - Install a new 100 kV, +100/-300 MVAR Static VAR Compensator (SVC) at Rural Hall Tie.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in the northern region of the Duke Energy Carolinas Balancing Authority Area under contingency.



DUKE CAROLINAS – 4

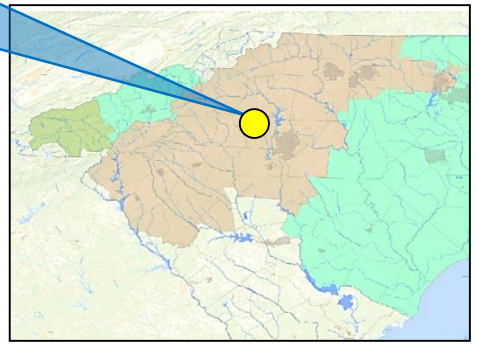
• **2020**

ORCHARD 230/100 KV TIE



Construct a new 230/100 kV Tie East of Maiden, NC

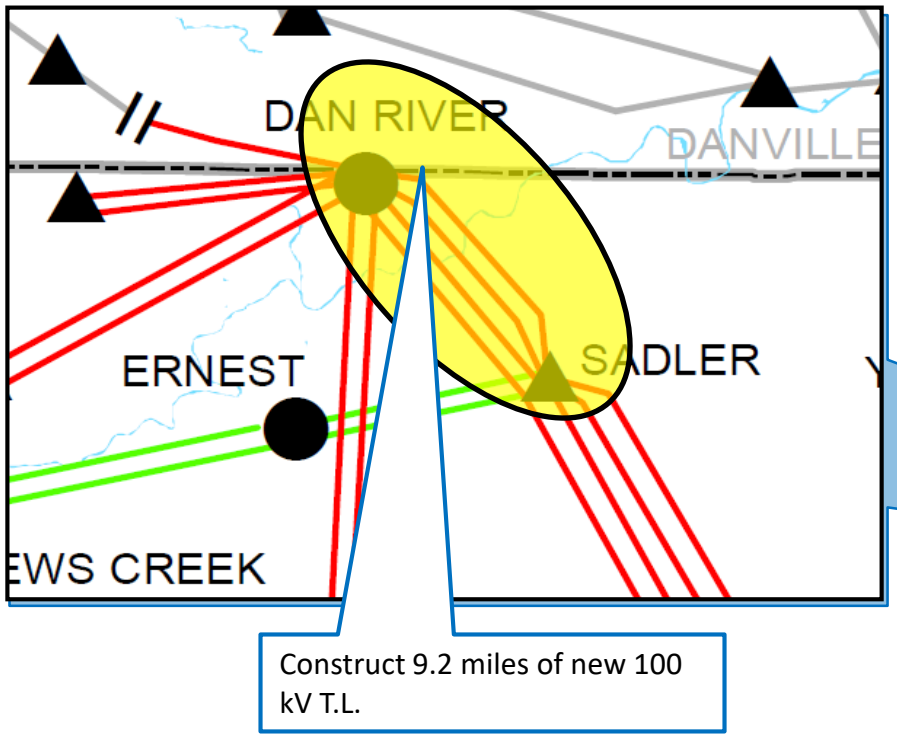
- **DESCRIPTION:**
  - Construct a new 230/100 kV Tie station, southwest of Maiden, NC at the intersection of the Lincoln CT to Longview Tie 230 kV transmission line and the Lincolnton Tie to Hickory Tie 100 kV transmission line.
- **SUPPORTING STATEMENT:**
  - To support additional load growth in the area.



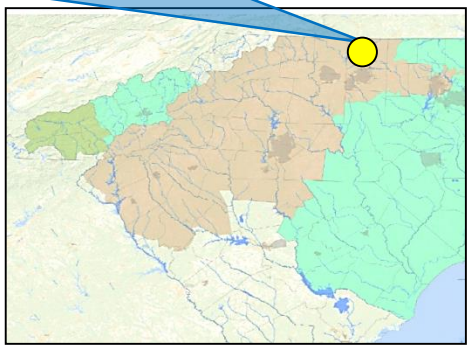
DUKE CAROLINAS – 5

• **2020**

SADLER TIE – DAN RIVER 100 KV TRANSMISSION LINE



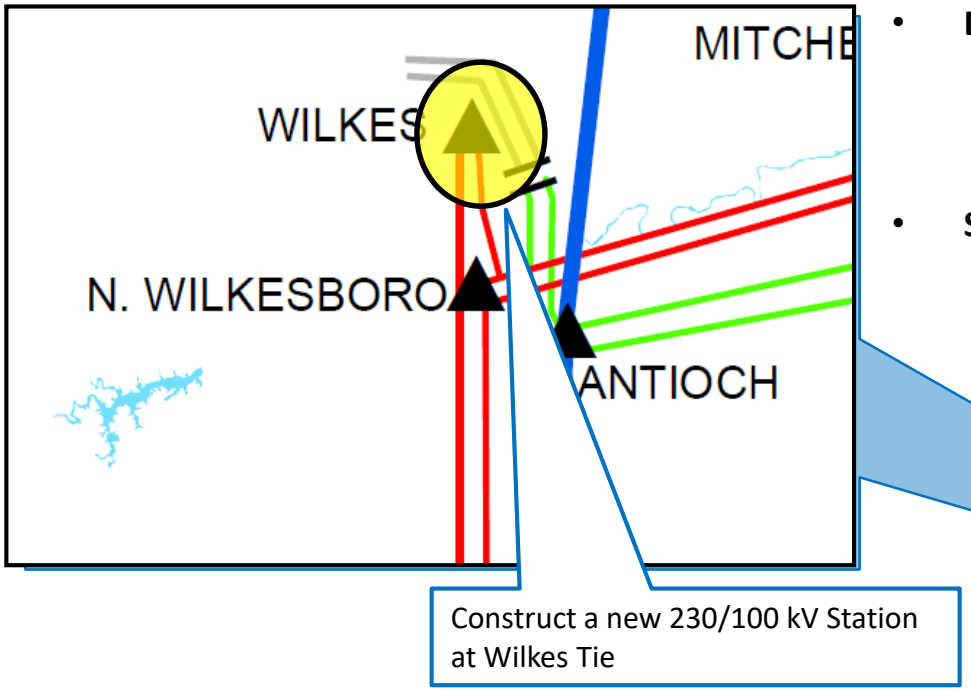
- **DESCRIPTION:**
  - Construct approximately 9.2 miles of new 100 kV transmission line between Dan River Steam Station and Sadler Tie with 954 AAC at 120°C.
- **SUPPORTING STATEMENT:**
  - Thermal overloads occur around Dan River Steam Station and Dan River Combined Cycle Station under contingency.



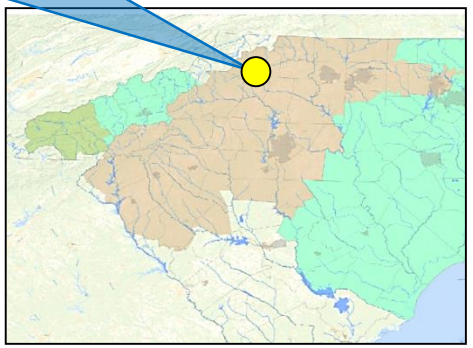
DUKE CAROLINAS – 6

• **2020**

WILKES TIE 230 KV SUBSTATION



- **DESCRIPTION:**
  - Install a new 230/100 kV, 448 MVA transformer at Wilkes Tie.
- **SUPPORTING STATEMENT:**
  - Thermal overloads occur near North Wilkesboro Tie and additional voltage support is needed in the area under contingency.

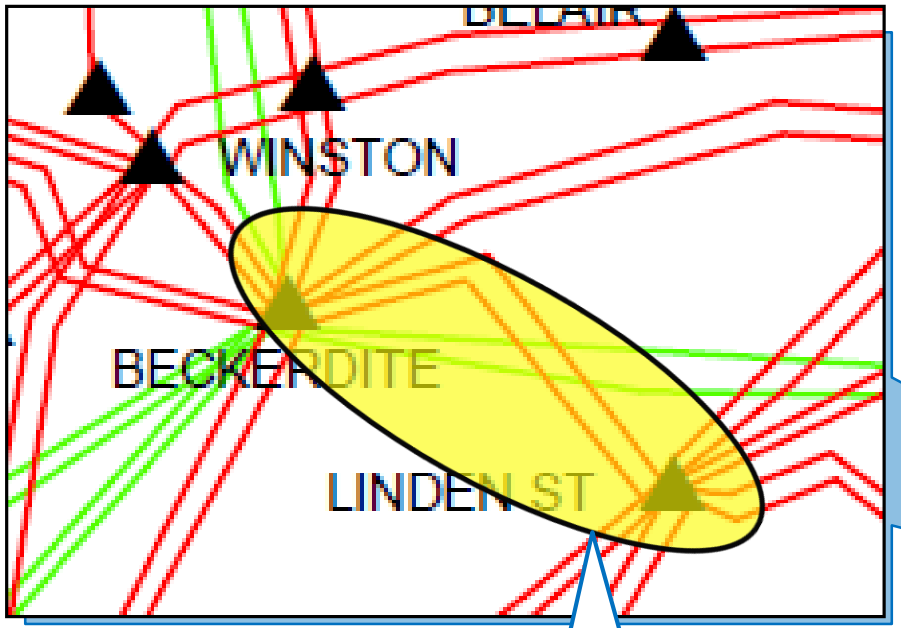


Duke Carolinas Balancing Authority Area

DUKE CAROLINAS – 7

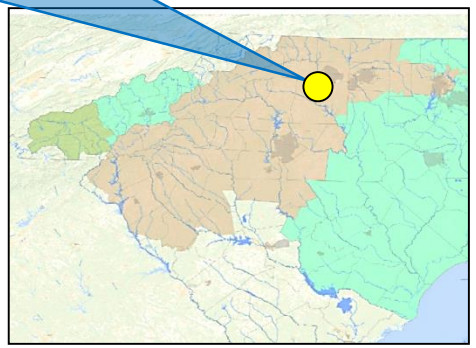
• **2024**

BECKERDITE – LINDEN STREET 100 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Reconductor approximately 16.0 miles of the double circuit Beckerdite to Linden St 100 kV transmission line with bundled 477 ACSR.
- **SUPPORTING STATEMENT:**
  - The Beckerdite to Linden Street 100 kV transmission line overloads under contingency.

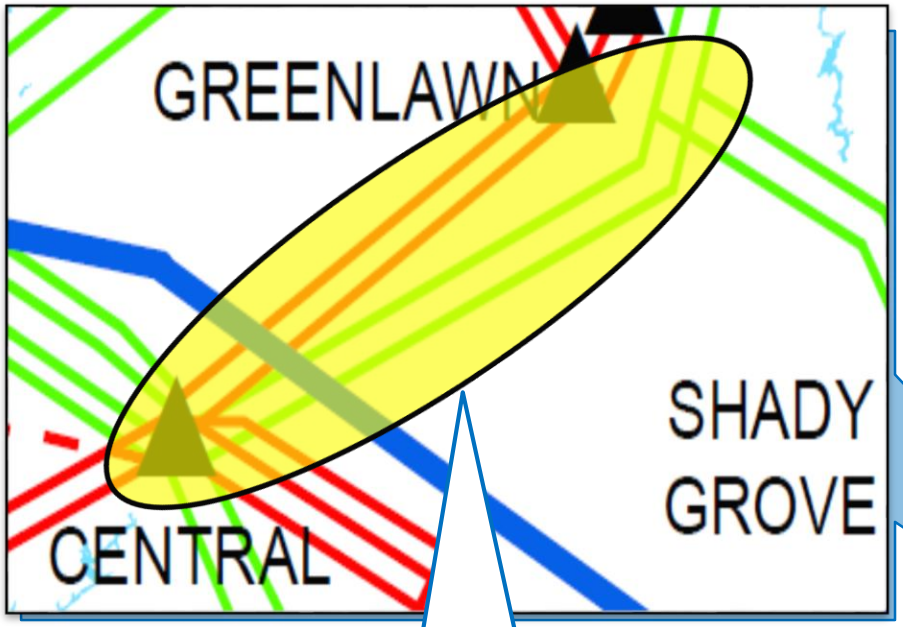
RECONDUCTOR 16.0 MILES OF THE BECKERDITE – LINDEN STREET 100 KV TL WITH BUNDLED 477 ACSR



DUKE CAROLINAS – 8

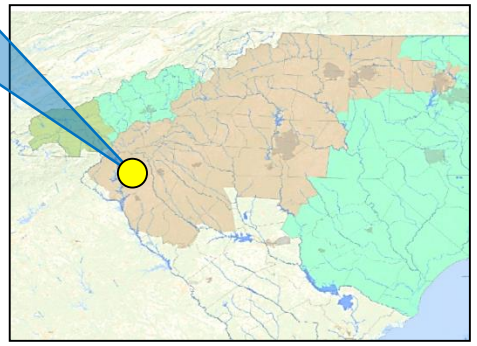
• **2024**

CENTRAL – SHADY GROVE 230 KV TRANSMISSION LINE



RECONDUCTOR 18.0 MILES OF THE CENTRAL – SHADY GROVE 230 KV TL WITH BUNDLED 954 ACSR AT 120°C

- **DESCRIPTION:**
  - Reconductor approximately 18.0 miles of the Central to Shady Grove 230 kV transmission line with bundled 954 ACSR at 120°C.
- **SUPPORTING STATEMENT:**
  - The Central to Shady Grove 230 kV transmission line overloads under contingency.

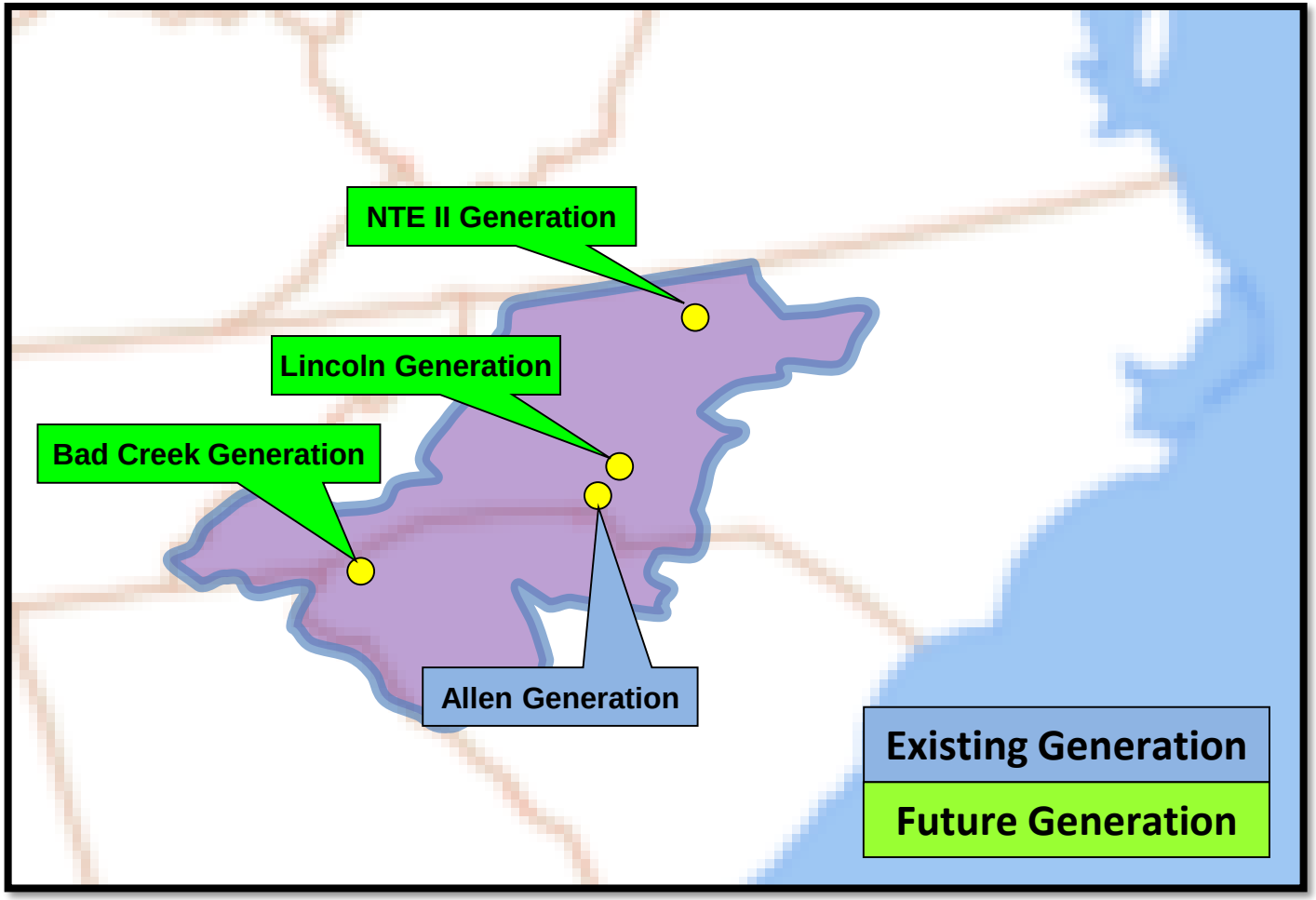


DUKE CAROLINAS Balancing Authority Area

Upcoming 2019 Generation Assumptions

DUKE CAROLINAS – Generation Assumptions

The following diagram depicts the location of generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process.



DUKE CAROLINAS – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ALLEN 1	COAL	174	174	174	174	174	0	--	--	--	--
ALLEN 2	COAL	172	172	172	172	172	0	--	--	--	--
ALLEN 3	COAL	271	271	271	271	271	0	--	--	--	--
ALLEN 4	COAL	274	274	274	274	274	274	274	274	0	--
ALLEN 5	COAL	290	290	290	290	290	290	290	290	0	--
BAD CREEK 1	Pumped Hydro	350	420	420	420	420	420	420	420	420	420
BAD CREEK 2	Pumped Hydro	350	350	420	420	420	420	420	420	420	420
BAD CREEK 3	Pumped Hydro	350	350	350	420	420	420	420	420	420	420
BAD CREEK 4	Pumped Hydro	350	350	350	350	420	420	420	420	420	420
LINCOLN 17	GAS	--	--	--	--	402	402	402	402	402	402
NTE II	GAS	--	--	474	474	474	474	474	474	474	474

Duke Carolinas Balancing Authority Area

DUKE CAROLINAS – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
BROAD RIVER	850	850	850	850	850	850	850	850	850	850
CATAWBA	155	155	155	155	155	155	155	155	155	155
ROWAN	150	150	150	150	150	150	150	150	150	150

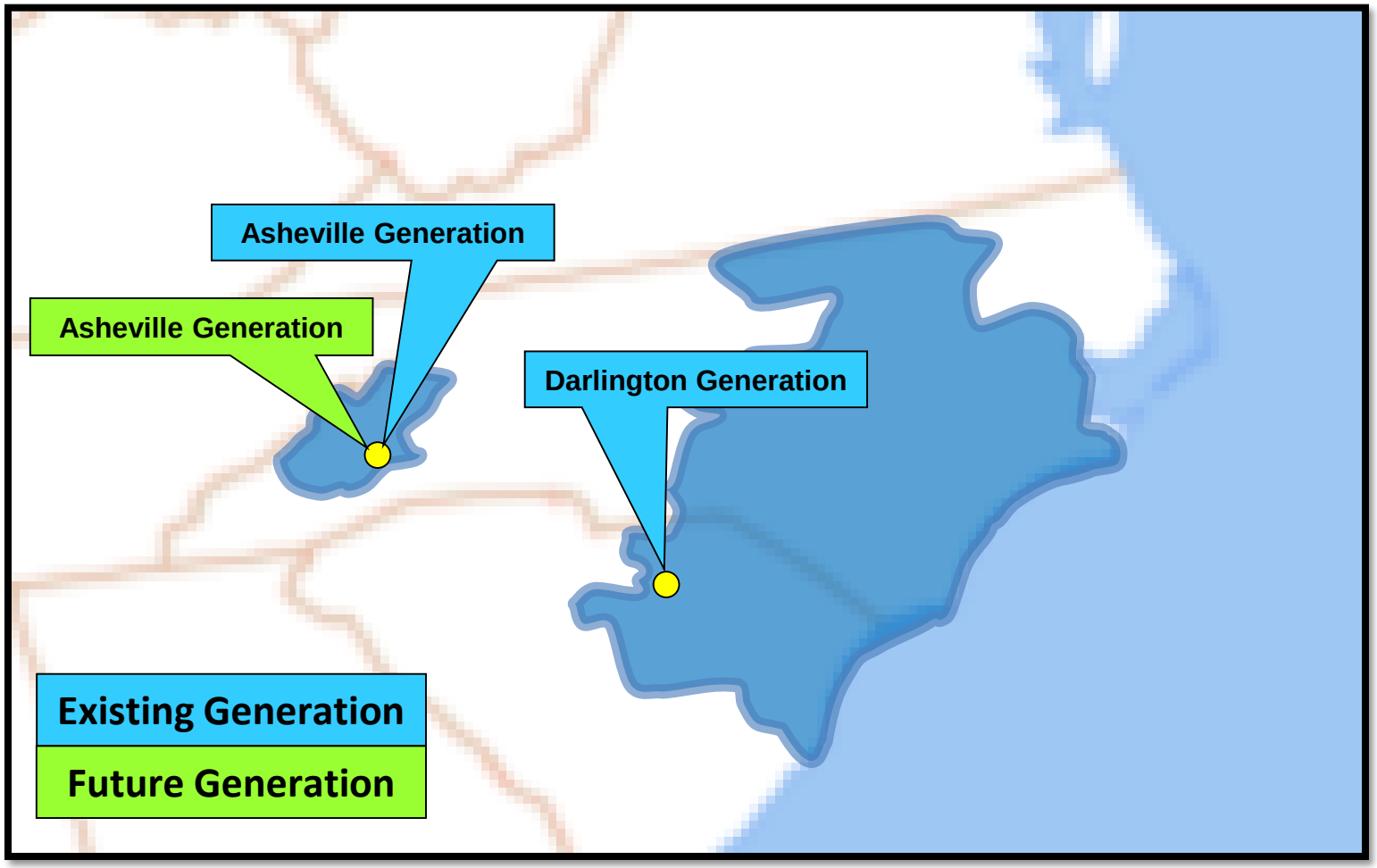
DUKE PROGRESS EAST/WEST

Balancing Authority Areas

2018 Generation Assumptions

DUKE PROGRESS – Generation Assumptions

The following diagram depicts the location of generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2018 SERTP Process.



DUKE PROGRESS – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
ASHEVILLE #1	Coal	191	0	--	--	--	--	--	--	--	--
ASHEVILLE #2	Coal	185	0	--	--	--	--	--	--	--	--
ASHEVILLE CC #1	Natural Gas	--	260	260	260	260	260	260	260	260	260
ASHEVILLE CC #2	Natural Gas	--	260	260	260	260	260	260	260	260	260
DARLINGTON CT #1	Gas/Oil	52	0	--	--	--	--	--	--	--	--
DARLINGTON CT #2	Oil	48	0	--	--	--	--	--	--	--	--
DARLINGTON CT #3	Gas/Oil	52	0	--	--	--	--	--	--	--	--
DARLINGTON CT #4	Oil	50	0	--	--	--	--	--	--	--	--
DARLINGTON CT #5	Gas/Oil	52	0	--	--	--	--	--	--	--	--
DARLINGTON CT #6	Oil	45	0	--	--	--	--	--	--	--	--

DUKE PROGRESS – Generation Assumptions (Cont.)

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
DARLINGTON CT #7	Gas/Oil	51	0	--	--	--	--	--	--	--	--
DARLINGTON CT #8	Oil	48	0	--	--	--	--	--	--	--	--
DARLINGTON CT #9	Gas/Oil	52	0	--	--	--	--	--	--	--	--
DARLINGTON CT #10	Oil	51	0	--	--	--	--	--	--	--	--

DUKE PROGRESS – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
HAMLET #1	55	55	55	55	55	55	55	55	55	55
HAMLET #2	55	55	55	55	55	55	55	55	55	55
HAMLET #3	55	55	55	55	55	55	55	55	55	55
INGENCO	6	6	6	6	6	6	6	6	6	6

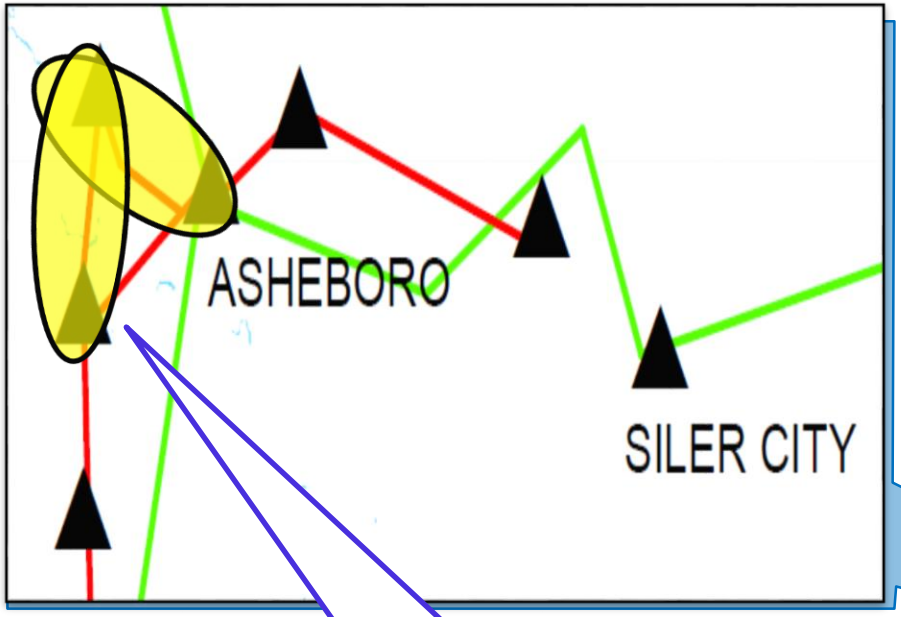
DUKE PROGRESS EAST Balancing Authority

SERTP Regional Transmission Expansion Plan

DUKE PROGRESS EAST – 1

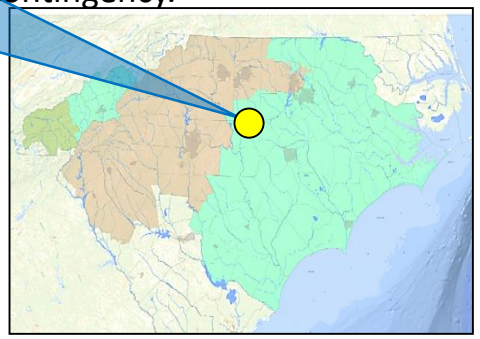
• **2020**

ASHEBORO – ASHEBORO EAST (NORTH) 115 KV TRANSMISSION LINE



REBUILD 6.5 MILES 0F 115 KV TL WITH 3-1590. REPLACE SWITCHES WITH AT LEAST 2000 A CAPABILITY

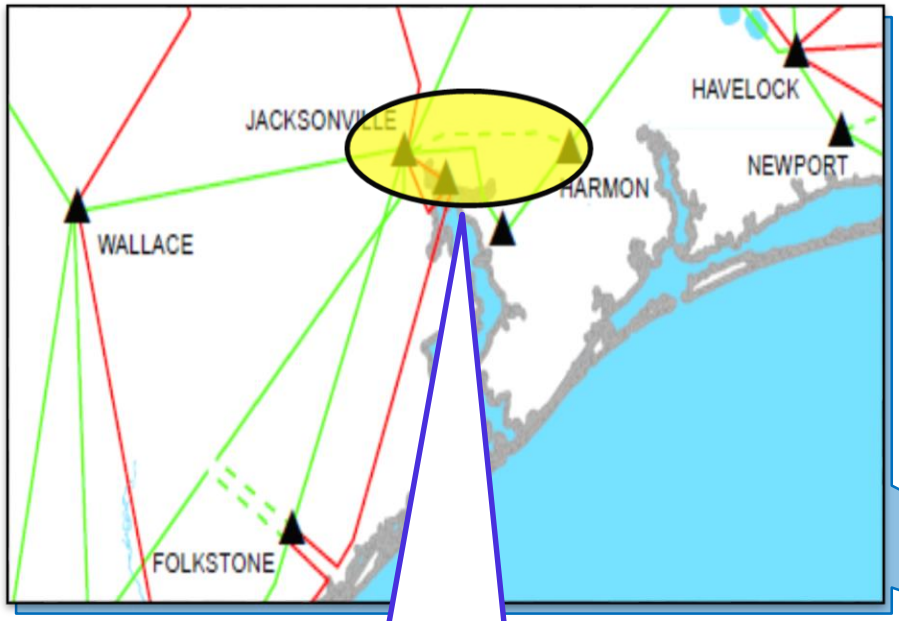
- **DESCRIPTION:**
  - Rebuild approximately 6.5 miles of the Asheboro to Asheboro East (North) 115 kV transmission line using 3-1590 ACSR rated for 307 MVA. Replace disconnect switches at Asheboro 230 kV and both the breaker and the disconnect switches at Asheboro East 115 kV with equipment of at least 2000A capability.
- **SUPPORTING STATEMENT:**
  - The Asheboro to Asheboro East (North) 115 kV transmission line overloads under contingency.



DUKE PROGRESS EAST – 2

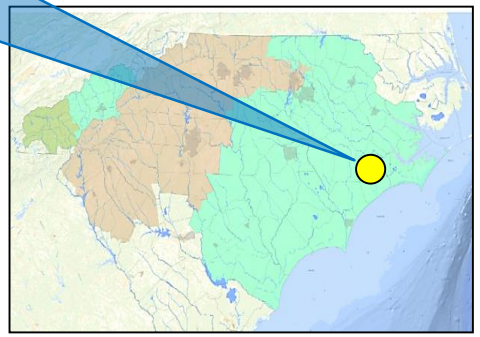
• **2020**

GRANT'S CREEK - JACKSONVILLE 230 KV TRANSMISSION LINE



NEW 230 KV TL WITH 6-1590 ACSR OR EQUIVALENT CONDUCTOR. NEW 230 KV SUBSTATION WITH A 230/115 KV, 300 MVA TRANSFORMER

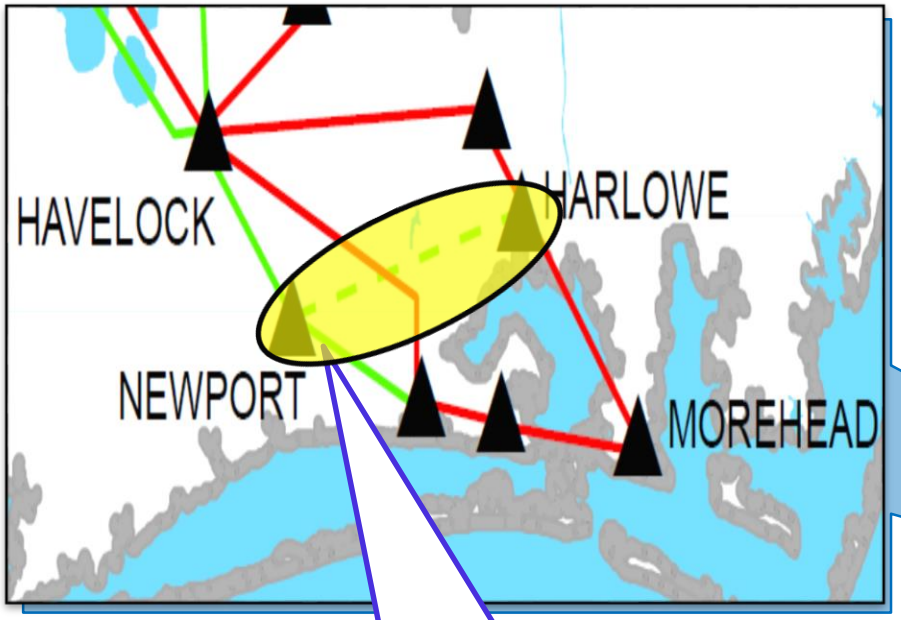
- **DESCRIPTION:**
  - Construct approximately 12.0 miles of new 230 kV transmission line from Jacksonville 230 kV substation to a new 230 kV substation at Grant's Creek with bundled 6-1590 ACSR or equivalent conductor rated for 1195 MVA. Build the new 230 kV Grant's Creek substation with four 230 kV breakers and a new 230/115 kV, 300 MVA transformer.
- **SUPPORTING STATEMENT:**
  - The Havelock to Jacksonville 230 kV transmission line overloads under contingency and additional voltage support is needed in the Jacksonville area.



DUKE PROGRESS EAST – 3

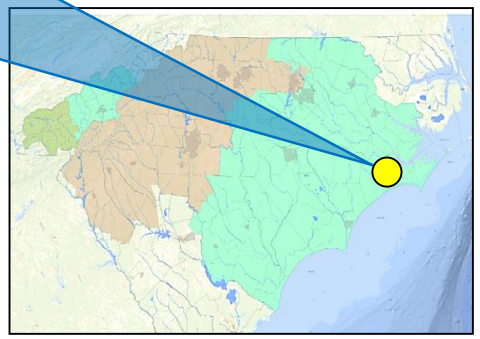
• **2020**

HARLOWE – NEWPORT 230 KV TRANSMISSION LINE



NEW 230 KV SWITCHING STATION. NEW 230 KV SUBSTATION. NEW 230 KV T.L. WITH 3-1590 ACSR OR EQUIVALENT CONDUCTOR

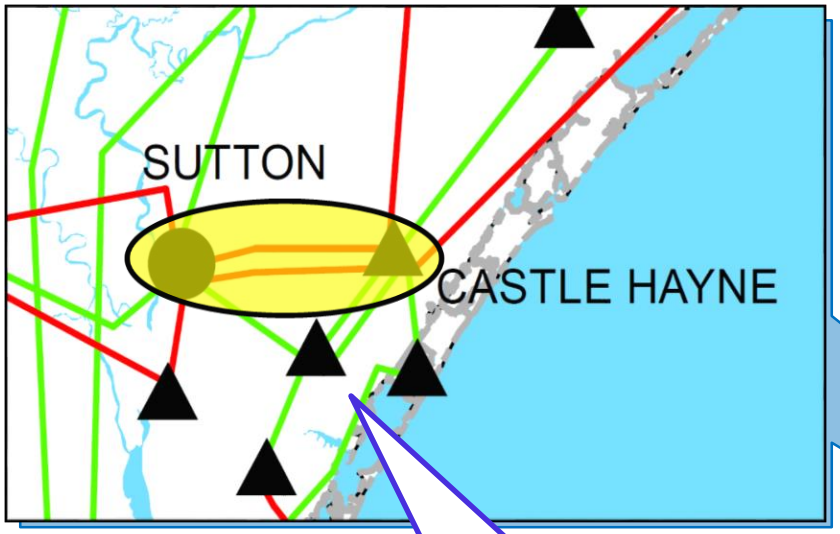
- **DESCRIPTION:**
  - Construct a new 230 kV switching station at Newport, construct a new 230 kV substation in the Harlowe Area, and construct approximately 10.0 miles of new 230 kV transmission line from the Harlowe to Newport with 3-1590 ACSR or equivalent conductor rated for 680 MVA.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in Havelock to Morehead area under contingency.



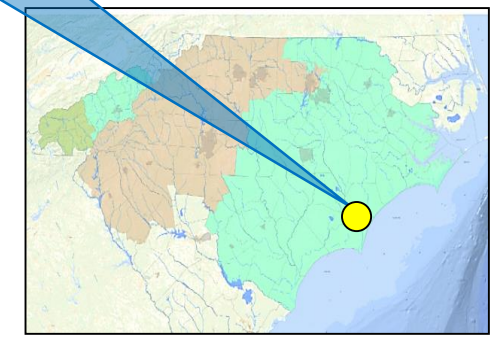
DUKE PROGRESS EAST – 4

• **2020**

SUTTON PLANT – CASTLE HAYNE 115 KV NORTH TRANSMISSION LINE



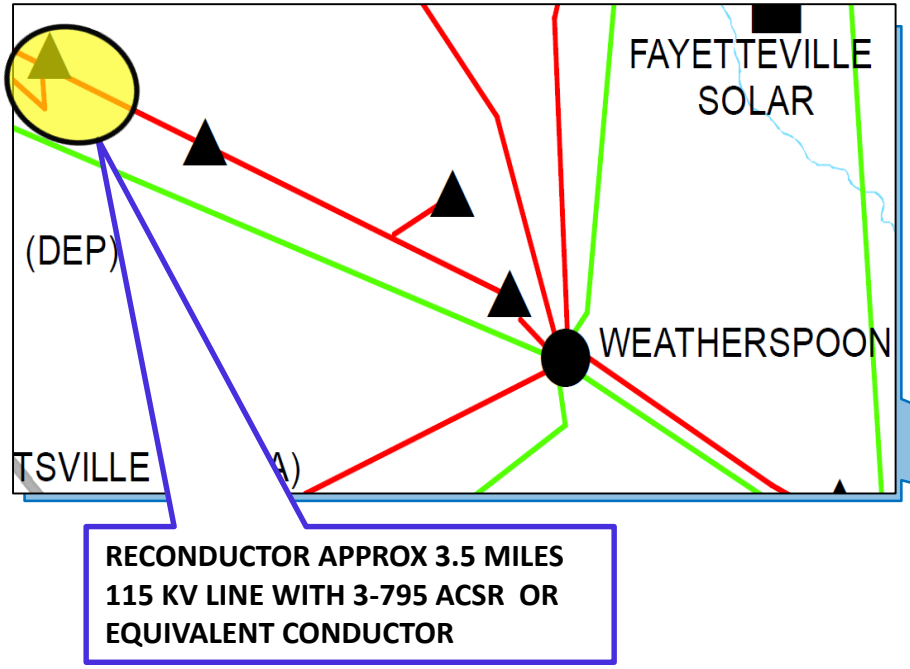
- **DESCRIPTION:**
  - Rebuild approximately 8.0 miles of the Sutton Plant to Castle Hayne 115 kV North transmission line using 1272 ACSR rated for 239 MVA.
- **SUPPORTING STATEMENT:**
  - The Sutton Plant to Castle Hayne 115 kV North transmission line overloads under contingency.



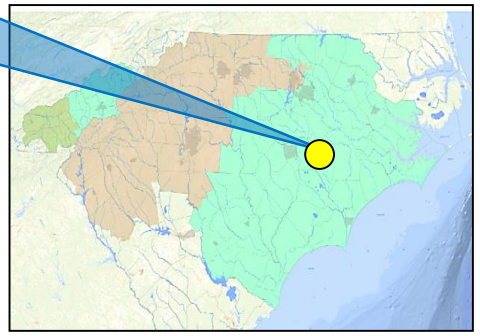
DUKE PROGRESS EAST – 5

• **2022**

IND 304440 – MAXTON 115 KV RECONDUCTOR



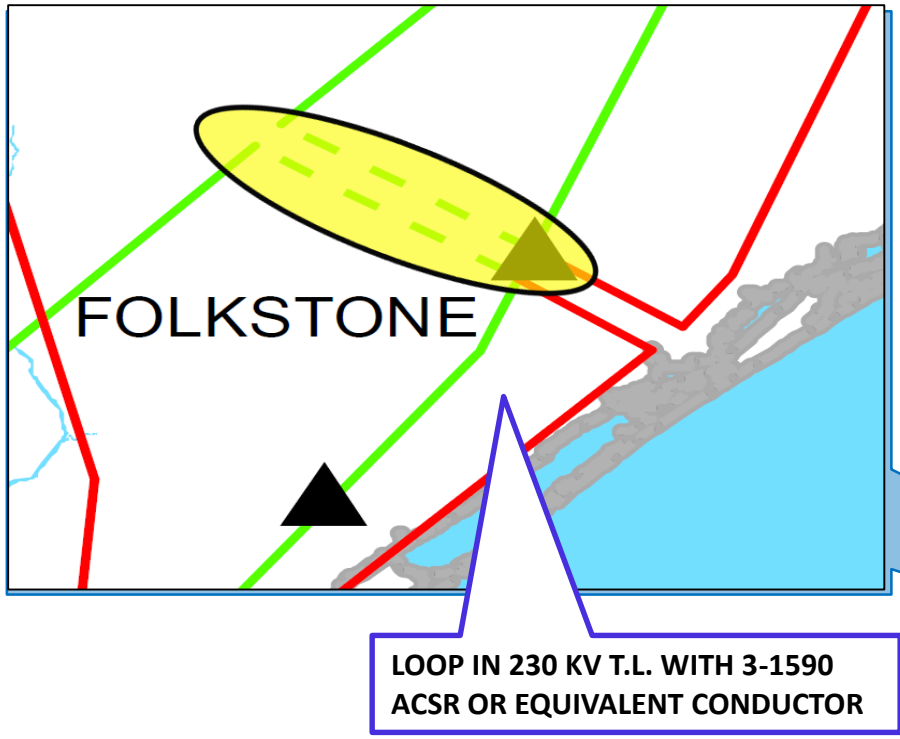
- **DESCRIPTION:**
  - Reconductor with 3-795 MCM ACSR or equivalent from IND 304440 to Maxton 115 kV substation, approximately 3.5 miles. Replace existing 600A switches with 1200A switches.
- **SUPPORTING STATEMENT:**
  - The IND 304440 to Maxton section of the Weatherspoon to IND 304440 115 kV transmission line overloads under contingency.



DUKE PROGRESS EAST – 6

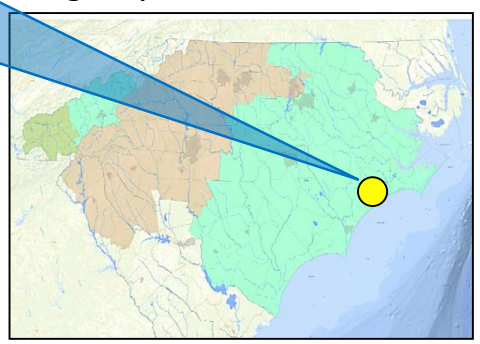
• **2024**

BRUNSWICK #1 – JACKSONVILLE 230 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Loop existing Brunswick Plant Unit 1 to Jacksonville 230 kV transmission line into the Folkstone 230 kV Substation. Also, convert the Folkstone 230 kV bus configuration to breaker-and-one-half by installing three (3) new 230 kV breakers.

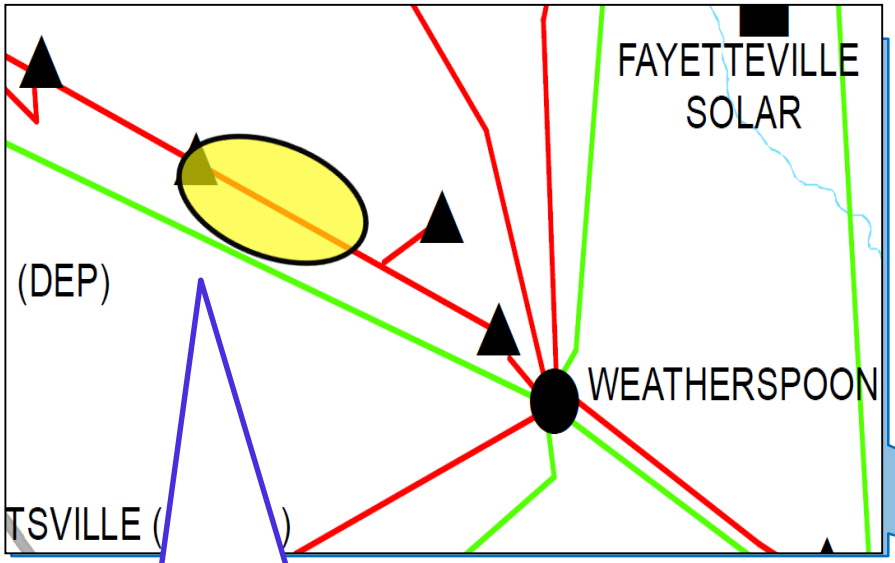
- **SUPPORTING STATEMENT:**
  - The Castle Hayne to Folkstone 115 kV transmission line overloads under contingency.



DUKE PROGRESS EAST – 7

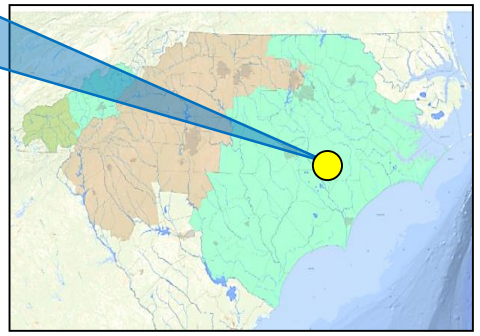
• **2026**

WSPN – IND 304440 115 KV TRANSMISSION LINE



RECONDUCTOR APPROX 9.0 MILES 115 KV LINE WITH 3-795 ACSR OR EQUIVALENT CONDUCTOR

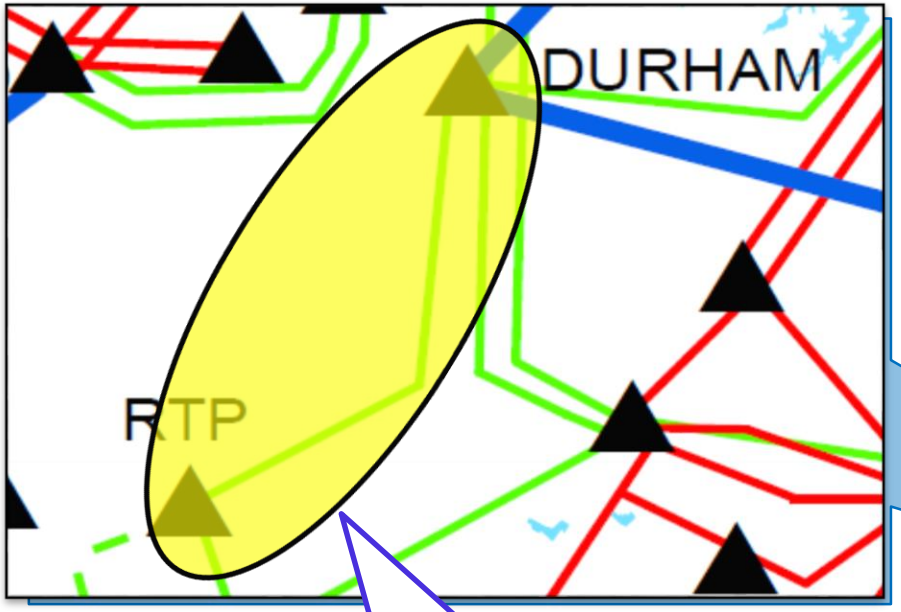
- **DESCRIPTION:**
  - Reconductor approximately 9.0 miles from Maxton to Pembroke 115 kV substation with 3-795 MCM ACSR or equivalent. Replace existing 600A switch with 1200A switch.
- **SUPPORTING STATEMENT:**
  - The Maxton to Pembroke section of the Weatherspoon to IND 304440 115 kV transmission line overloads under contingency.



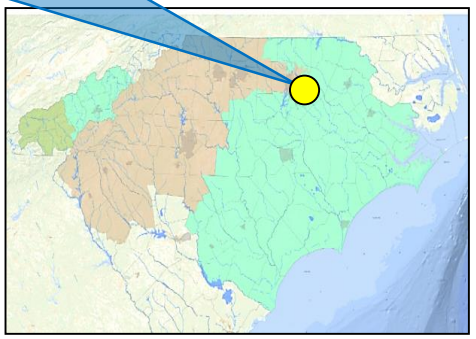
DUKE PROGRESS EAST – 8

• **2027**

DURHAM – RTP 230 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Reconductor approximately 10.0 miles of the Durham to RTP 230 kV transmission line with bundled 6-1590 ACSR rated for 1195 MVA.
- **SUPPORTING STATEMENT:**
  - The Durham to RTP 230 kV transmission line overloads under contingency.



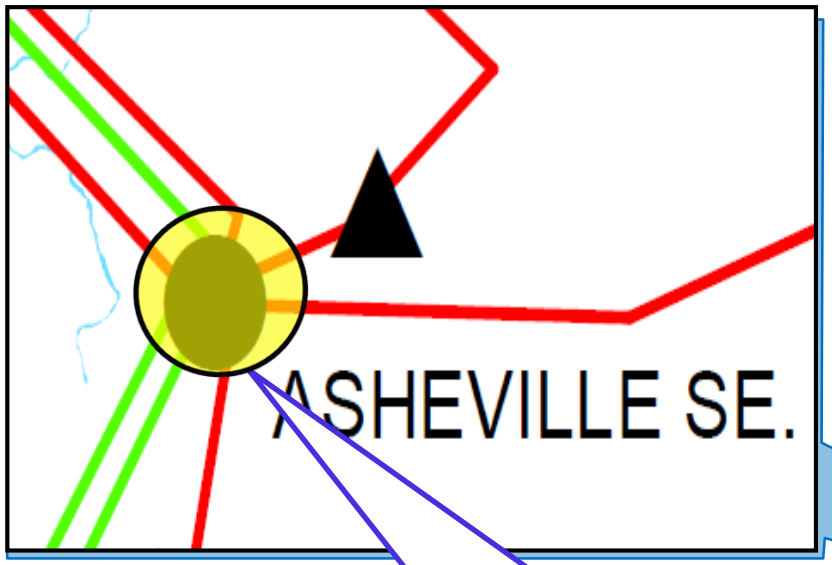
DUKE PROGRESS WEST Balancing Authority Area

SERTP Regional Transmission Expansion Plan

DUKE PROGRESS WEST – 1

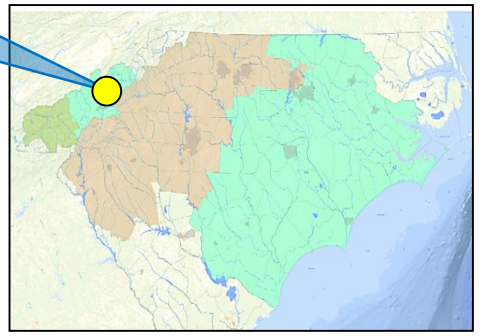
• **2019**

ASHEVILLE SE PLANT



REPLACE TRANSFORMERS. REBUILD 1.2 MILES 0F 115 KV TL WITH 1590 ACSR. REPLACE BREAKERS WITH 3000 A BREAKERS. INSTALL 72 MVAR CAPACITOR BANK. INSTALL SVC AT CANE RIVER 230 KV SUB. REPLACE TRANSFORMERS AT PISGAH FOREST 230 KV SUB.

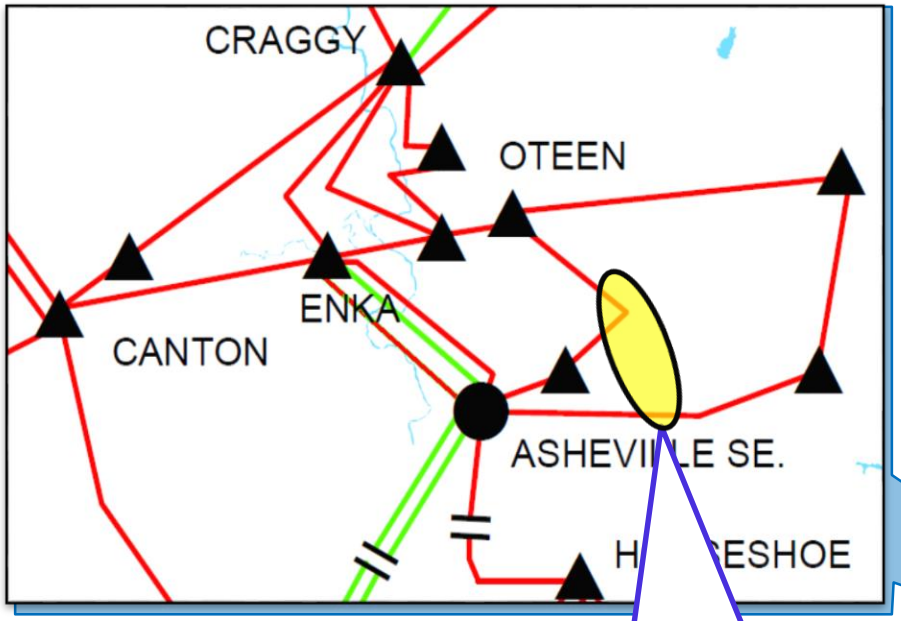
- **DESCRIPTION:**
  - Upgrade the two existing 230/115 kV transformers to 400 MVA each, reconductor approximately 1.2 miles of the 115 kV north and south transformer tie lines with 1590 ACSR at 100°C, replace the existing breakers with 3000A breakers, and install a 72 MVAR 230 kV capacitor bank. Associated projects include installation of SVC at Cane River 230 kV Substation and transformer replacement at Pisgah Forest 230 kV Substation.
- **SUPPORTING STATEMENT:**
  - Necessary upgrades to allow for the interconnection of two combined cycle units at Asheville Plant.



DUKE PROGRESS WEST – 2

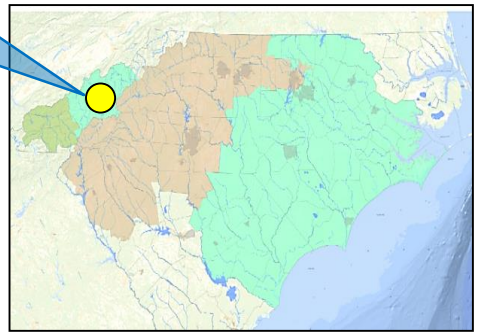
• **2022**

ASHEVILLE PLANT – OTEEN WEST 115 KV T.L., BALDWIN TAP



CONSTRUCT 2.2 MILES OF 115 KV TRANSMISSION LINE WITH 795 ACSR. RECONNECT THE BALDWIN 115 KV SUBSTATION.

- **DESCRIPTION:**
  - Construct approximately 2.2 miles of new 115 kV transmission line from the Asheville Plant to Oteen West 115 kV transmission line to the Asheville Plant to Oteen East 115 kV transmission line with 795 ACSR. The Baldwin 115 kV substation will be reconnected to this new tap line.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in the Baldwin area.



DUKE PROGRESS EAST/WEST

Balancing Authority Areas

Upcoming 2019 Generation Assumptions

* Duke Progress East/West has no generation assumptions expected to change throughout the ten year planning horizon for the 2019 SERTP Process.

DUKE PROGRESS – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
HAMLET #1	55	55	55	55	55	55	55	55	55	55
HAMLET #2	55	55	55	55	55	55	55	55	55	55
HAMLET #3	55	55	55	55	55	55	55	55	55	55
INGENCO	6	6	6	6	6	6	6	6	6	6

LG&E/KU Balancing Authority Area

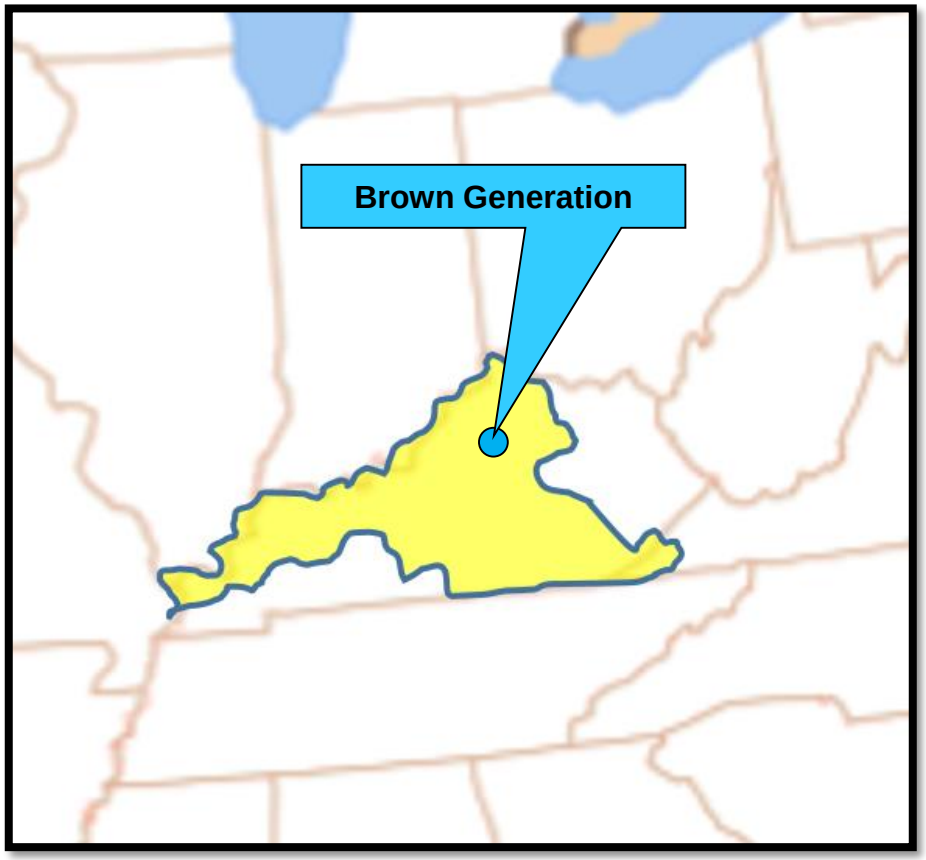
2018 Generation Assumptions

Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

LG&E/KU – Generation Assumptions

The following diagram depicts the location of generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process.



Existing Generation

Future Generation

LG&E/KU Balancing Authority Area

LG&E/KU – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BROWN 1	COAL	0	--	--	--	--	--	--	--	--	--
BROWN 2	COAL	0	--	--	--	--	--	--	--	--	--

Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

LG&E/KU – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
TRIMBLE COUNTY	324	324	324	324	324	324	324	324	324	324

LG&E/KU Balancing Authority Area

SERTP Regional Transmission Expansion Plan

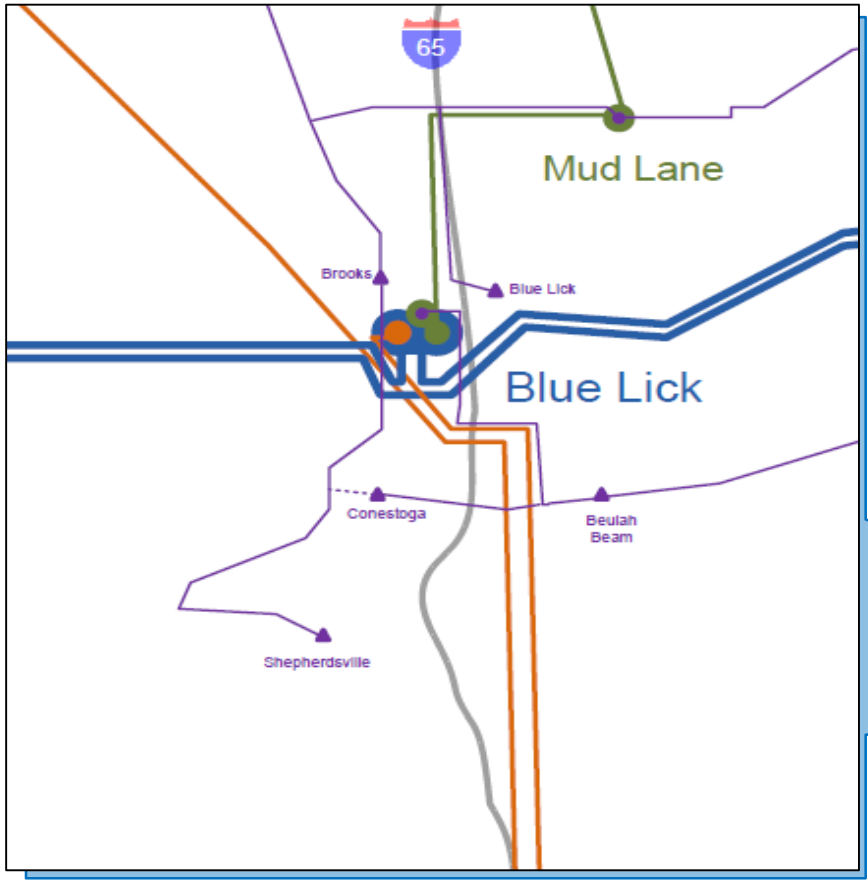
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

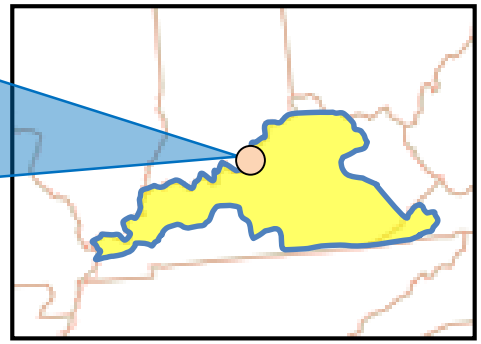
LG&E/KU - 1

- **2020**

BLUE LICK 345/161 KV TRANSFORMER



- **DESCRIPTION:**
  - Replace the Blue Lick 345/161 kV, 240 MVA transformer with a 345/161 KV, 450 MVA transformer, reset/replace any CTs less than 2000A and increase the loadability of relays.
- **SUPPORTING STATEMENT:**
  - The existing Blue Lick 345/161 kV transformer overloads under contingency.



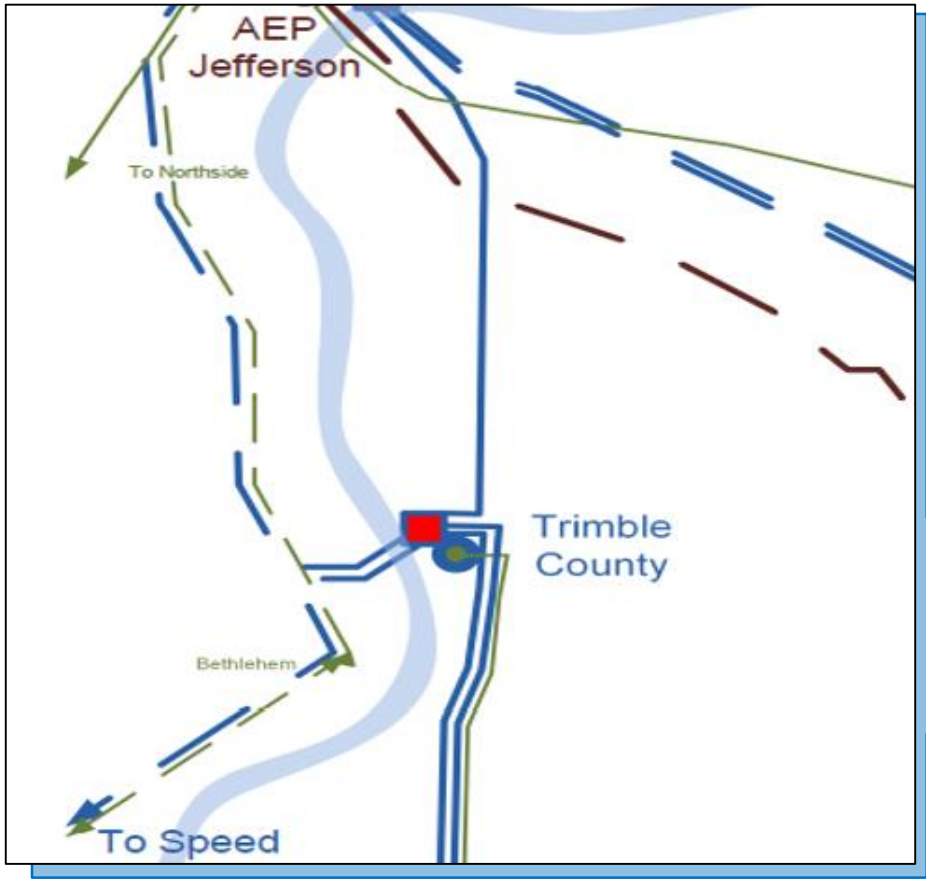
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

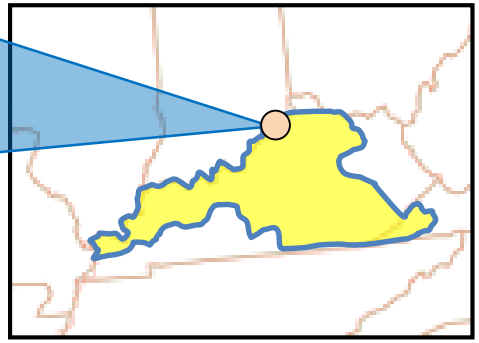
LG&E/KU - 2

- **2020**

TRIMBLE COUNTY 345 KV BREAKER FAILURE PROTECTION



- **DESCRIPTION:**
  - Add breaker failure scheme to the protection system which reduces the delayed clearing time allowing the disturbance to pass TPL-001 criteria.
- **SUPPORTING STATEMENT:**
  - Instability occurs under contingency due to delayed clearing.

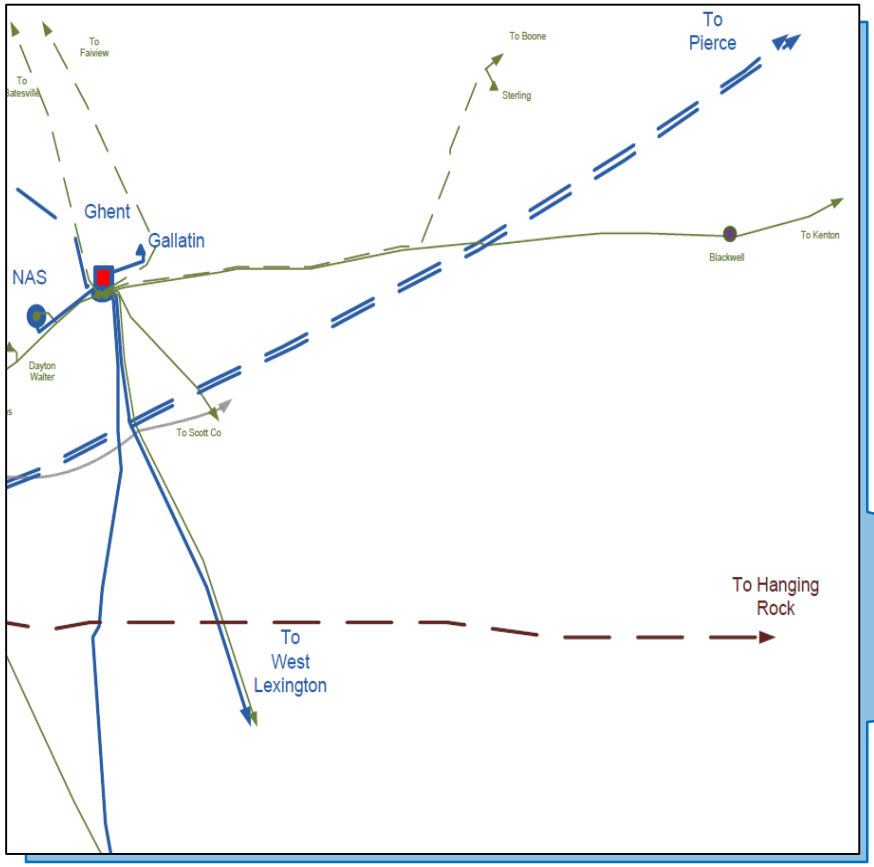


LG&E/KU Balancing Authority Area

LG&E/KU - 3

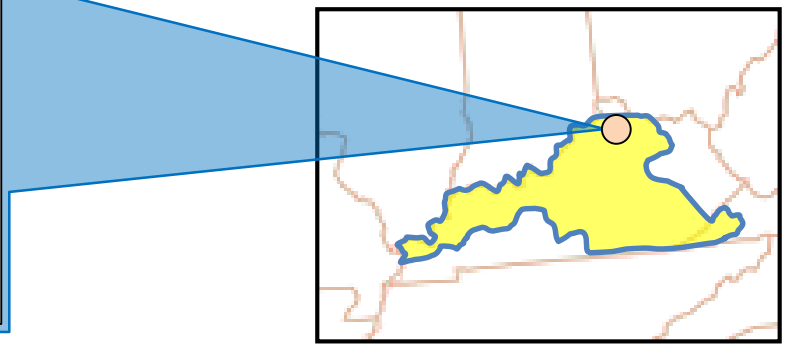
- **2021**

GHENT - BLACKWELL 138 KV TRANSMISSION LINE



- **DESCRIPTION**:
  - Upgrade approximately 23.54 miles of the Ghent to Blackwell 138 kV transmission line to increase the maximum operating temperature of the conductor to at least 160°F.

- **SUPPORTING STATEMENT:**
  - The Ghent to Blackwell 138 kV transmission line overloads under contingency.

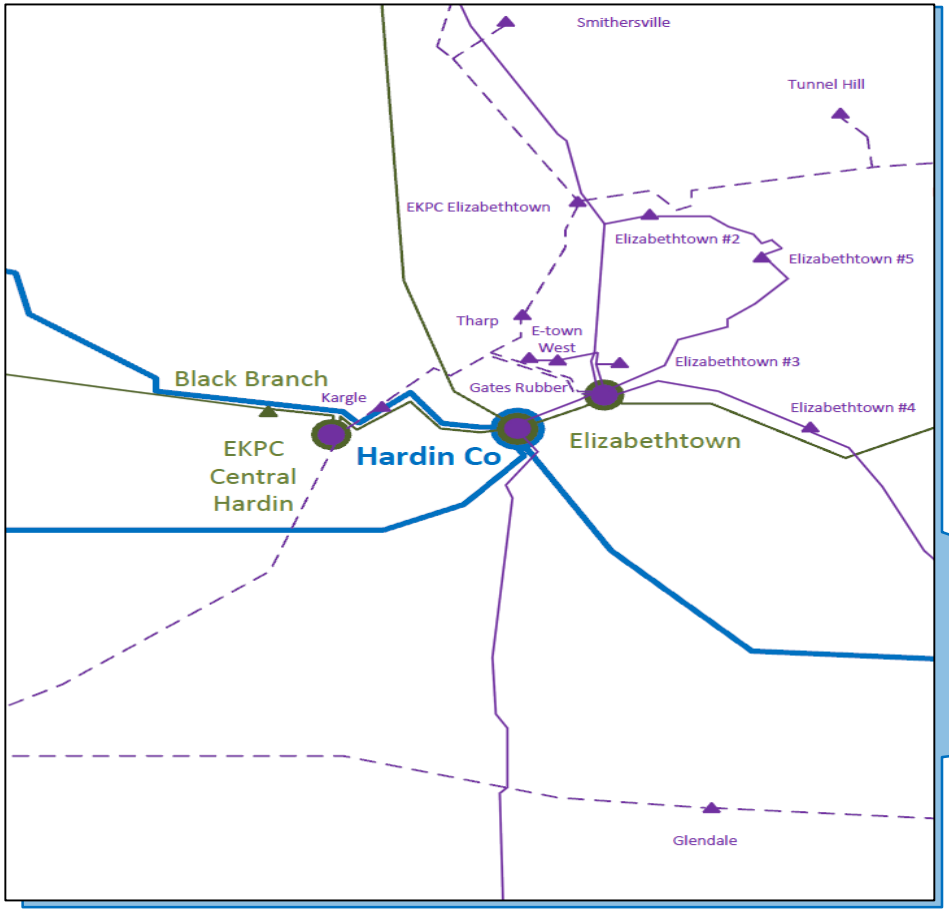


LG&E/KU Balancing Authority Area

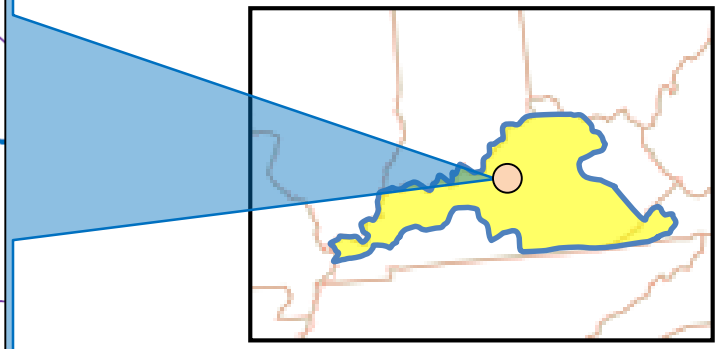
LG&E/KU - 4

- **2021**

HARDIN COUNTY 138 KV BREAKER REPLACEMENTS



- **DESCRIPTION:**
  - Replace three 138 kV breakers and three 69 kV breakers at Hardin Co which have breaker duty overloads.
- **SUPPORTING STATEMENT:**
  - The short circuit analysis results in breaker duty overloads as a result of other projects at Hardin Co and surrounding area.



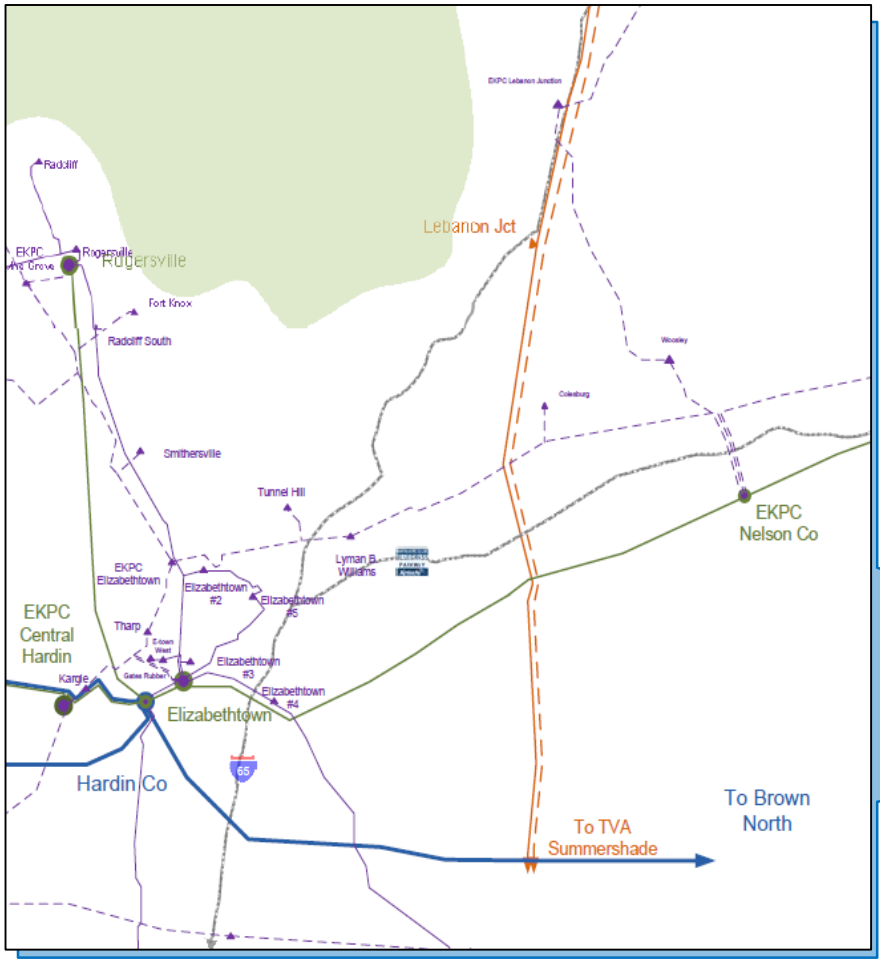
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

LG&E/KU - 5

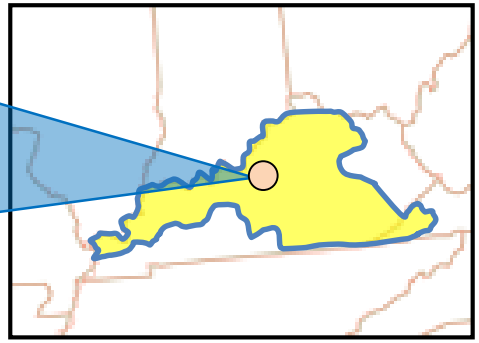
- **2022**

ELIZABETHTOWN - NELSON COUNTY 138 KV TRANSMISSION LINE



- **DESCRIPTION**:
  - Upgrade approximately 15.5 miles of the Nelson County to Elizabethtown 138 kV transmission line to a maximum operating temperature of 176°F.

- **SUPPORTING STATEMENT:**
  - The Nelson County to Elizabethtown 138 kV transmission line overloads under contingency.



Southeastern Regional TRANSMISSION PLANNING

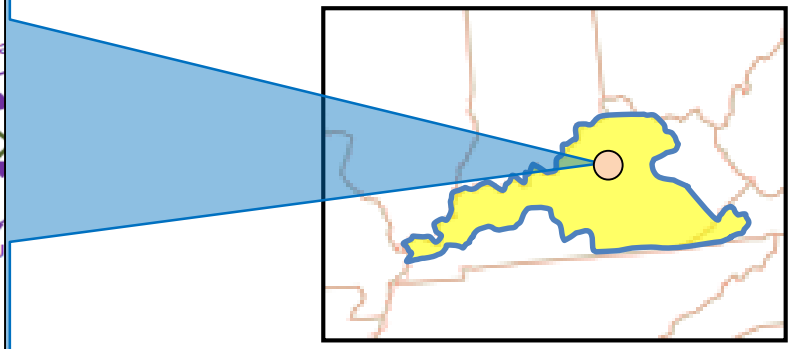
LG&E/KU Balancing Authority Area

LG&E/KU - 6

• **2022**

WEST LEXINGTON 345/138 KV #2 TRANSFORMER

- **DESCRIPTION:**
  - Install a second West Lexington 450 MVA, 345/138 kV transformer.
- **SUPPORTING STATEMENT:**
  - The West Lexington 345/138 kV Transformer #1 overloads under contingency.



Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

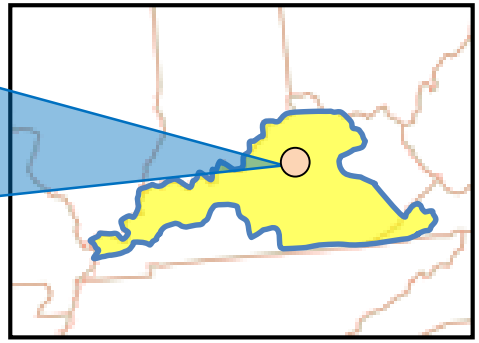
LG&E/KU - 7

• **2022**

WEST LEXINGTON - HAEFLING 138 KV TRANSMISSION LINE

- **DESCRIPTION:**
  - Reconductor approximately 7.34 miles of the West Lexington to Haefling 138 kV transmission line, using high-temperature conductor capable of at least 1500A.

- **SUPPORTING STATEMENT:**
  - The West Lexington to Haefling 138 kV transmission line overloads under contingency.



Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

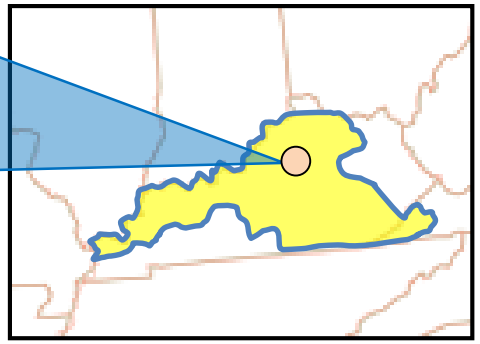
LG&E/KU - 8

- **2022**

WEST LEXINGTON - VILEY ROAD 138 KV TRANSMISSION LINE

- **DESCRIPTION:**
  - Reconductor approximately 5.19 miles of the West Lexington to Viley Road section of the West Lexington to Viley Road to Haefling 138 kV transmission line, using high-temperature conductor capable of at least 1500A.

- **SUPPORTING STATEMENT:**
  - The West Lexington to Viley Road 138 kV transmission line section overloads under contingency.



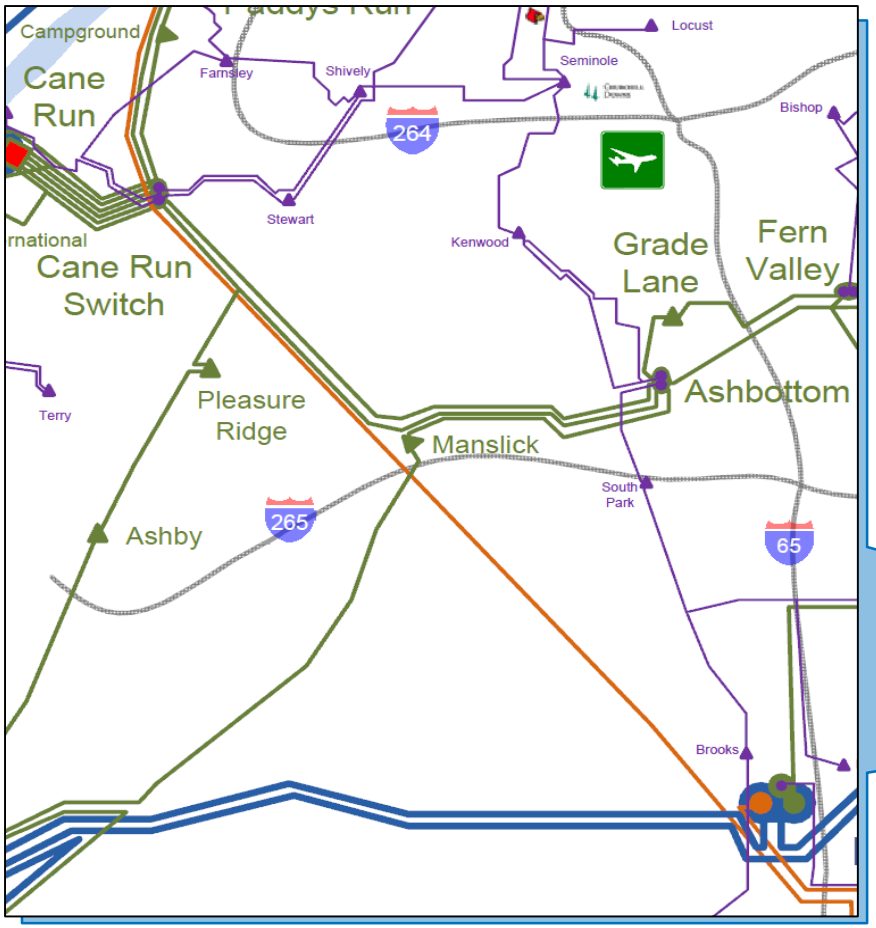
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

LG&E/KU - 9

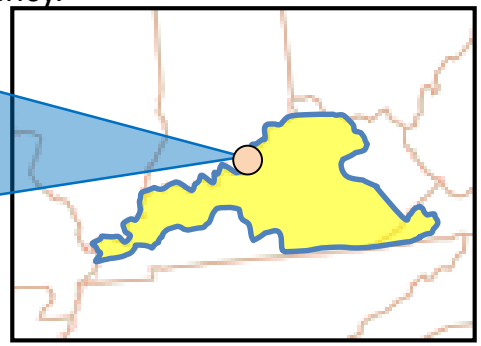
- **2023**

ASHBOTTOM - CANE RUN SWITCHING 138 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Upgrade approximately 8.04 miles of the Ashbottom to Cane Run Switch 138 kV transmission line (Bundled 795 ACSR) to increase the maximum operating temperature from 150°F to 155°F.

- **SUPPORTING STATEMENT:**
  - The Ashbottom to Cane Run Switch 138 kV transmission line overloads under contingency.



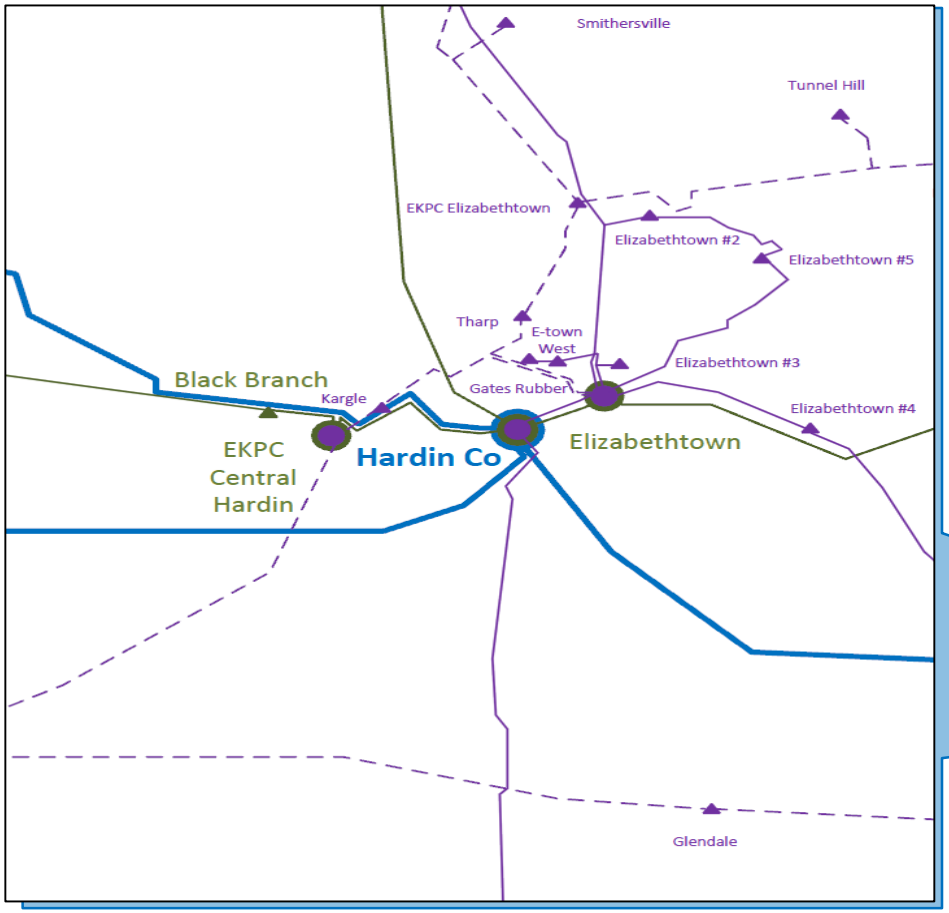
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

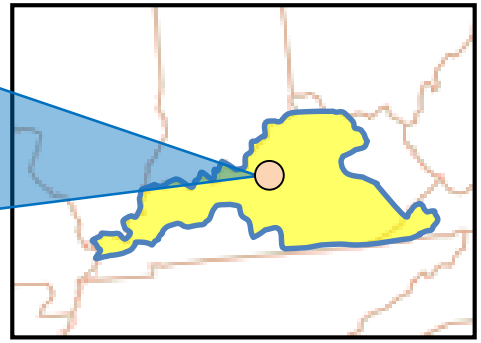
LG&E/KU - 10

- **2023**

HARDIN CO 2ND 345/138KV & 138/69KV TRANSFORMERS



- **DESCRIPTION:**
  - Install a second 345/138 kV, 450 MVA transformer and a second 138/69 kV transformer at Hardin County
- **SUPPORTING STATEMENT:**
  - The existing Hardin County 345/138 kV transformer overloads and additional voltage support in needed in the area under contingency.



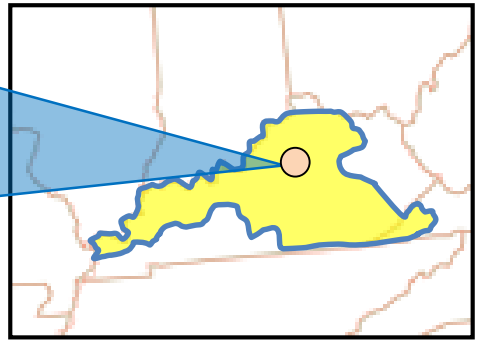
LG&E/KU Balancing Authority Area

LG&E/KU - 11

• **2023**

WEST LEXINGTON 138 KV REDUNDANT PROTECTION SYSTEM

- **DESCRIPTION:**
  - Add redundant protection system at the West Lexington 138 kV bus.
- **SUPPORTING STATEMENT:**
  - Low voltage and generator stability issues occur under contingency due to delayed clearing as a result of a non-redundant protection system.



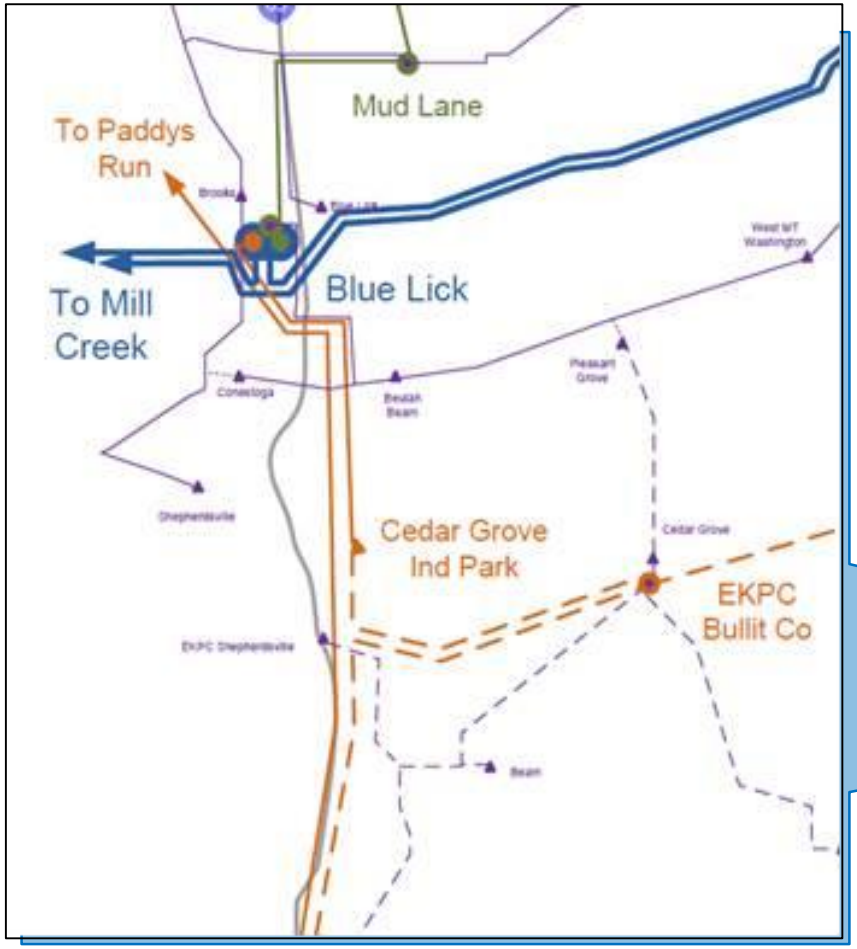
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

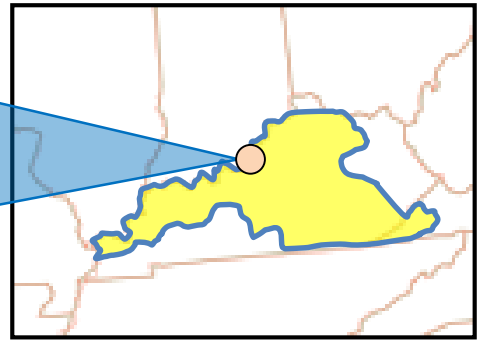
LG&E/KU - 12

• **2026**

BLUE LICK – CEDAR GROVE 161 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Reconductor approximately 4.7 miles of the Blue Lick to Cedar Grove 161 kV transmission line with 795 ACSR at 100 °C.
- **SUPPORTING STATEMENT:**
  - The Blue Lick to Cedar Grove 161 KV transmission line overloads under certain normal conditions.



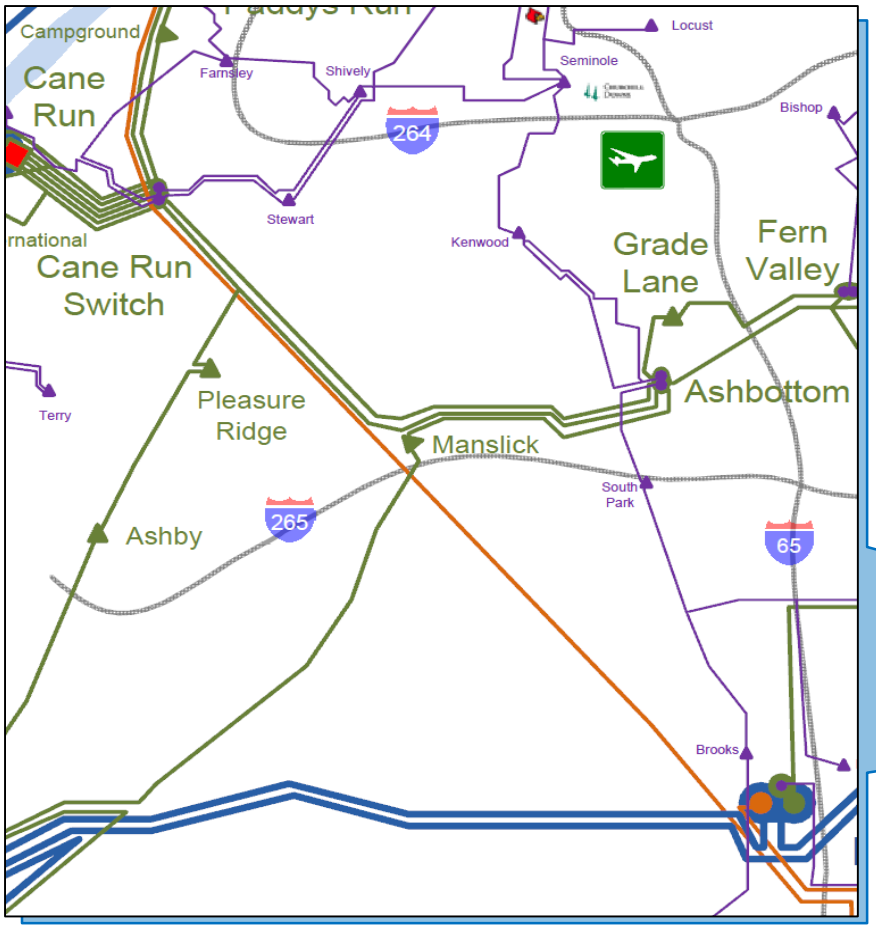
Southeastern Regional TRANSMISSION PLANNING

LG&E/KU Balancing Authority Area

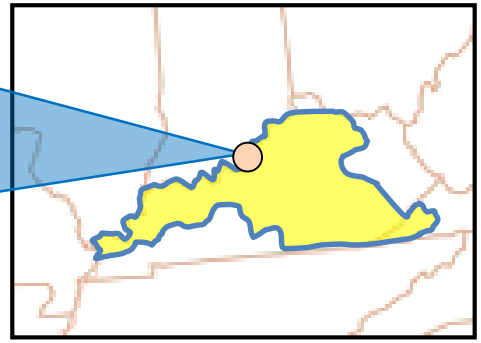
LG&E/KU - 13

• **2027**

CANE RUN SWITCHING 138 KV REDUNDANT PROTECTION SYSTEM



- **DESCRIPTION:**
  - Add redundant protection system at the Cane Run 138 kV bus.
- **SUPPORTING STATEMENT:**
  - Low voltage and generators slipping a pole occurs under contingency as a result of delayed clearing due to a non-redundant protection system.



LG&E/KU Balancing Authority Area

2019 Upcoming Generation Assumptions

* LG&E/KU has no generation assumptions expected to change throughout the ten year planning horizon for the 2019 SERTP Process.

LG&E/KU Balancing Authority Area

LG&E/KU – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
TRIMBLE COUNTY	324	324	324	324	324	324	324	324	324	324

OVEC Balancing Authority Area

OVEC Balancing Authority Area

SERTP Regional Transmission Expansion Plan & Generation Assumptions

* OVEC has no transmission projects included in the 2018 SERTP Regional Transmission Expansion Plan. In addition, OVEC has no generation assumptions expected to change throughout the ten year planning horizon for the 2018 and 2019 SERTP Planning Processes.

POWERSOUTH Balancing Authority Area

2018 Generation Assumptions

* POWERSOUTH has no generation assumptions expected to change throughout the ten year planning horizon for the 2018 SERTP Process.

POWERSOUTH Balancing Authority Area

SERTP Regional Transmission Expansion Plan

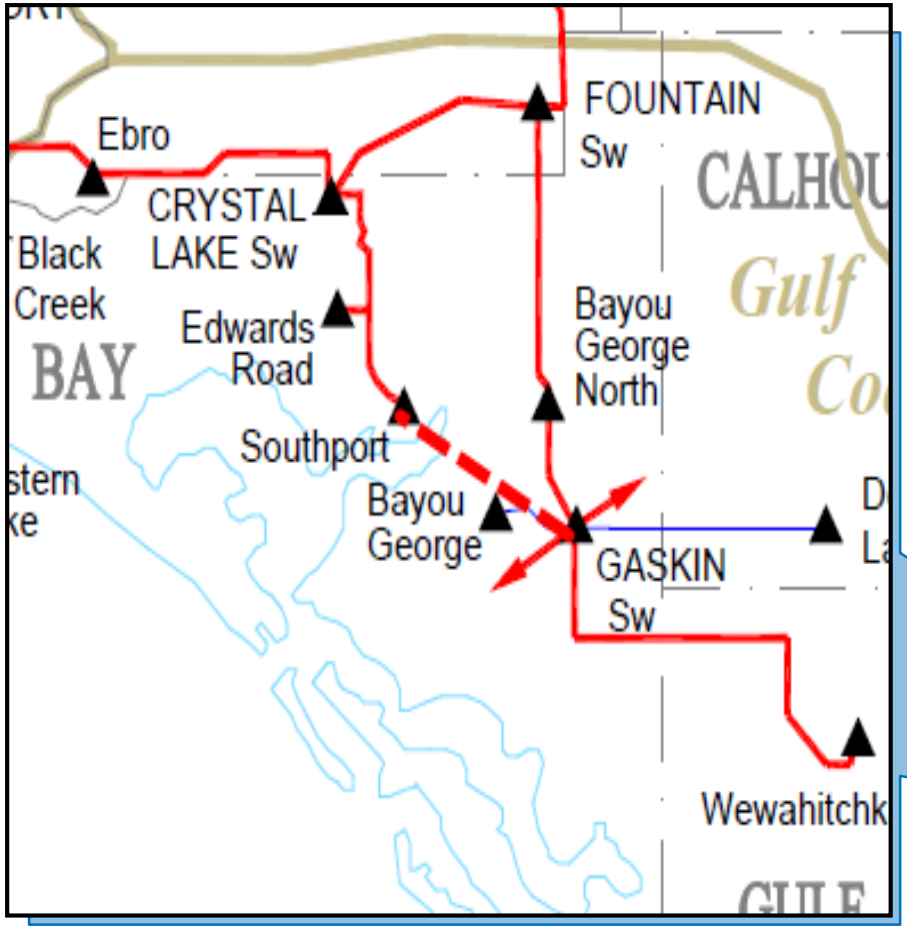
Southeastern Regional TRANSMISSION PLANNING

POWERSOUTH Balancing Authority Area

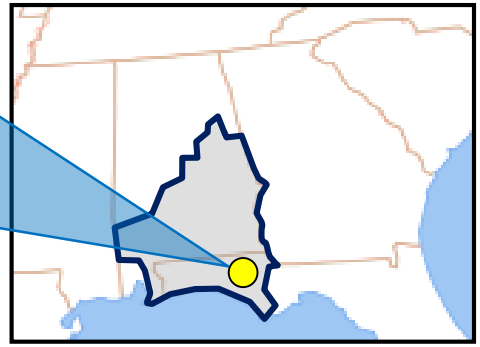
POWERSOUTH - 1

• **2020**

GASKIN – SOUTHPORT 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Construct approximately 9.0 miles of new 115 kV transmission line from Gaskin Switching Station to Southport Substation with 795 ACSR at 100°C.
- **SUPPORTING STATEMENT:**
  - Improve the reliability of Gulf Coast Electric's substations by providing a looped service feed.

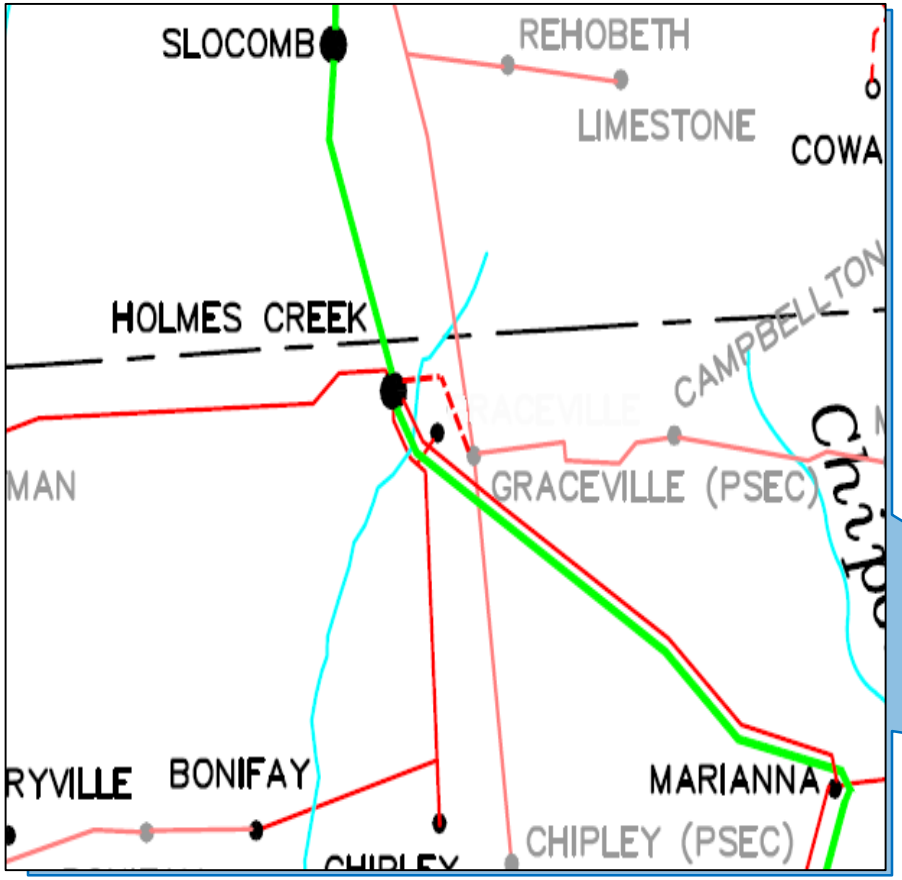


POWERSOUTH Balancing Authority Area

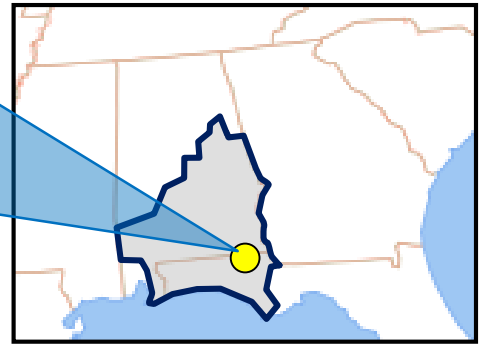
POWERSOUTH - 2

• **2020**

GRACEVILLE – HOLMES CREEK 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Construct approximately 0.5 mile of new 115 kV transmission line from Graceville 115 kV substation to Gulf Power Holmes Creek substation with 795 ACSR at 100°C.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed at Graceville and Fountain under contingency.



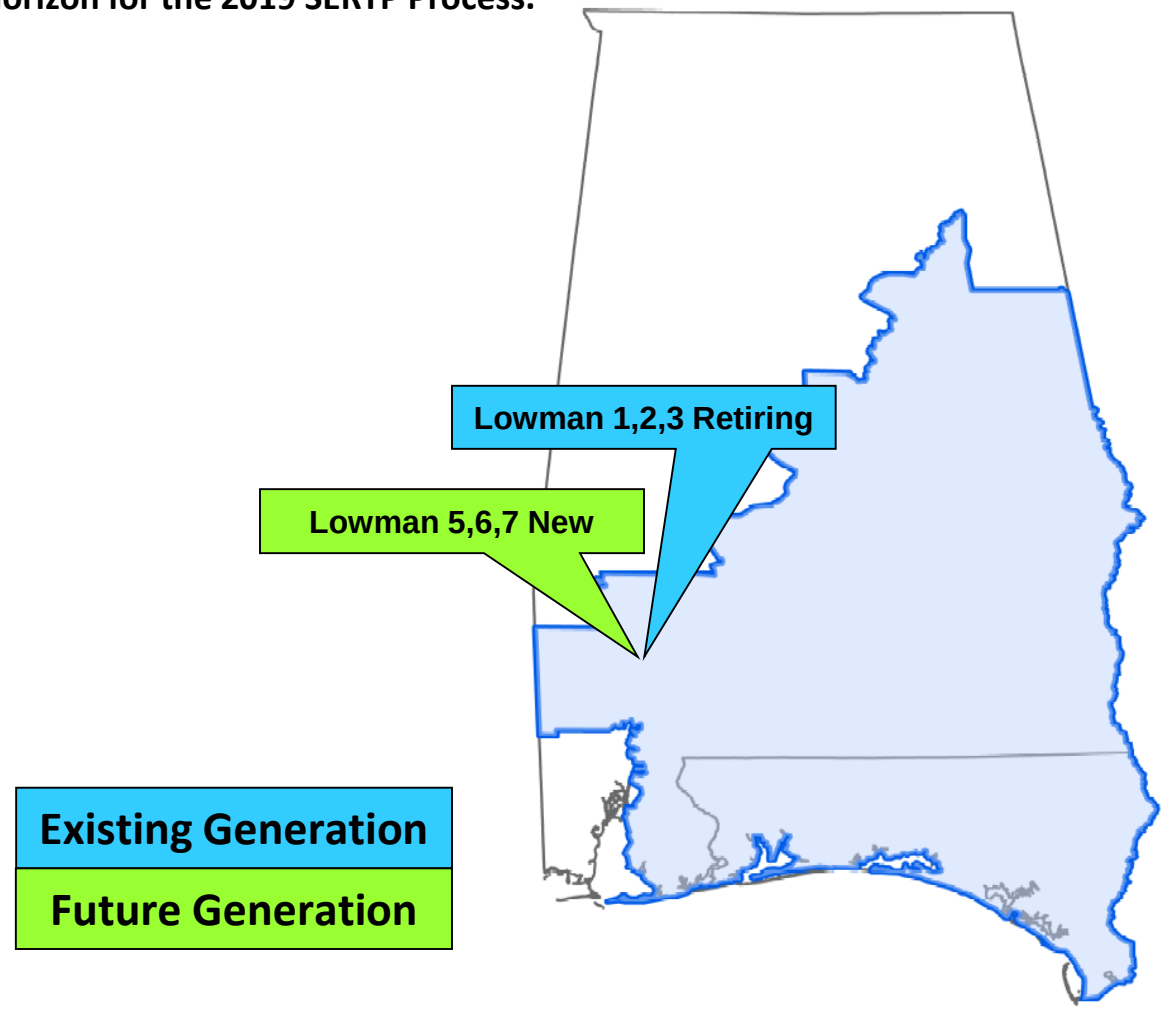
POWERSOUTH Balancing Authority Area

Upcoming 2019 Generation Assumptions

POWERSOUTH Balancing Authority Area

POWERSOUTH – Generation Assumptions

The following diagram depicts the location of generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process.



POWERSOUTH – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Lowman 1,2,3	Coal	551	0	--	--	--	--	--	--	--	--
Lowman 5,6	Gas	--	--	--	586	586	586	586	586	586	586
Lowman 7	Gas	--	--	--	--	--	--	--	179	179	179

SOUTHERN Balancing Authority Area

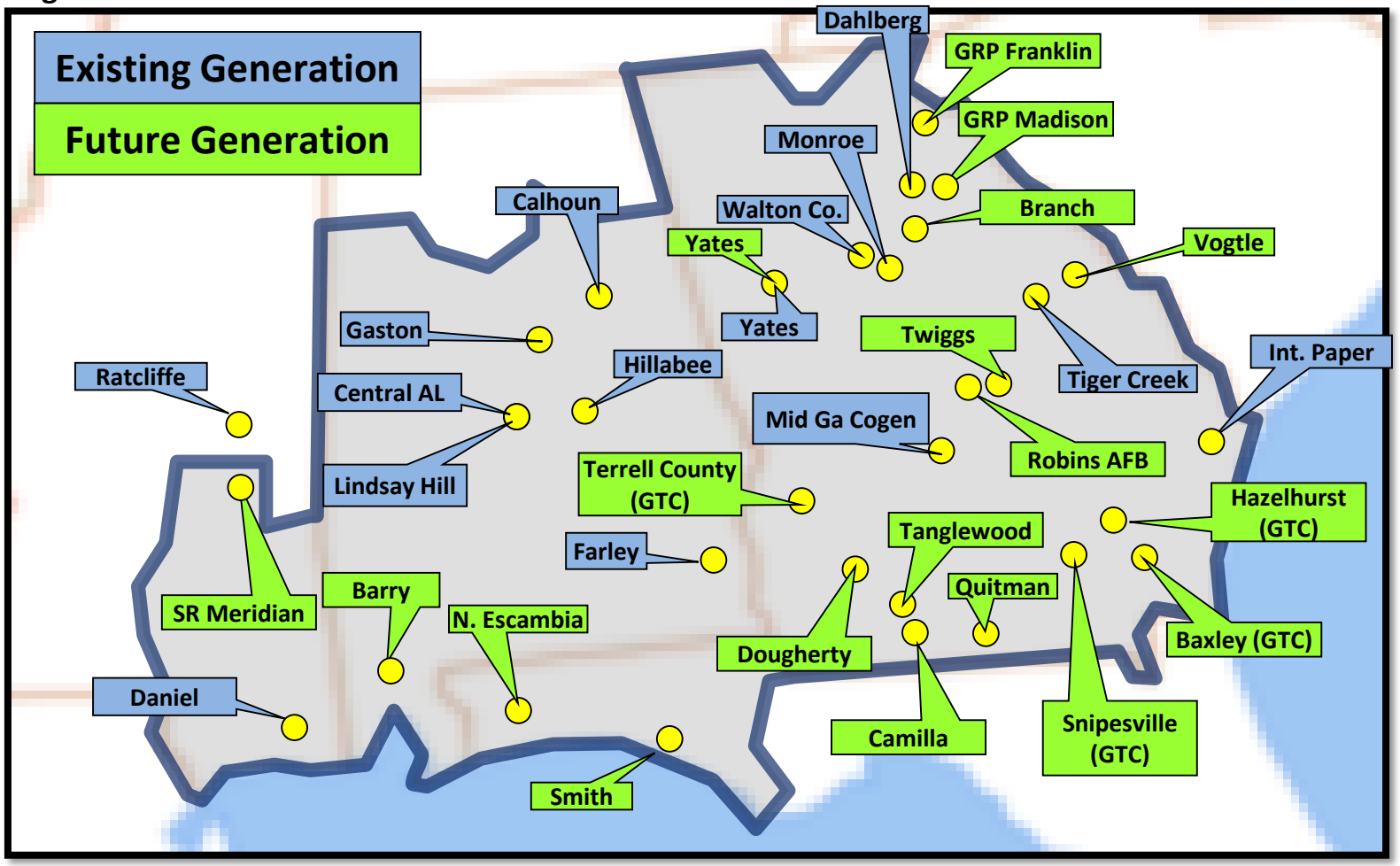
2018 Generation Assumptions

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – Generation Assumptions

The following diagram depicts the location of generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2018 SERTP Process.



Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions

The following table depicts the generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
CALHOUN 1-4	Gas	632	632	632	632	0	--	--	--	--	--
CENTRAL ALABAMA	Gas	885	885	885	885	0	--	--	--	--	--
DAHLBERG 2, 6, 8, 10	Gas	298	298	298	298	298	298	0	--	--	--
INT. PAPER - PW BIOMASS	Bio	20	20	20	20	20	20	20	20	0	--
MID GA COGEN	Gas	300	300	300	300	300	300	300	300	300	0
MONROE POWER	Gas	309	309	309	309	309	0	--	--	--	--
TIGER CREEK 1&4	Gas	313	313	313	313	313	0	--	--	--	--
WALTON COUNTY	Gas	465	465	465	465	465	0	--	--	--	--

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
GASTON 1-4	Gas	465	465	465	465	465	515	515	515	515	515
YATES 6-7	Gas	649	649	649	649	649	714	714	714	714	714

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions (Cont.)

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
CAMILLA	Solar	--	160	160	160	160	160	160	160	160	160
DOUGHERTY	Solar	--	120	120	120	120	120	120	120	120	120
GRP FRANKLIN	Bio	58	58	58	58	58	58	58	58	58	58
GRP MADISON	Bio	58	58	58	58	58	58	58	58	58	58
QUITMAN SOLAR	Solar	--	150	150	150	150	150	150	150	150	150
ROBINS AFB	Solar	139	139	139	139	139	139	139	139	139	139
SR MERIDIAN III	Solar	--	52	52	52	52	52	52	52	52	52
TANGLEWOOD	Solar	--	58	58	58	58	58	58	58	58	58
TWIGGS	Solar	--	200	200	200	200	200	200	200	200	200
VOGTLE 3	Nuclear	--	--	--	504	504	504	504	504	504	504
VOGTLE 4	Nuclear	--	--	--	--	504	504	504	504	504	504

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY– Generation Assumptions (Cont.)

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LANSING SMITH CC	Gas	593	593	593	593	593	593	593	593	593	593
RATCLIFFE CC	Gas	696	696	696	696	696	696	696	696	696	696

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions

The following table depicts future generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BARRY[1]	--	--	--	--	610	610	610	610	610	610
BRANCH[1]	--	--	--	--	--	--	--	--	940	940
LANSING SMITH [1]	--	--	--	--	230	230	230	230	230	230
NORTH ESCAMBIA [1]	--	--	--	--	610	610	610	610	610	610
YATES[1]	--	--	--	--	--	--	1200	1200	1200	1200

(1) This assumption may be modified as resource decisions are made by the corresponding LSEs pursuant to applicable regulatory processes.

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BOWEN	159	159	159	159	159	159	159	159	159	159
DAHLBERG	494	494	494	494	494	494	494	494	494	494
DANIEL	--	--	150	150	150	100	100	100	100	100
FRANKLIN	424	424	424	424	424	424	424	424	424	424
HAMMOND	10	10	10	10	10	10	10	10	10	10
HILLABEE	350	350	350	350	350	350	350	350	350	350
LINDSAY HILL	300	300	300	300	300	300	300	300	300	300
SCHERER	911	911	911	911	911	911	911	911	911	911
VOGTLE	206	206	206	206	206	206	206	206	206	206

GTC – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BAXLEY	SOLAR	--	24	24	24	24	24	24	24	24	24
SNIPESVILLE	SOLAR	--	60	60	60	60	60	60	60	60	60
SR HAZELHURST 3	SOLAR	--	41	41	41	41	41	41	41	41	41
TERRELL COUNTY	SOLAR	--	--	74	74	74	74	74	74	74	74
VOGTLE 3	NUCLEAR	--	--	--	330	330	330	330	330	330	330
VOGTLE 4	NUCLEAR	--	--	--	--	330	330	330	330	330	330

MEAG – Generation Assumptions

The following table depicts the generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
VOGTLE 3	NUCLEAR	--	--	--	250	250	250	250	250	250	250
VOGTLE 4	NUCLEAR	--	--	--	--	250	250	250	250	250	250

DALTON – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
VOGTLE 3	NUCLEAR	--	--	--	19	19	19	19	19	19	19
VOGTLE 4	NUCLEAR	--	--	--	--	19	19	19	19	19	19

SOUTHERN (WEST) Balancing Authority Area

SERTP Regional Transmission Expansion Plan

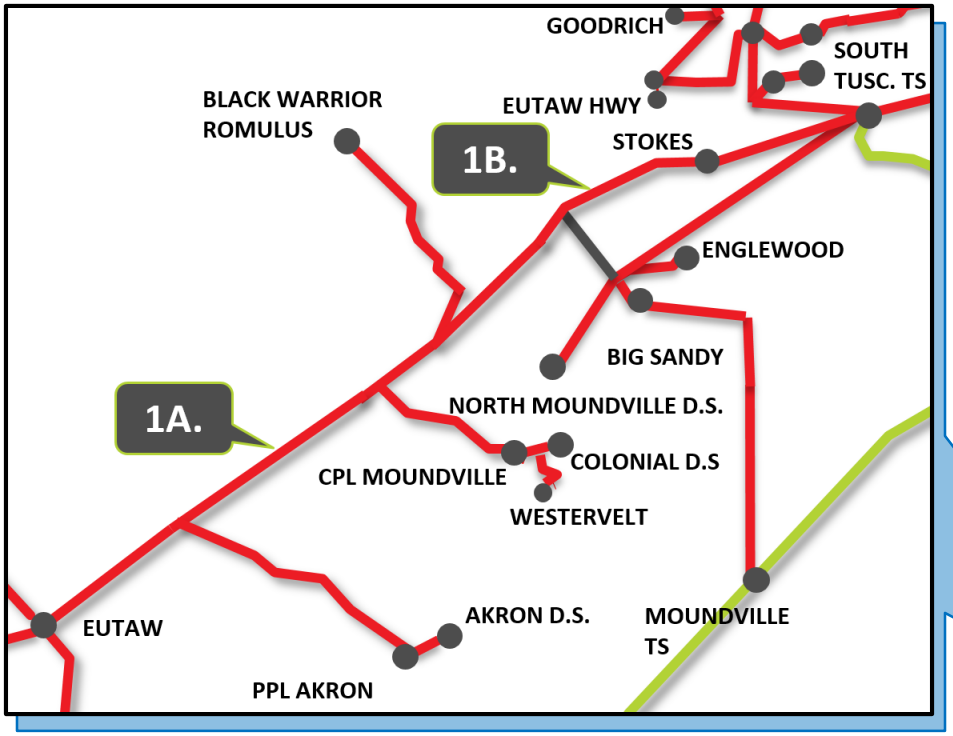
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 1W

• **2020**

EUTAW – SOUTH TUSCALOOSA 115 KV TRANSMISSION LINE

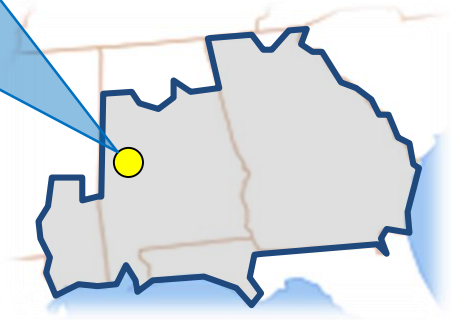


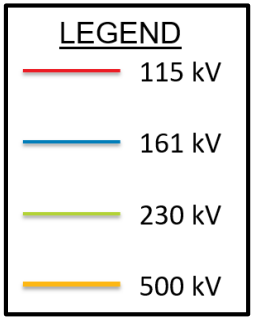
PROJECT DESCRIPTION:

1. Rebuild approximately 30.0 miles of 397 ACSR 115 kV transmission line from Eutaw to South Tuscaloosa TS, with 1033 ACSR at 100°C.

SUPPORTING STATEMENT:

- The Eutaw to South Tuscaloosa 115 kV transmission line overloads under contingency.





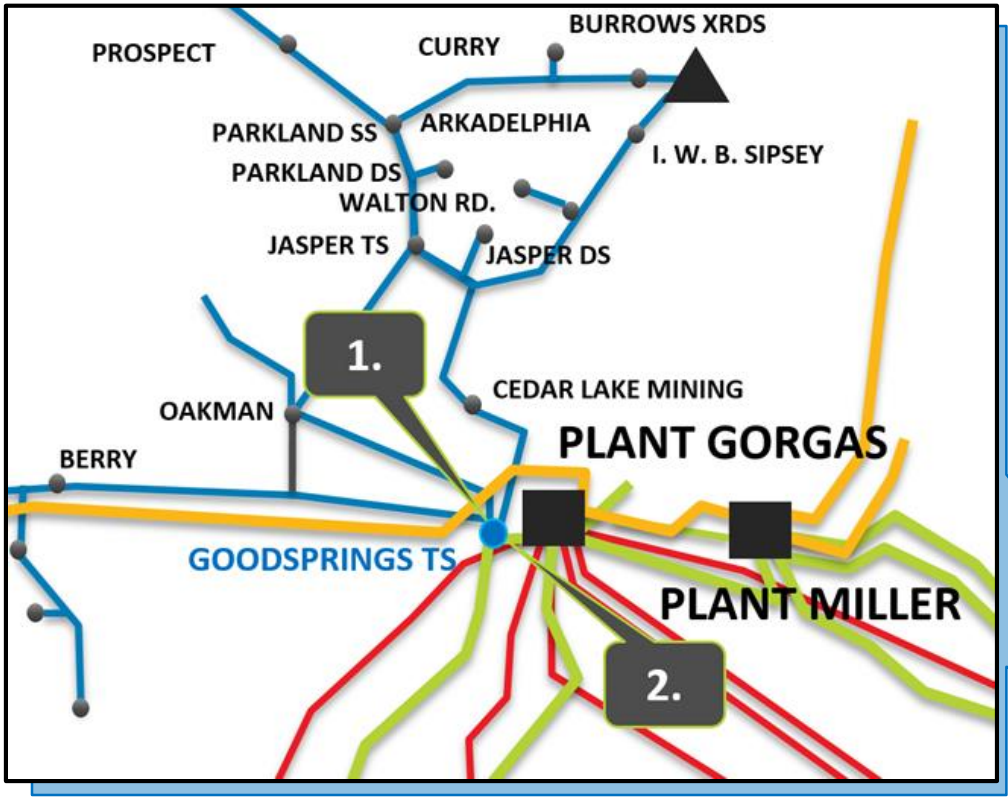
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 2W

• **2020**

GOODSPRINGS 230/161 KV T.S.

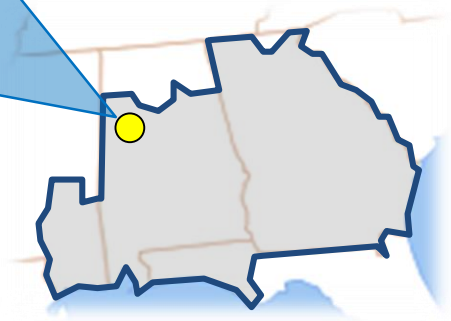


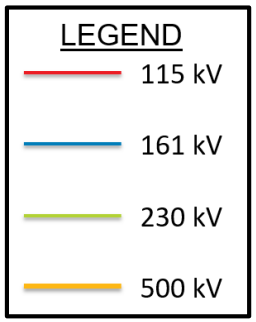
PROJECT DESCRIPTION:

1. Construct Goodsprings 230/161 TS
2. Rebuild Gorgas to Holt No. 1 230 kV Transmission line from Gorgas to Goodsprings TS.

SUPPORTING STATEMENT:

- The Gorgas 230/115 kV transformer overloads under contingency.



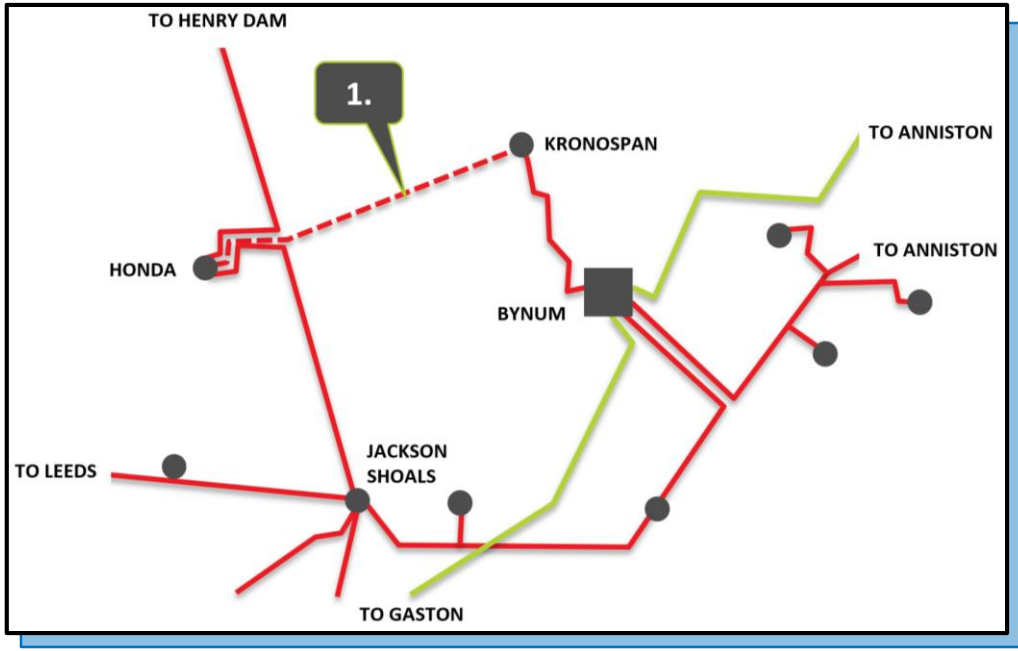


SOUTHERN Balancing Authority Area

SOUTHERN – 3W

• **2020**

HONDA – KRONOSPAN 115 KV TRANSMISSION LINE

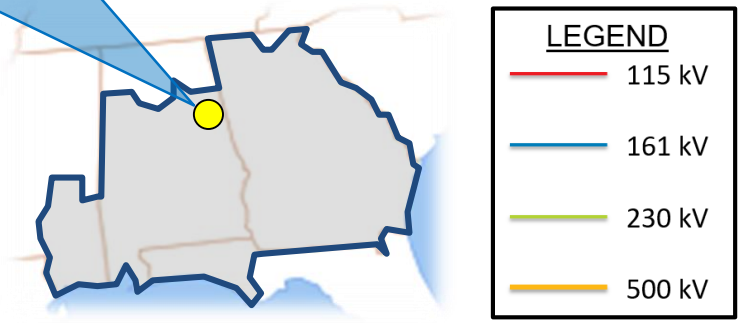


PROJECT DESCRIPTION:

1. Construct approximately 10.3 miles of 795 ACSR 115 kV transmission line at 100°C from Honda to Kronospan.

SUPPORTING STATEMENT:

- Provides additional operational and maintenance flexibility, which then increases reliability. This project also provides voltage support under contingency scenarios.



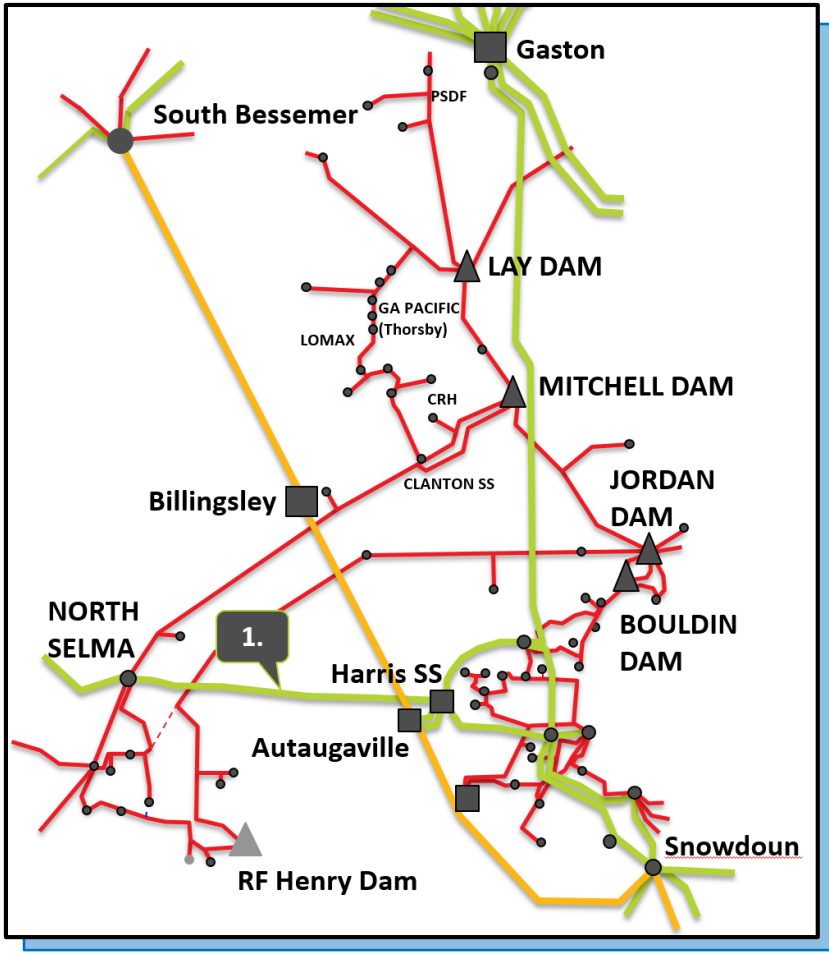
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 4W

• **2021**

HARRIS – NORTH SLEMA 230 KV TRANSMISSION LINE

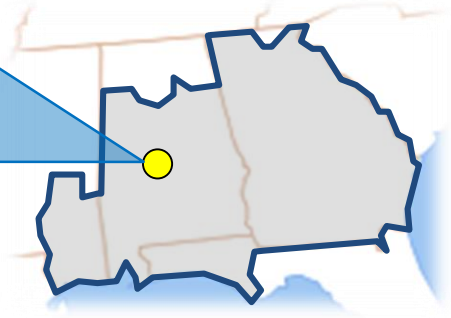


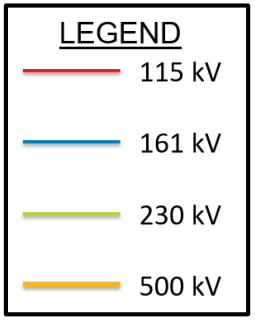
PROJECT DESCRIPTION:

1. Rebuild approximately 26.0 miles of the Harris SS to North Selma 230 kV transmission line with 1033 ACCR at 200°C.

SUPPORTING STATEMENT:

- The Harris to North Selma 230 kV transmission line overloads under contingency.





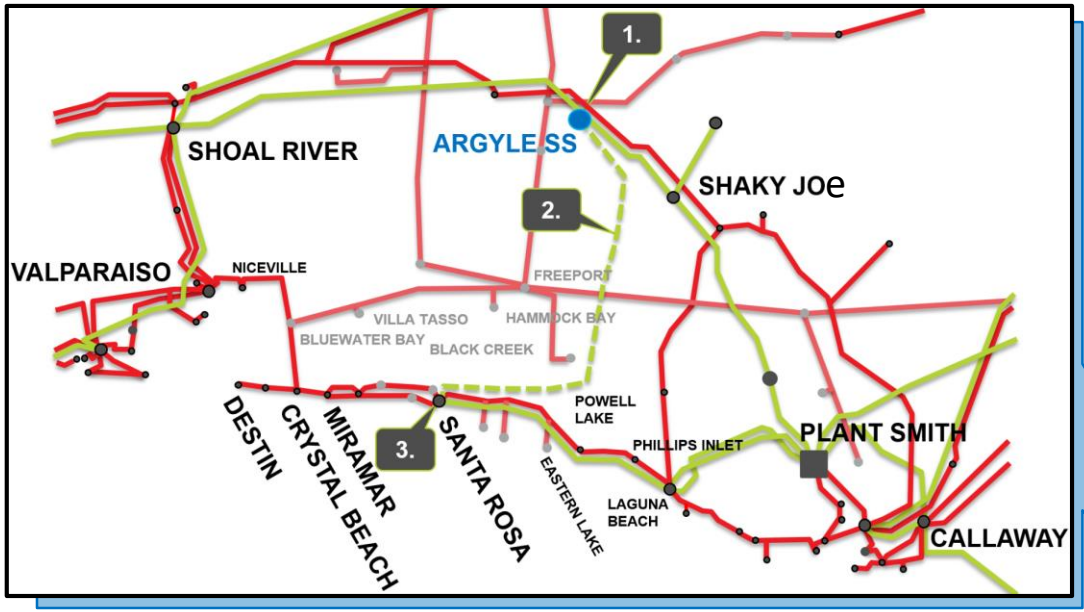
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 5W

• **2023**

ARGYLE – SANTA ROSA 230 KV TRANSMISSION LINE

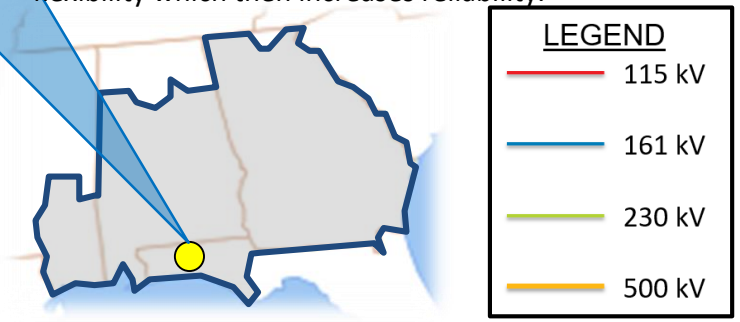


PROJECT DESCRIPTION:

1. Construct of new switching station along the existing transmission line.
2. Construct approximately 45.0 miles of new 1351 ACSR 230 kV transmission line at 100°C from Santa Rosa and connect into the existing Shoal River to Shaky Jo 230 kV transmission line.
3. Install a second 230/115 kV transformer at Santa Rosa TS

SUPPORTING STATEMENT:

- This project eliminates several overloads under a number of contingency scenarios. This project also provides additional operational and maintenance flexibility which then increases reliability.



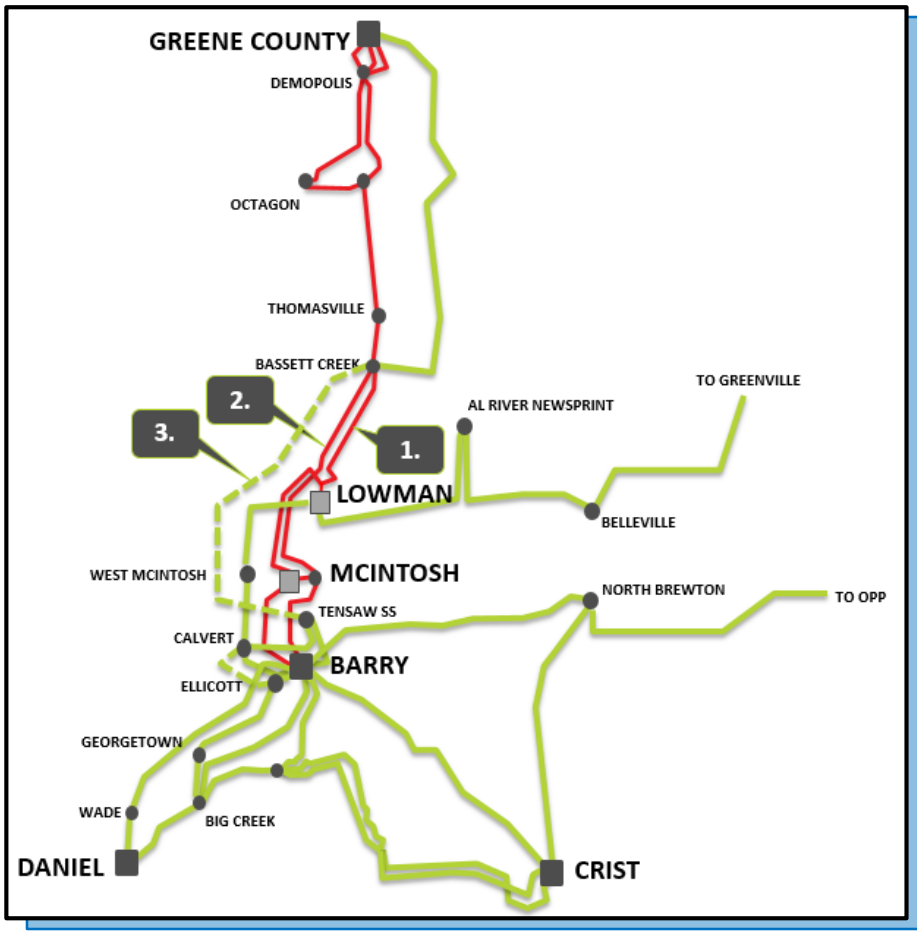
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 6W

• **2023**

BASSETT CREEK CORRIDOR PROJECTS

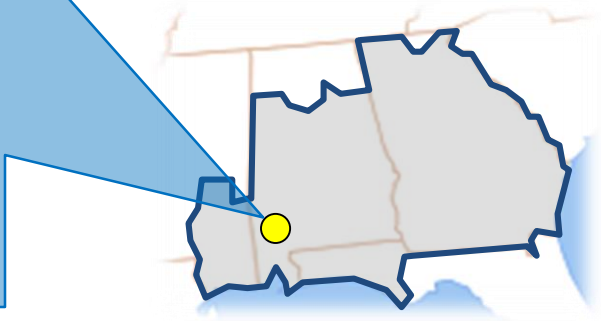


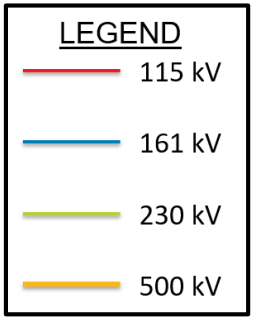
PROJECT DESCRIPTION:

1. Reconductor approximately 24.0 miles along the Bassett Creek to Lowman 115 kV transmission line with 1033.5 ACSS at 200°C.
2. Reconductor approximately 46.0 miles along the Bassett Creek to McIntosh 115 kV transmission line with 1033.5 ACSS at 200°C.
3. Construct approximately 60.0 miles of 1351 ACSS 230 kV transmission line at 200°C from Bassett Creek to Tensaw then Calvert to Ellicott.

SUPPORTING STATEMENT:

- The Bassett Creek to McIntosh 115 kV transmission lines overload under contingency. These projects provide additional operational and maintenance flexibility which then increases reliability.





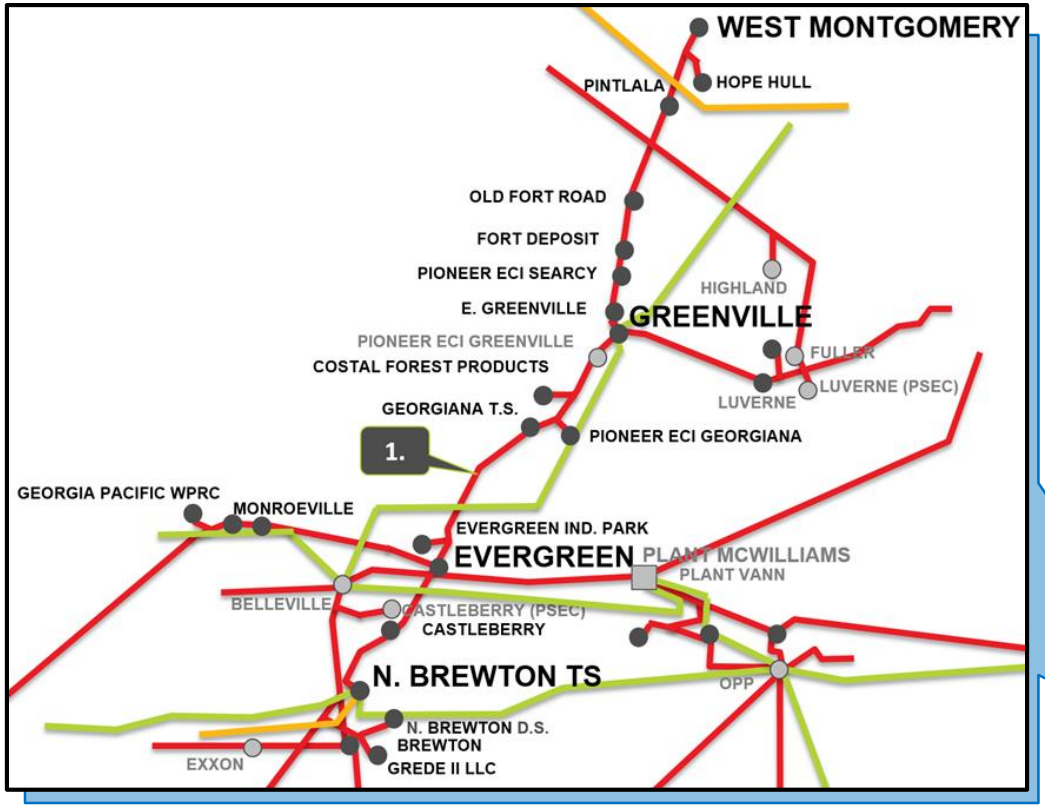
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 7W

• **2023**

CENTRAL ALABAMA AREA 115 KV PROJECT

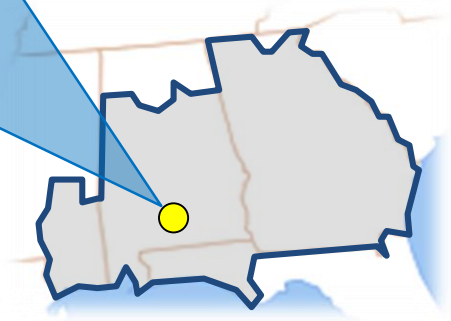


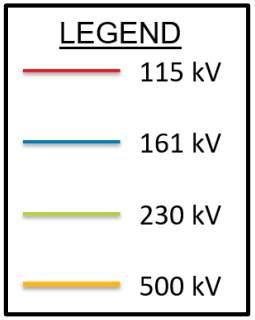
PROJECT DESCRIPTION:

1. Rebuild approximately 97.0 miles of 115 kV transmission line from West Montgomery to North Brewton 115 kV transmission line with 795 ACSS at 200°C.

SUPPORTING STATEMENT:

- This project eliminates high loadings under contingency scenarios. This project also provides additional operational and maintenance flexibility which then increases reliability.





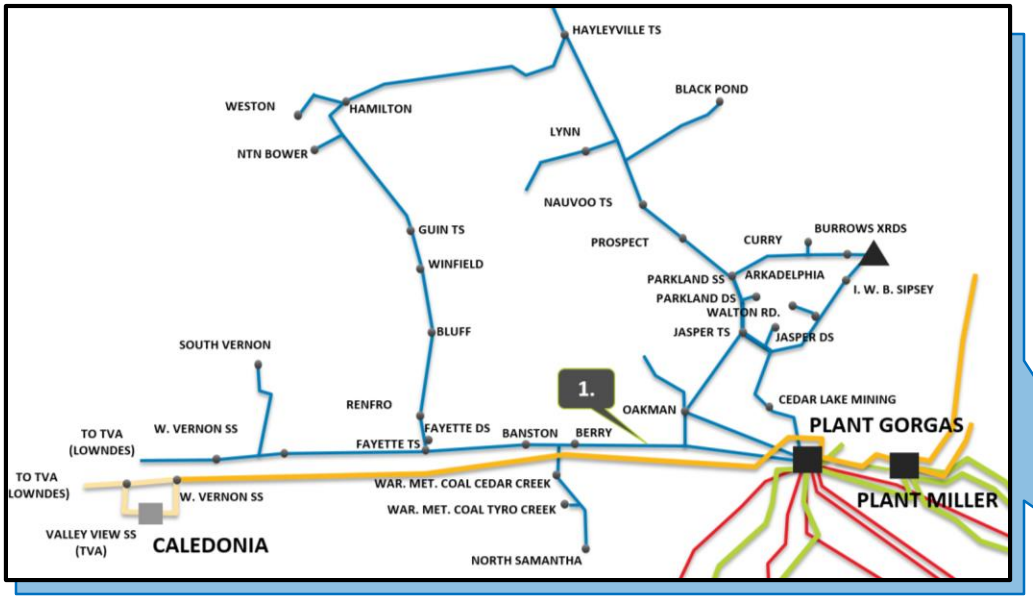
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 8W

• **2023**

FAYETTE – GORGAS 161 KV TRANSMISSION LINE

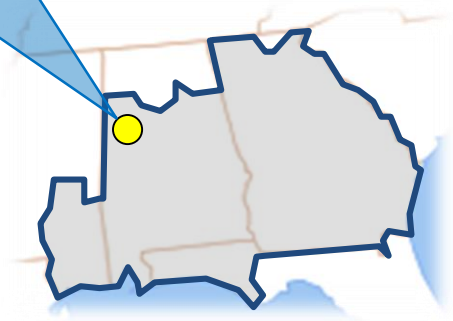


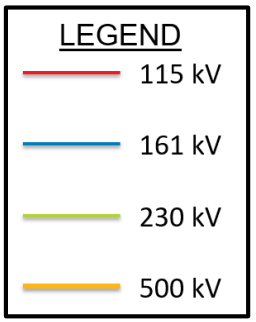
PROJECT DESCRIPTION:

1. Rebuild approximately 37.0 miles of 397 from Fayette to Gorgas 161 kV transmission line with 795 ACSS at 200°C.

SUPPORTING STATEMENT:

- The Fayette to Gorgas 161 kV transmission line overloads under contingency.





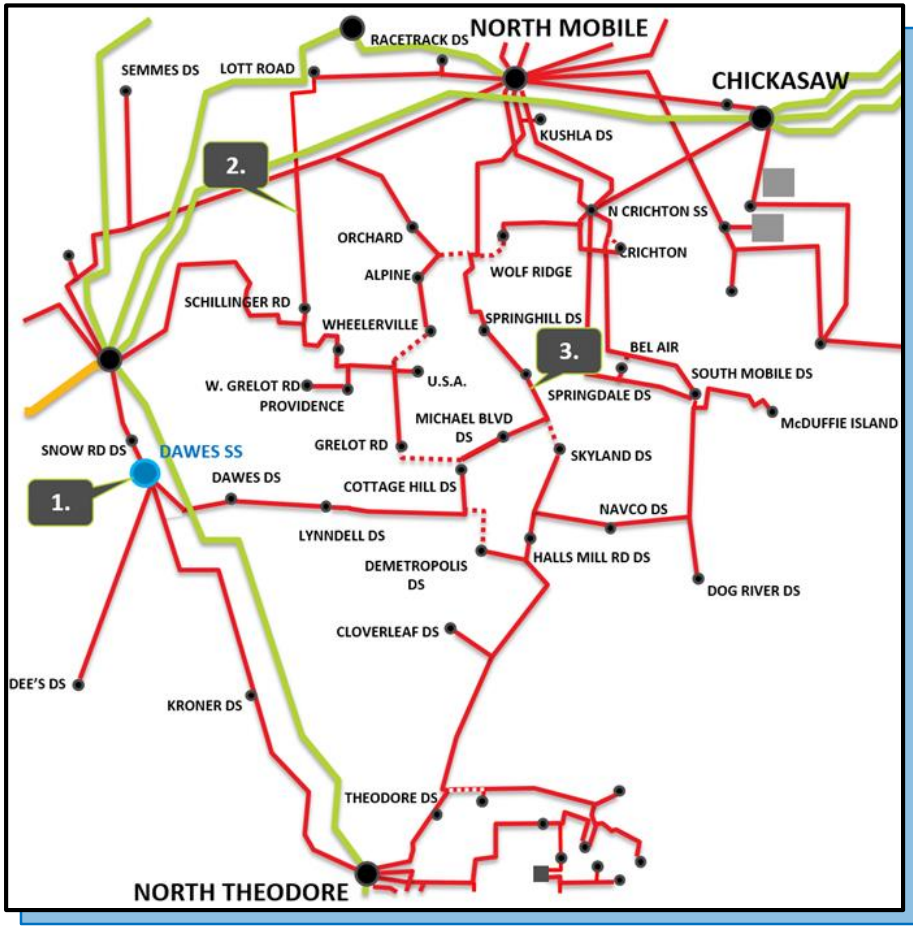
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 9W

• **2023**

MOBILE AREA NETWORKING



PROJECT DESCRIPTION:

1. Construct a new substation at Dawes Tap on the Big Creek to N. Theodore 115 kV transmission line.
2. Reconductor approximately 4.0 miles of 115 kV transmission line from Lott Road to Schillinger Road with 795 ACSS at 200°C.
3. Reconductor approximately 6.3 miles of 115 kV transmission line from North Mobile to Michael Blvd with 397 ACSS at 200°C.

SUPPORTING STATEMENT:

- Provides additional operational and maintenance flexibility which then increases reliability.

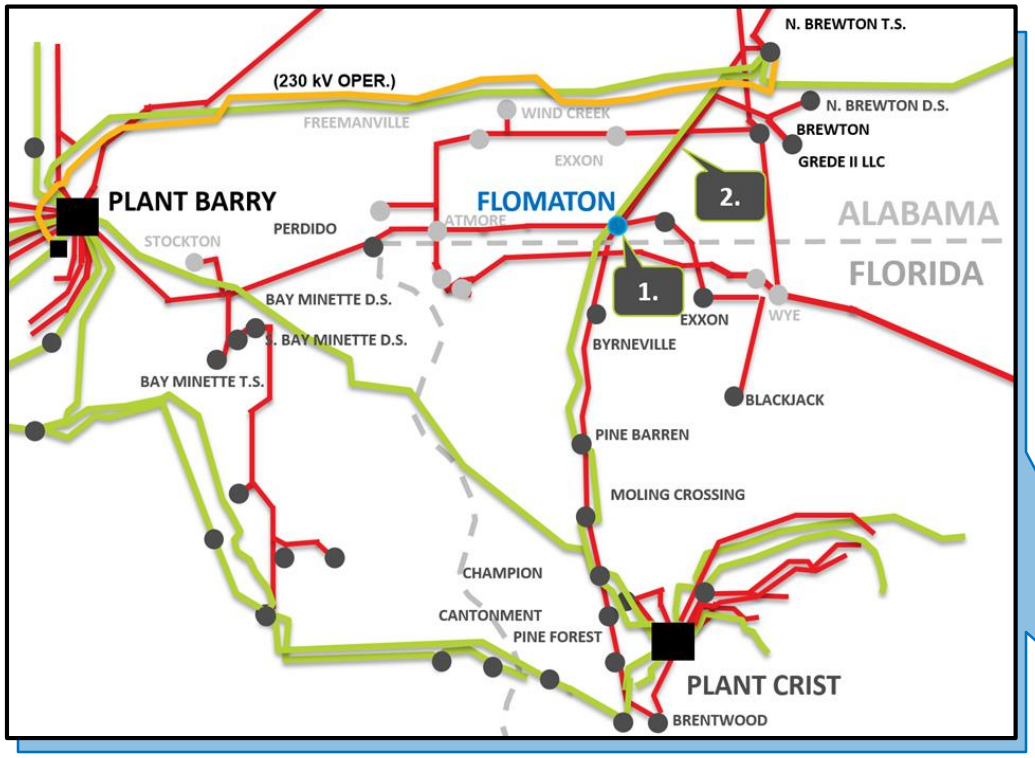
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 10W

• **2024**

FLOMATON 230/115 KV SUBSTATION

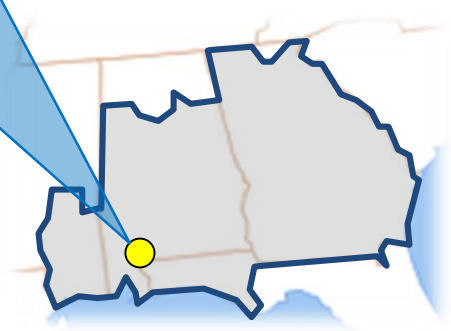


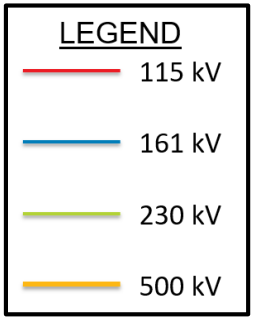
PROJECT DESCRIPTION:

1. Construct a new Flomaton 230/115 kV, 480 MVA transformer at Flomaton TS.
2. Reconductor approximately 16.0 miles of 795 ACSR from N. Brewton to Flomaton 115 kV with 795 ACSS at 200°C.

SUPPORTING STATEMENT:

- Provides additional operational and maintenance flexibility which then increases reliability. This project also provides voltage support under contingency scenarios.





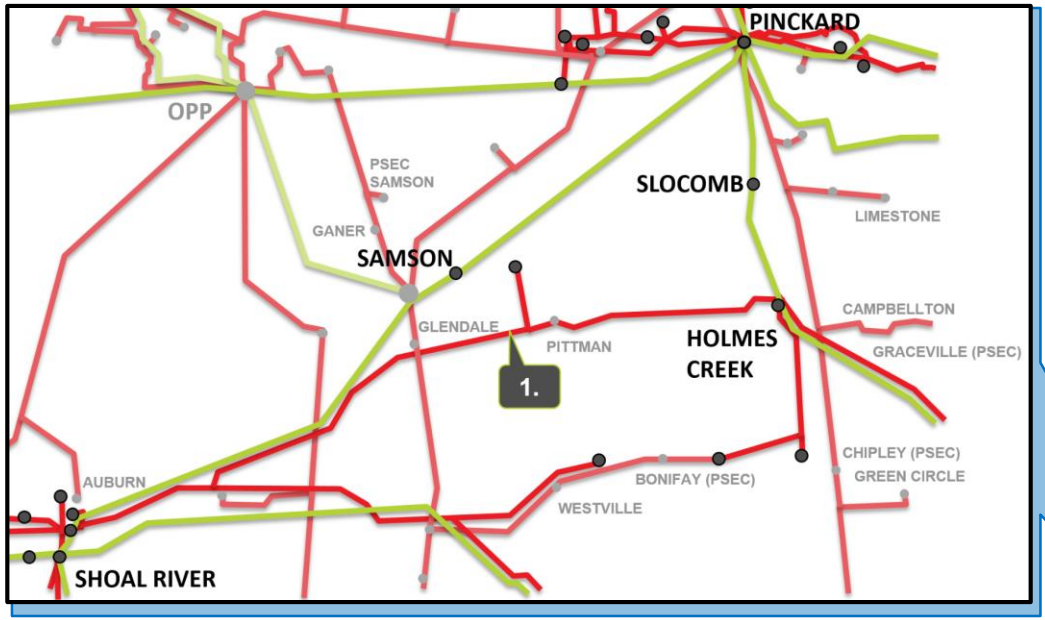
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 11W

• **2024**

HOLMES CREEK – SOUTH CRESTVIEW 115 KV TRANSMISSION LINE

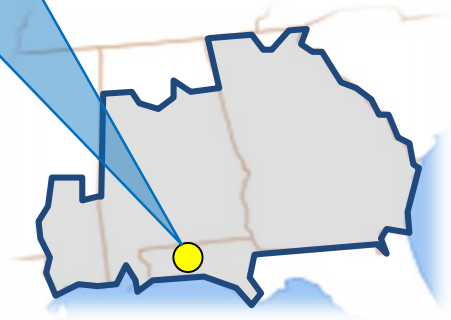


PROJECT DESCRIPTION:

1. Rebuild approximately 54.4 miles of 115 kV transmission line between Holmes Creek and Glendale Road tap point with 795 ACSR at 100°C.

SUPPORTING STATEMENT:

- This project eliminates high loadings under contingency scenarios. This project also provides additional operational and maintenance flexibility which then increases reliability.



LEGEND
115 kV
161 kV
230 kV
500 kV

SOUTHERN (EAST) Balancing Authority Area

SERTP Regional Transmission Expansion Plan

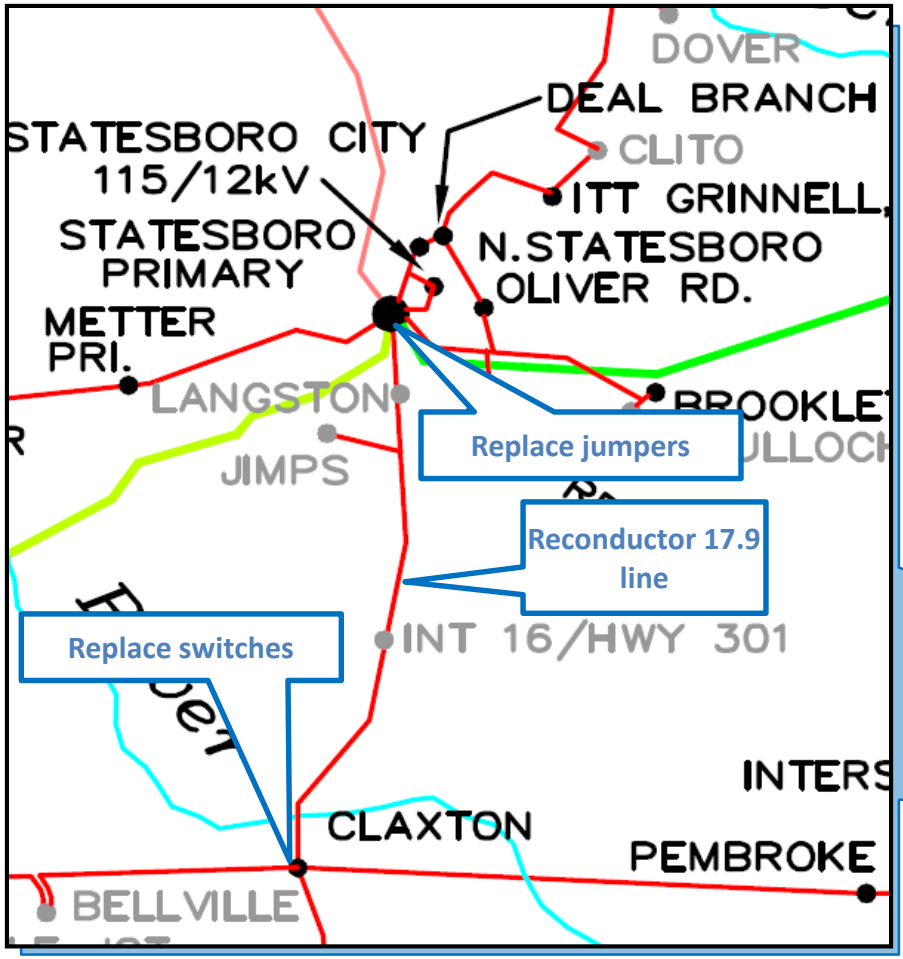
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

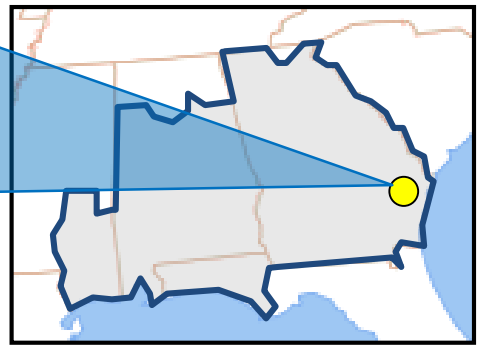
SOUTHERN – 1E

• **2019**

CLAXTON – STATESBORO PRIMARY 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Reconductor approximately 17.9 miles, along the Claxton to Statesboro Primary 115 kV transmission line with 1351 ACSR at 100°C. Replace 600A switches at Claxton with 2000A switches and replace 500 CU jumpers at Statesboro Primary with 1590 AAC jumpers.
- **SUPPORTING STATEMENT:**
  - The Claxton to Statesboro 115 kV transmission line overloads under contingency.

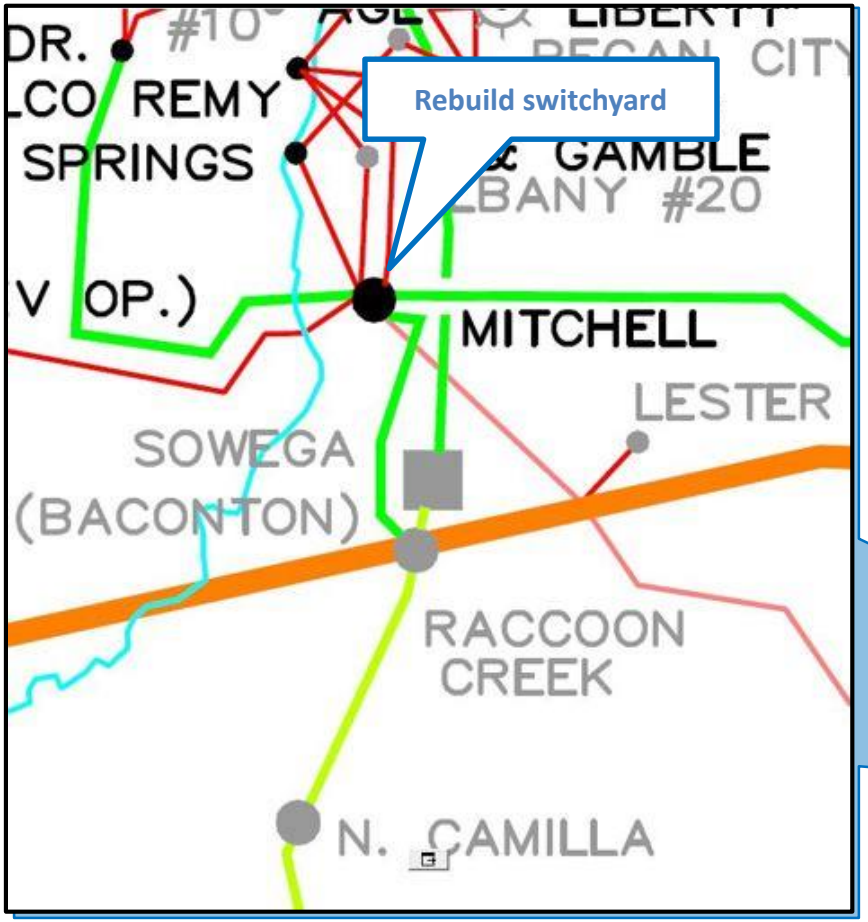


SOUTHERN Balancing Authority Area

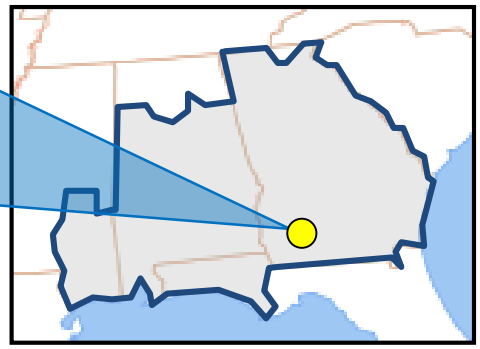
SOUTHERN – 2E

• **2019**

MITCHELL 230 KV REBUILD



- **DESCRIPTION:**
  - Rebuild of the Plant Mitchell switchyard to allow the spare transformer and the new transformer to both be in-service.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in the Albany area under contingency.



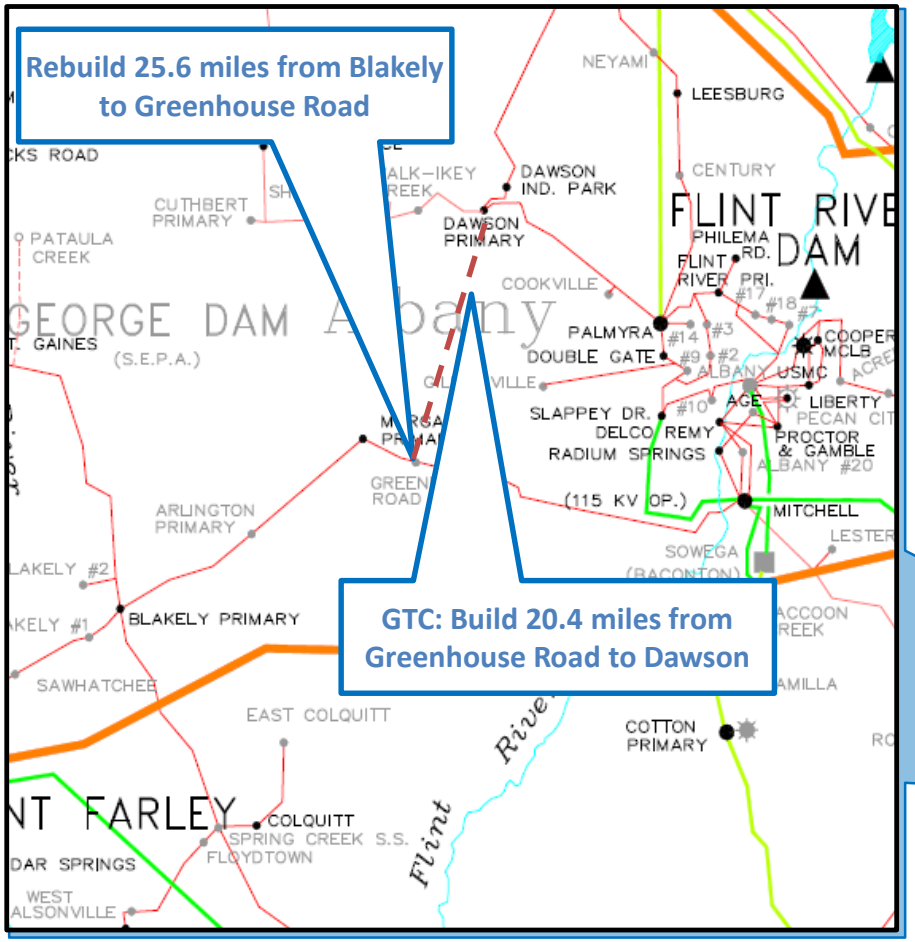
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

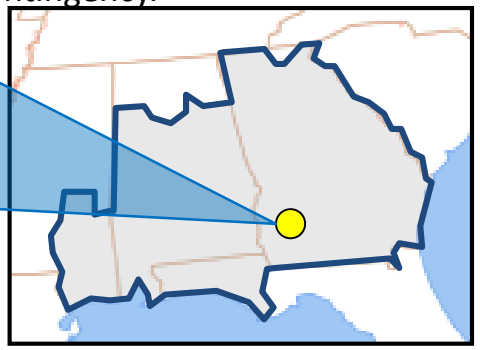
SOUTHERN – 3E

• **2020**

BLAKELY PRIMARY – DAWSON PRIMARY 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - GPC to rebuild approximately 25.6 miles of 50°C 266 ACSR 115 kV transmission line from Blakely Primary to Greenhouse Road with 100°C 765 ACSR.
  - GTC to build approximately 20.4 miles of new 115 kV transmission line from Greenhouse Road to Dawson Primary with 100°C 765 ACSR.
- **SUPPORTING STATEMENT:**
  - The Blakely Primary to Mitchell 115 kV transmission line overloads under contingency.



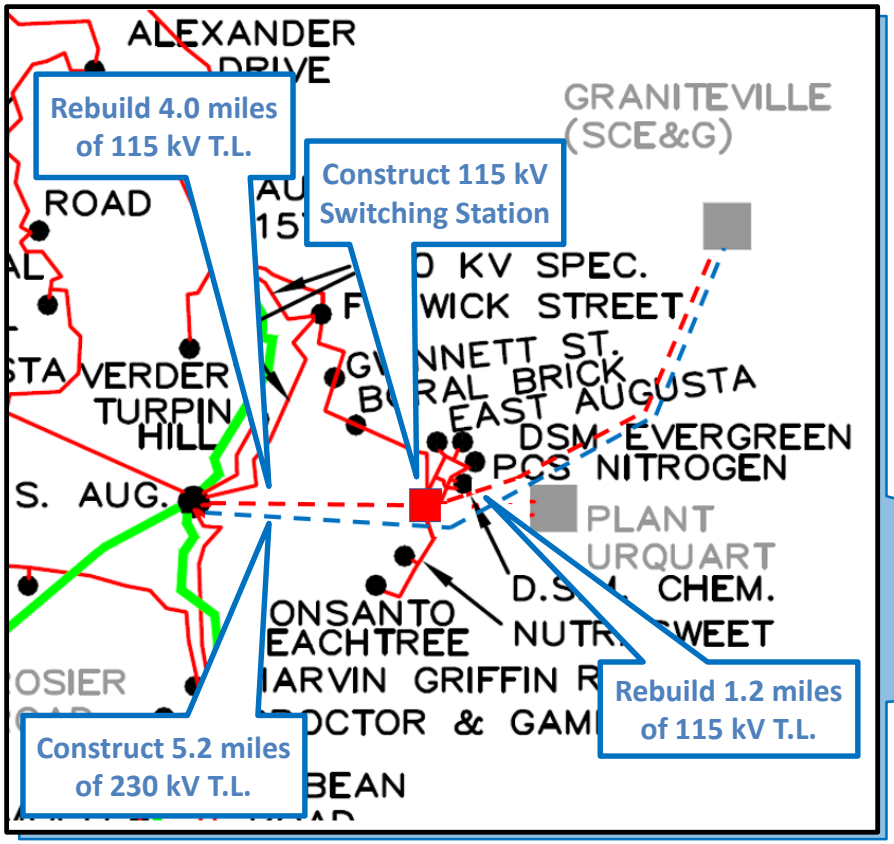
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 4E

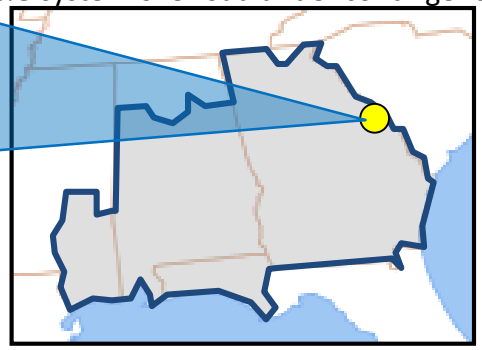
• **2020**

GRANITEVILLE - SOUTH AUGUSTA 115 & 230 KV TRANSMISSION LINES



- **DESCRIPTION:**
  - Construct a new 5.2 mile 230 kV tie-line (GPC to SCE&G) from the South Augusta 230/115 kV substation to the GA/SC state-line with bundled 1351 ACSR at 100°C. Construct a 5-breaker 115 kV switching station. Rebuild existing transmission line from the switching station to the GA/SC state line (1.2 miles) with 1351 ACSR at 100°C. Rebuild 4.0 miles of existing line between South Augusta and the new switching station with 1351 ACSR at 100°C.

- **SUPPORTING STATEMENT:**
  - The Savannah River (SCE&G) to Vogtle 230 kV tie – line and multiple other transmission facilities on the SCE&G system overload under contingency.



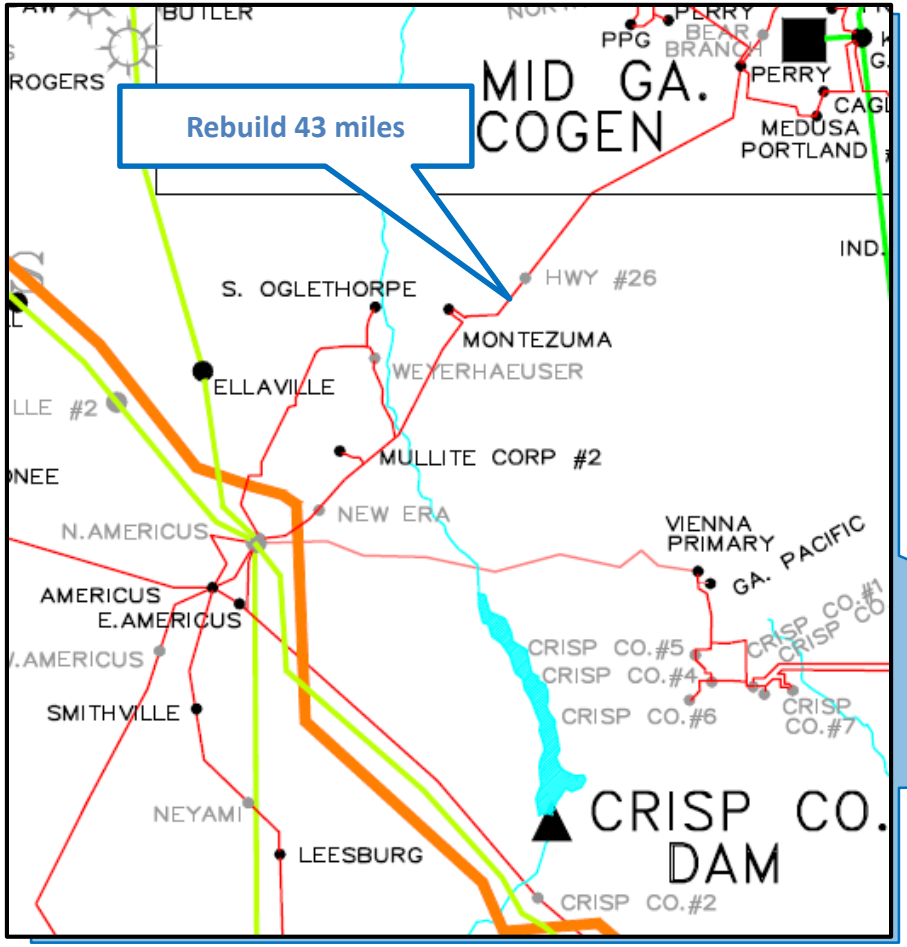
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 5E

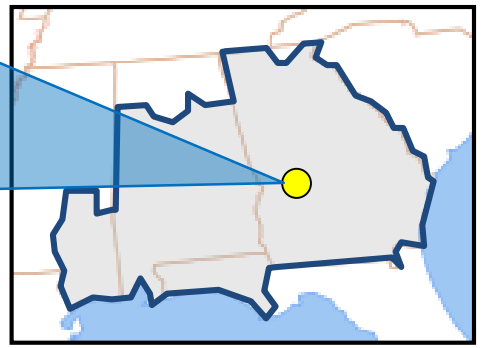
• **2020**

NORTH AMERICUS – PERRY 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Rebuild approximately 43.0 miles of the existing 115 kV transmission line from North Americus to Perry substation with 795 ACSR at 100°C.

- **SUPPORTING STATEMENT:**
  - The North Americus to Perry 115 kV transmission line overloads under contingency.



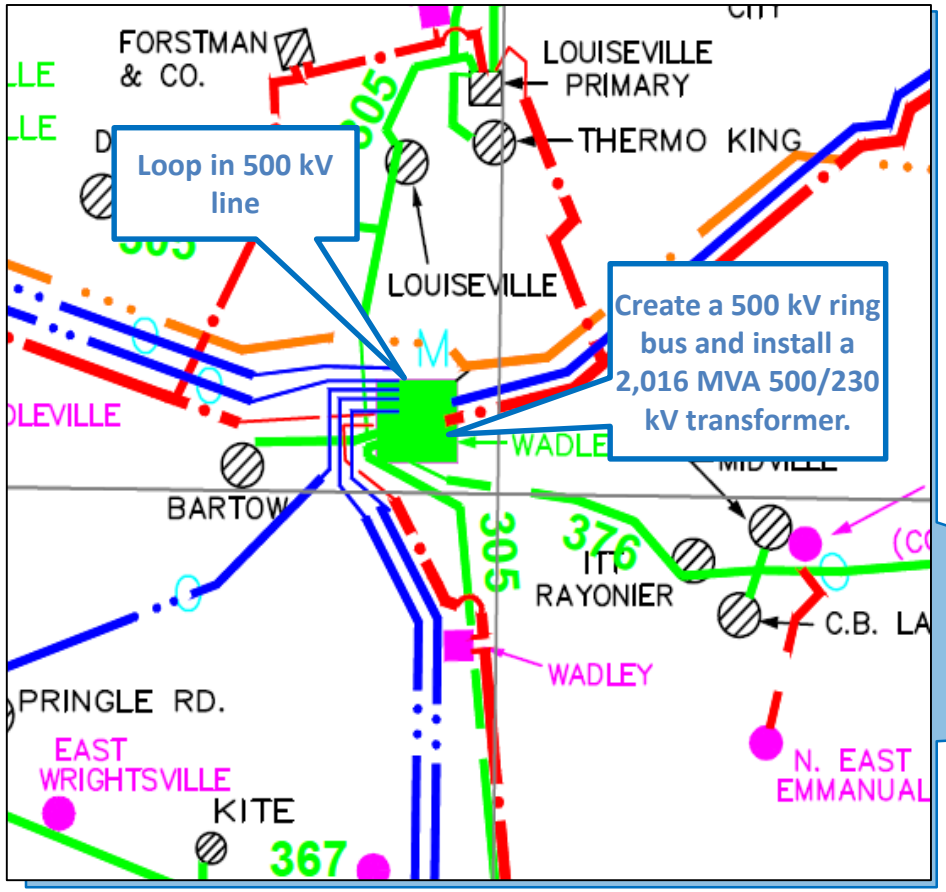
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

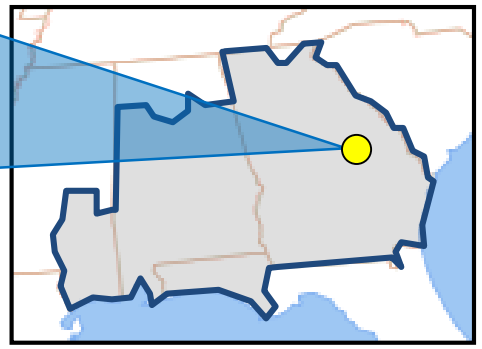
SOUTHERN – 6E

• **2021**

WADLEY PRIMARY 500/230 KV PROJECT



- **DESCRIPTION:**
  - Loop in the Vogtle to Warthen 500 kV transmission line into the new 500 kV ring bus at Wadley Primary. Install a 500/230 kV, 2016 MVA transformer that ties to the Wadley Primary 230 kV bus.
- **SUPPORTING STATEMENT:**
  - Project to enhance reliability in the Augusta area and to support the expansion of Plant Vogtle.

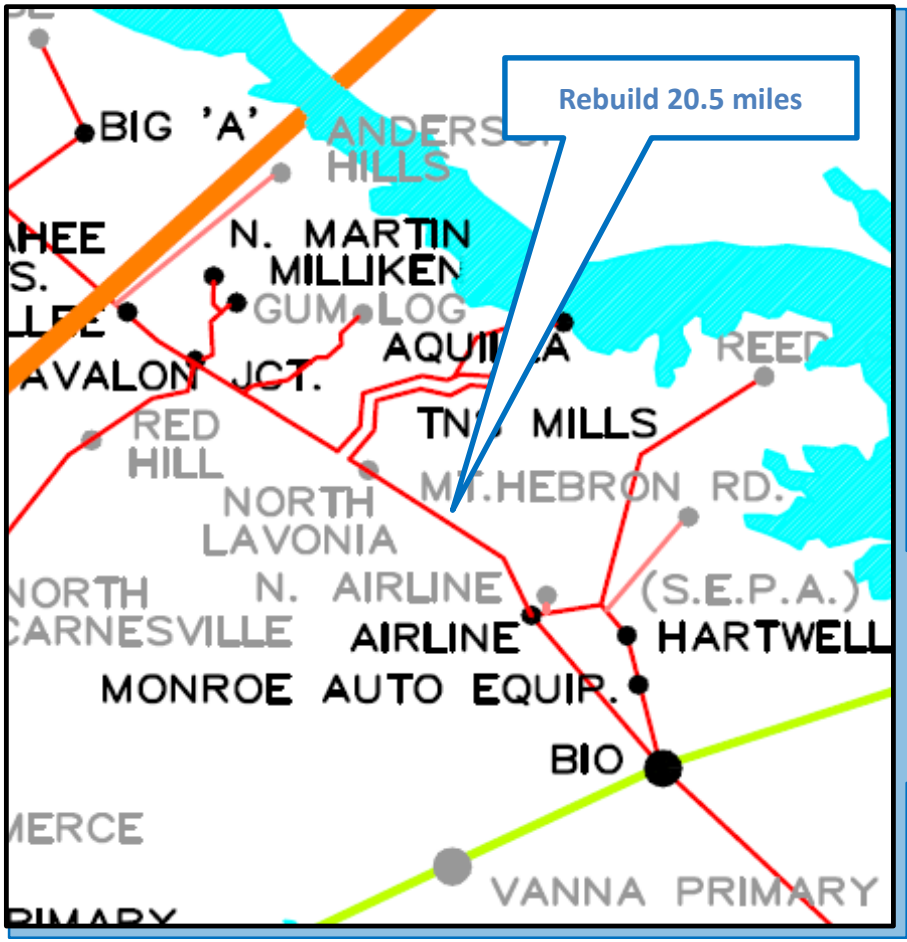


SOUTHERN Balancing Authority Area

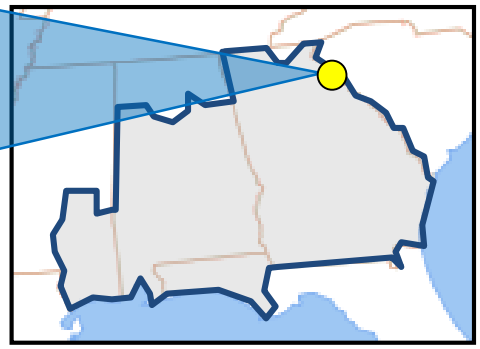
SOUTHERN – 7E

• **2022**

AVALON JUNCTION – BIO 115 KV TRANSMISSION LINE REBUILD



- **DESCRIPTION:**
  - Rebuild approximately 20.5 miles of the Avalon Junction to Bio 115 kV transmission line (636 ACSR/795ACSR) with 100°C 1351 ACSR and replace the terminal equipment at various substations.
- **SUPPORTING STATEMENT:**
  - The Avalon Junction to Bio 115 kV transmission line overloads under contingency.



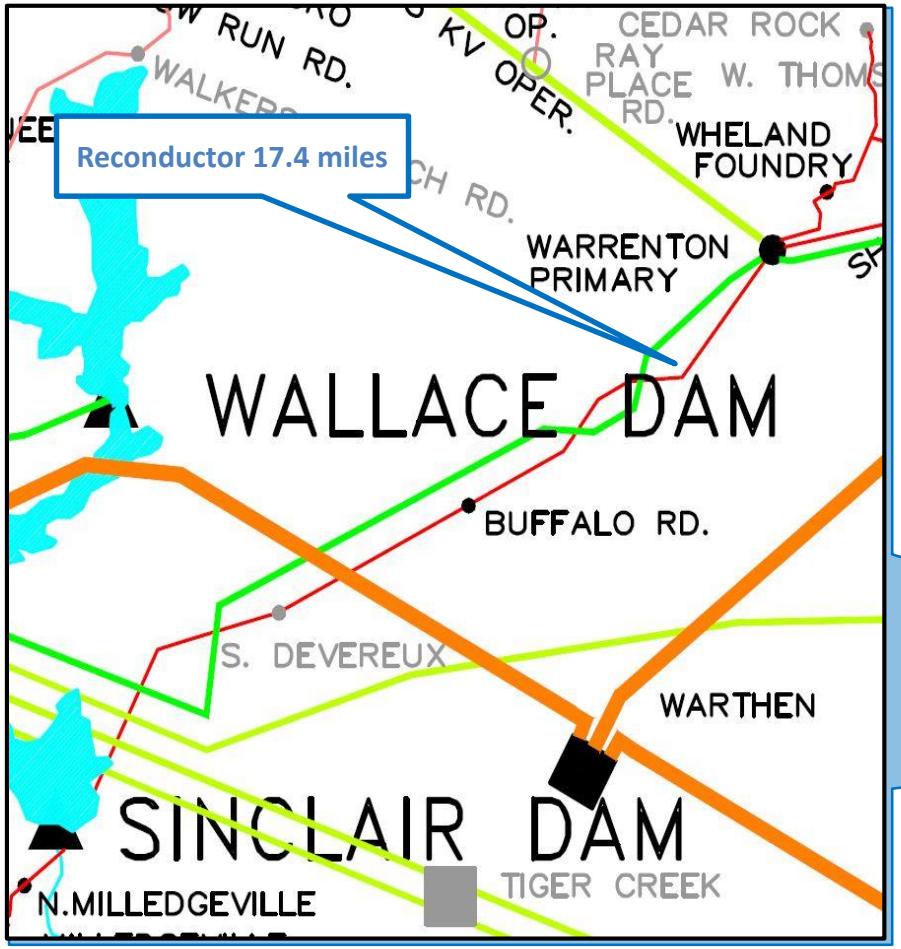
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 8E

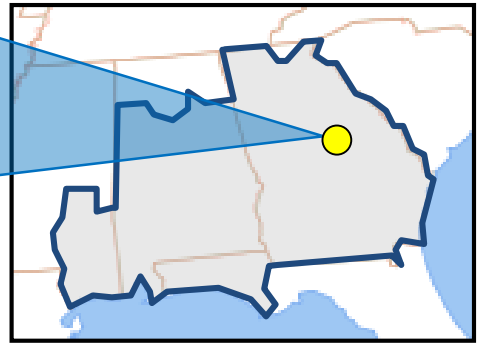
• **2024**

SINCLAIR DAM – WARRENTON PRIMARY 115 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Reconductor the Buffalo Road to Warrenton Primary section (17.4 miles of 50°C 4/0 CU) with 100°C 795 ACSR.
  - Replace 90°C 4/0 CU jumpers with AAC 1590 at Buffalo Road.

- **SUPPORTING STATEMENT:**
  - The Sinclair Dam to Warrenton Primary 115 kV transmission line overloads under contingency.



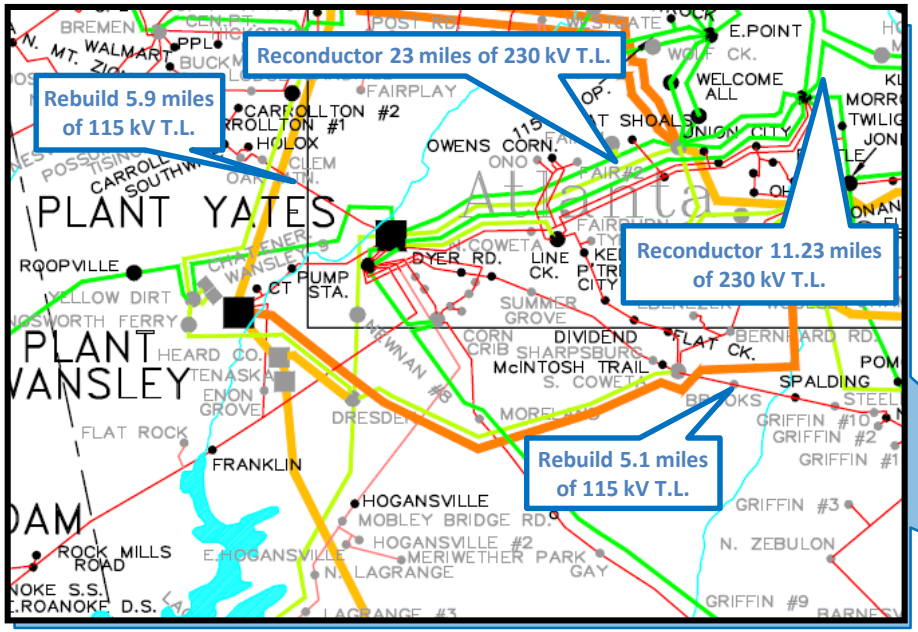
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

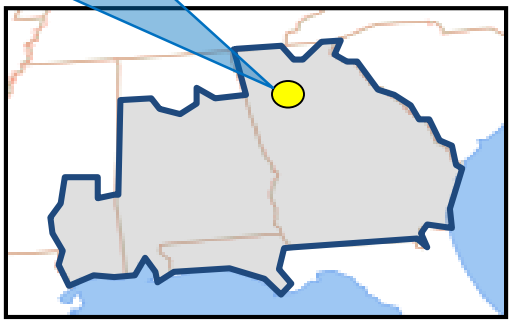
SOUTHERN – 9E

• **2025**

YATES UNIT 8 NETWORK IMPROVEMENTS



- **DESCRIPTION:**
  - Reconductor Union City to Yates (White) 230 kV (23.0 miles with 200°C 1033 ACSS), Klondike - Morrow 230 kV Line (11.23 miles with 2-795 ACSR), Possum Branch to Yates 115 kV Line (11.2 miles with 1351 ACSR), Morrow to Yates 115 kV (
  - Rebuild South Coweta to South Griffin 115 kV Line (5.1 miles of 100°C 1033 ACSR)
  - Upgrade Clarkston to Scottdale 115kV Line (2.7 miles to 160°C rating
  - Install second Dyer Road 230/115 kV transformer
  - Rebuild Conyers Substation 230 kV bus
- **SUPPORTING STATEMENT:**
  - The addition of Plant Yates Unit 8 generation causes various facilities in the northwestern Georgia area to overload.



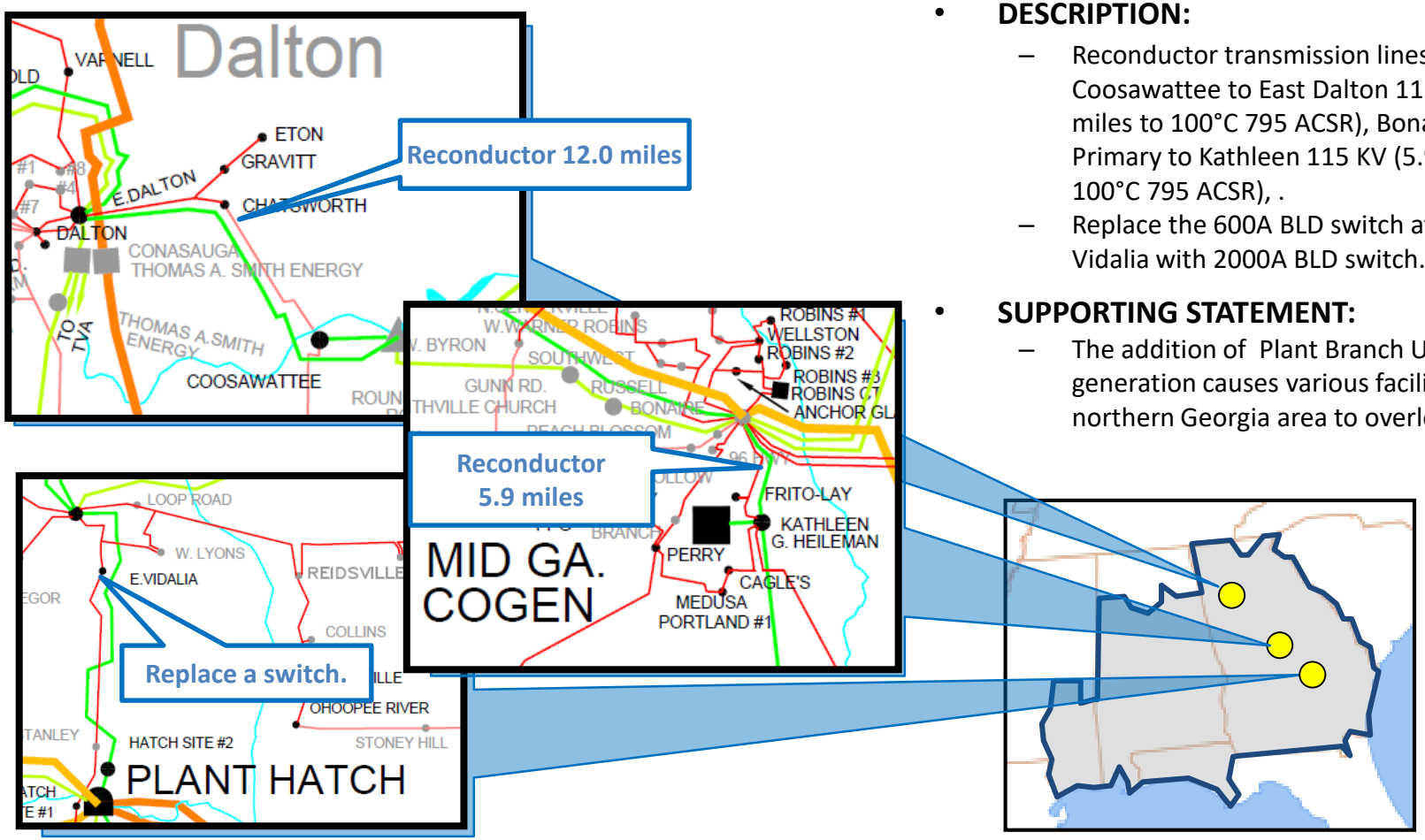
Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – 10E

• **2027**

BRANCH UNIT 5 NETWORK IMPROVEMENTS

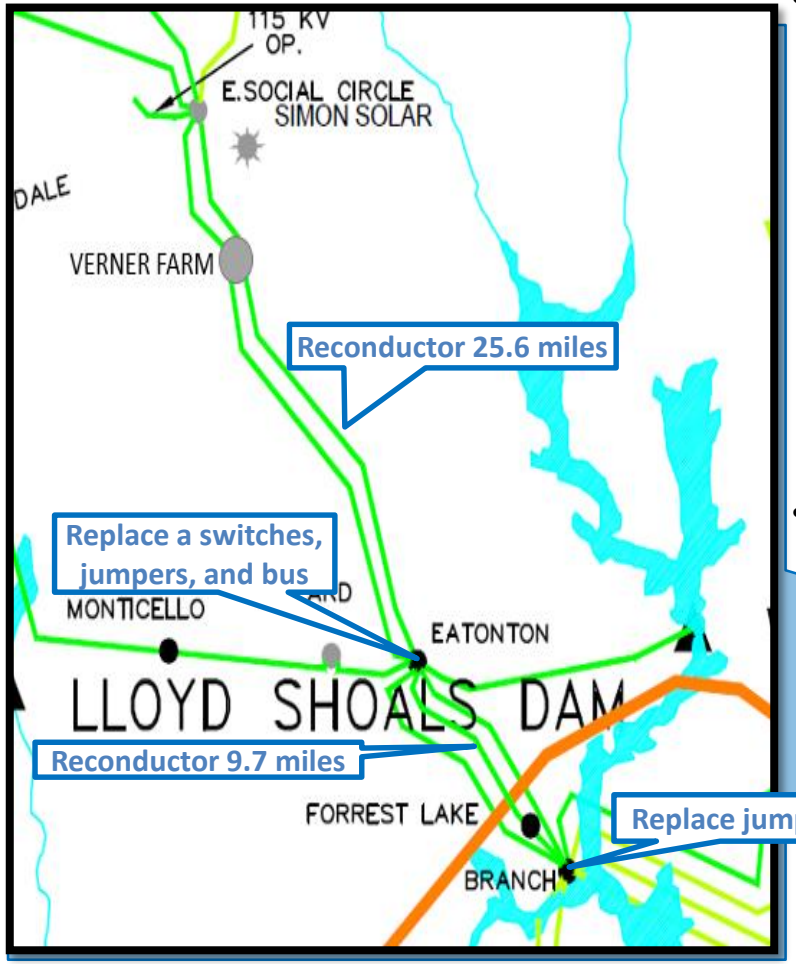


- **DESCRIPTION:**
  - Reconductor transmission lines: Coosawattee to East Dalton 115 KV (12.0 miles to 100°C 795 ACSR), Bonaire Primary to Kathleen 115 KV (5.9 miles to 100°C 795 ACSR), .
  - Replace the 600A BLD switch at East Vidalia with 2000A BLD switch.
- **SUPPORTING STATEMENT:**
  - The addition of Plant Branch Unit 5 generation causes various facilities in the northern Georgia area to overload.

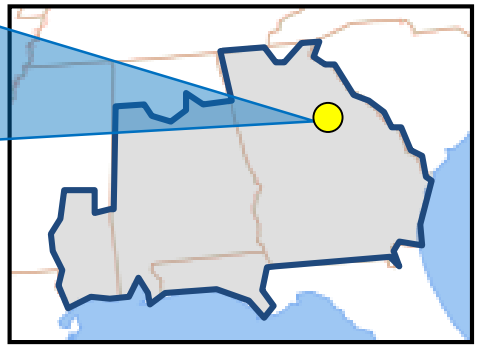
SOUTHERN – 10E (Continued)

• **2027**

BRANCH UNIT 5 NETWORK IMPROVEMENTS



- **DESCRIPTION:**
  - Reconductor the Branch to Verner Farms 230kV line (9.7 miles of 100°C 1351 ACSR) using 160°C 1351 ACSS. Replace 1590 AAC main bus, jumpers at Eatonton Primary, and jumpers at Branch, with 2-1590 AAC. Replace switches at Eatonton Primary with 2000A switches.
  - Reconductor the Eatonton Primary to Verner Farms 230KV line (25.6 miles of 100°C 1351 ACSR) using 160°C 1351 ACSS. Replace switches at Eatonton Primary with 2000A switches.
- **SUPPORTING STATEMENT:**
  - The addition of Plant Branch Unit 5 generation causes various facilities in the northern Georgia area to overload.



SOUTHERN Balancing Authority Area

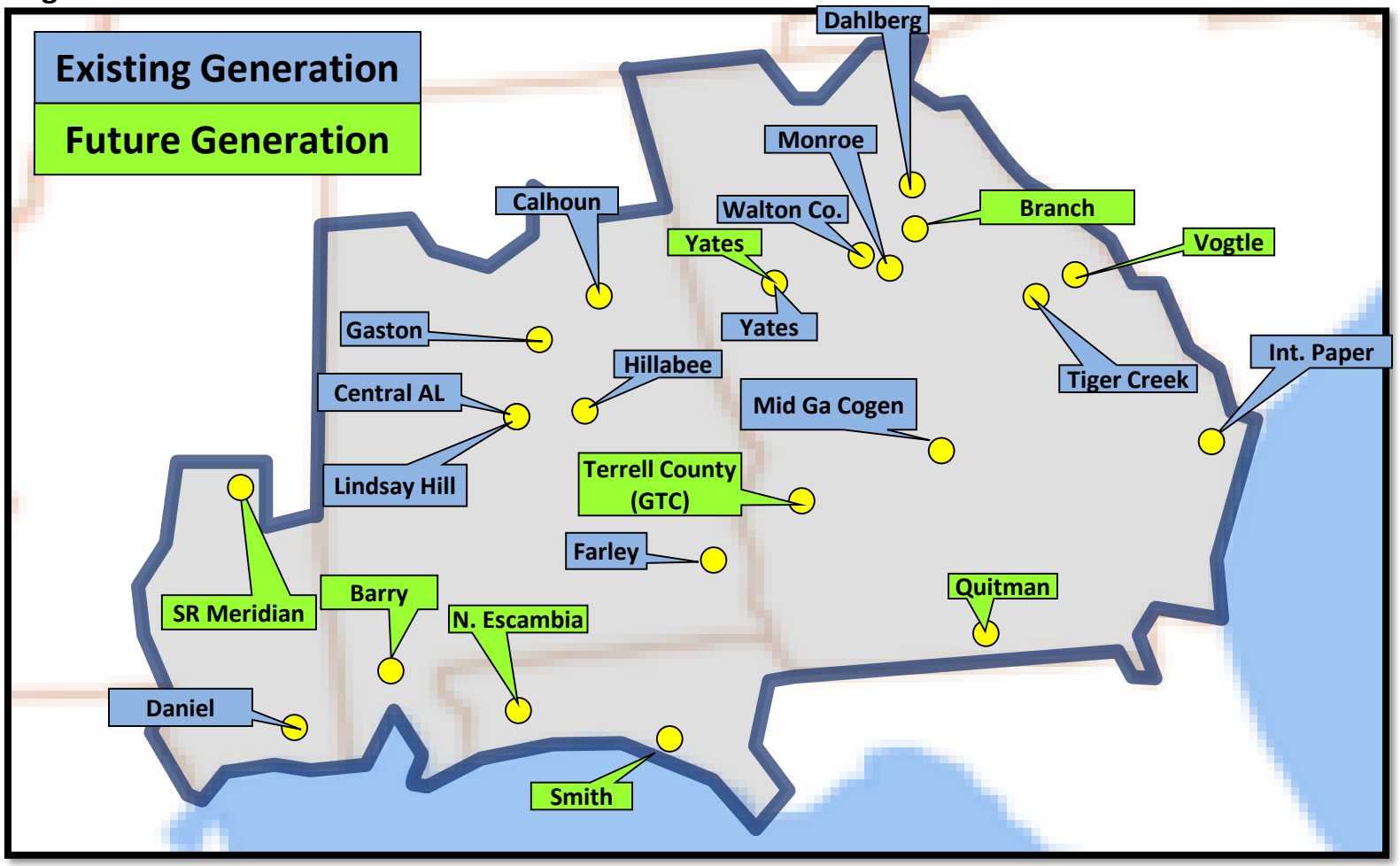
2019 Upcoming Generation Assumptions

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN – Generation Assumptions

The following diagram depicts the location of generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2019 SERTP Process.



Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CALHOUN 1-4	Gas	632	632	632	0	--	--	--	--	--	--
CENTRAL ALABAMA	Gas	885	885	885	885	0	--	--	--	--	--
DAHLBERG 2, 6, 8, 10	Gas	298	298	298	298	298	0	--	--	--	--
INT. PAPER - PW BIOMASS	Bio	20	20	20	20	20	20	0	--	--	--
MID GA COGEN	Gas	300	300	300	300	300	300	300	300	0	--
MONROE POWER	Gas	309	309	309	309	0	--	--	--	--	--
TIGER CREEK 1&4	Gas	313	313	313	0	--	--	--	--	--	--
WALTON COUNTY	Gas	465	465	465	0	--	--	--	--	--	--

SOUTHERN COMPANY – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
GASTON 1-4	Gas	465	465	465	465	515	515	515	515	515	515
YATES 6-7	Gas	649	649	649	649	714	714	714	714	714	714

SOUTHERN COMPANY – Generation Assumptions (Cont.)

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SR MERIDIAN III	Solar	--	52	52	52	52	52	52	52	52	52
VOGTLE 3	Nuclear	--	--	504	504	504	504	504	504	504	504
VOGTLE 4	Nuclear	--	--	--	504	504	504	504	504	504	504

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions

The following table depicts future generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
BARRY[1]	--	--	--	610	610	610	610	610	610	610
BRANCH[1]	--	--	--	--	--	--	--	940	940	940
LANSING SMITH [1]	--	--	--	230	230	230	230	230	230	230
NORTH ESCAMBIA [1]	--	--	--	610	610	610	610	610	610	610
YATES[1]	--	--	--	--	--	1200	1200	1200	1200	1200

(1) This assumption may be modified as resource decisions are made by the corresponding LSEs pursuant to applicable regulatory processes.

Southeastern Regional TRANSMISSION PLANNING

SOUTHERN Balancing Authority Area

SOUTHERN COMPANY – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
BOWEN	159	159	159	159	159	159	159	159	159	159
DAHLBERG	494	494	494	494	494	494	494	494	494	494
DANIEL	--	150	150	150	100	100	100	100	100	100
FRANKLIN	424	424	424	424	424	424	424	424	424	424
HAMMOND	10	10	10	10	10	10	10	10	10	10
HILLABEE	350	350	350	350	350	350	350	350	350	350
LINDSAY HILL	300	300	300	300	300	300	300	300	300	300
SCHERER	911	911	911	911	911	911	911	911	911	911
VOGTLE	206	206	206	206	206	206	206	206	206	206

GTC – Generation Assumptions

The following table depicts the generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SR HAZELHURST 3	SOLAR	--	41	41	41	41	41	41	41	41	41
TERRELL COUNTY	SOLAR	--	--	74	74	74	74	74	74	74	74
VOGTLE 3	NUCLEAR	--	--	--	330	330	330	330	330	330	330
VOGTLE 4	NUCLEAR	--	--	--	--	330	330	330	330	330	330

MEAG – Generation Assumptions

The following table depicts the generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
VOGTLE 3	NUCLEAR	--	--	250	250	250	250	250	250	250	250
VOGTLE 4	NUCLEAR	--	--	--	250	250	250	250	250	250	250

DALTON – Generation Assumptions

The following table depicts the generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	FUEL TYPE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
VOGTLE 3	NUCLEAR	--	--	19	19	19	19	19	19	19	19
VOGTLE 4	NUCLEAR	--	--	--	19	19	19	19	19	19	19

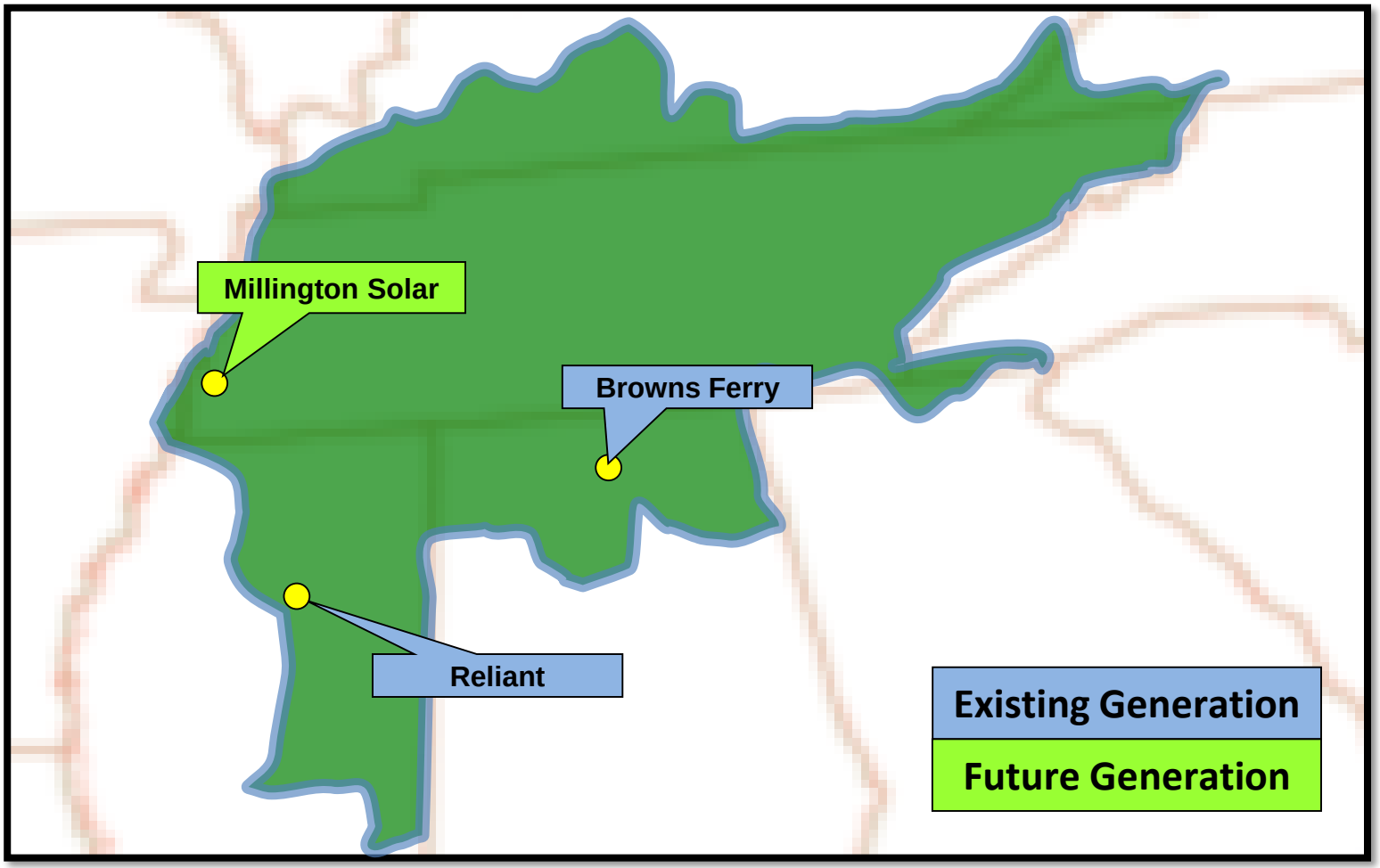
TVA Balancing Authority Area

2018 Generation Assumptions

TVA Balancing Authority Area

TVA – Generation Assumptions

The following diagram depicts the location of generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process.



TVA Balancing Authority Area

TVA – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2018 SERTP Process. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BROWNS FERRY UNIT 1	1262	1262	1262	1262	1262	1262	1262	1262	1262	1262
BROWNS FERRY UNIT 2	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266
MILLINGTON SOLAR	53	53	53	53	53	53	53	53	53	53

TVA Balancing Authority Area

TVA – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
RELIANT	800	800	800	800	800	800	800	800	800	800

TVA Balancing Authority Area

SERTP Regional Transmission Expansion Plan

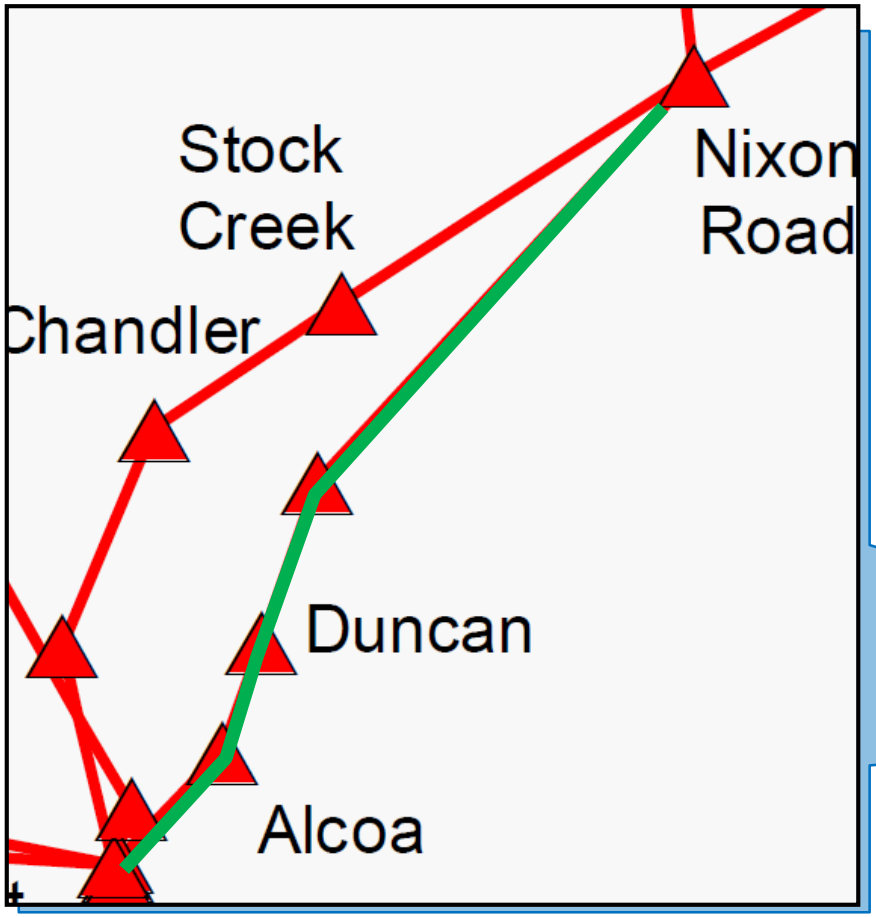
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

TVA – 1

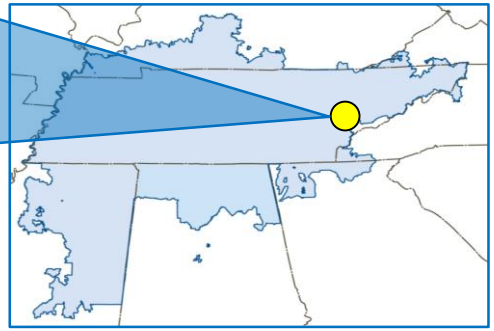
- **2020**

ALCOA SS – NIXON ROAD 161 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Rebuild approximately 12.0 miles of the Alcoa North to Nixon Road 161 kV transmission line with 1590 ACSR at 100°C and construct approximately 2.0 miles of new transmission line to create the Alcoa SS to Nixon Rd 161 kV #2 transmission line.

- **SUPPORTING STATEMENT:**
  - The existing Alcoa Switching Station to Nixon Road 161 kV transmission line overloads under contingency.



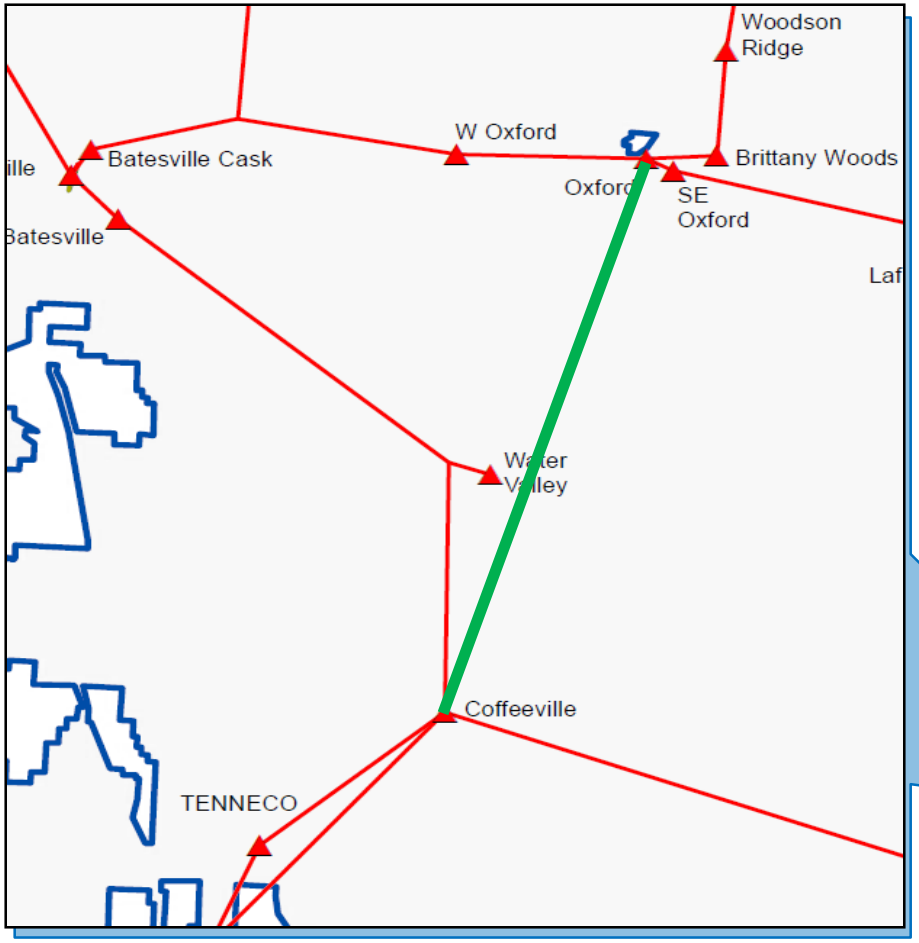
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

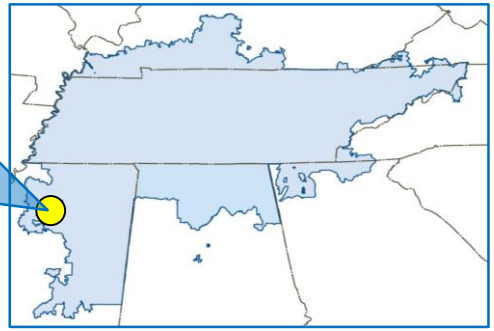
TVA – 2

- **2020**

OXFORD – COFFEEVILLE 161 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Construct approximately 30.0 miles of the new Oxford to Coffeeville 161 kV transmission line with 954 ACSR at 100°C.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in the Oxford, MS and Coffeeville, MS areas under contingency.



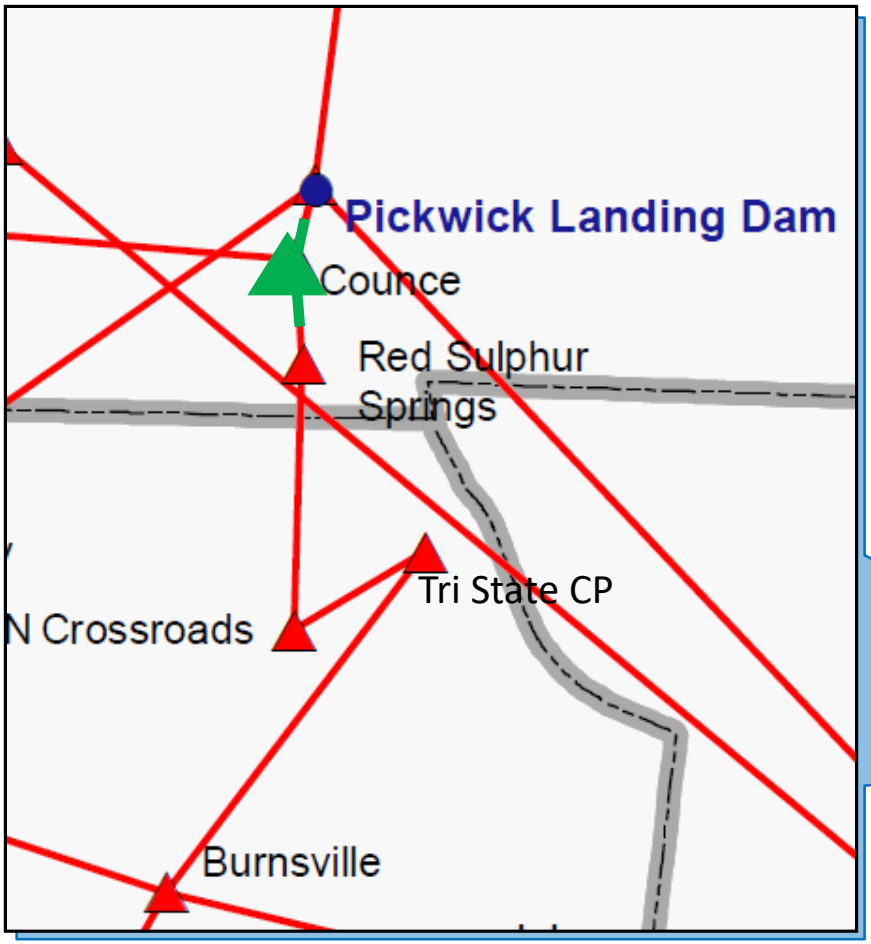
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

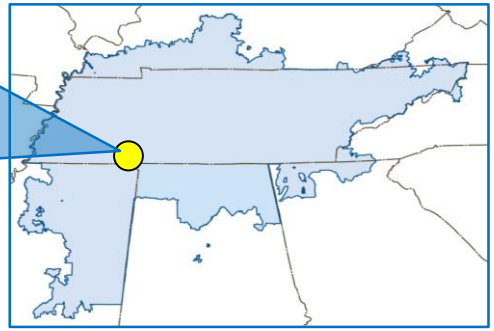
TVA – 3

• **2021**

COUNCE, TN 161 KV SUBSTATION



- **DESCRIPTION:**
  - Convert Counce 161 kV switchyard to a double breaker arrangement. Loop the existing Pickwick to Tri State Commerce Park 161 kV transmission line into the Counce 161 kV station.
- **SUPPORTING STATEMENT:**
  - Additional voltage support is needed in the Counce, TN area under contingency.



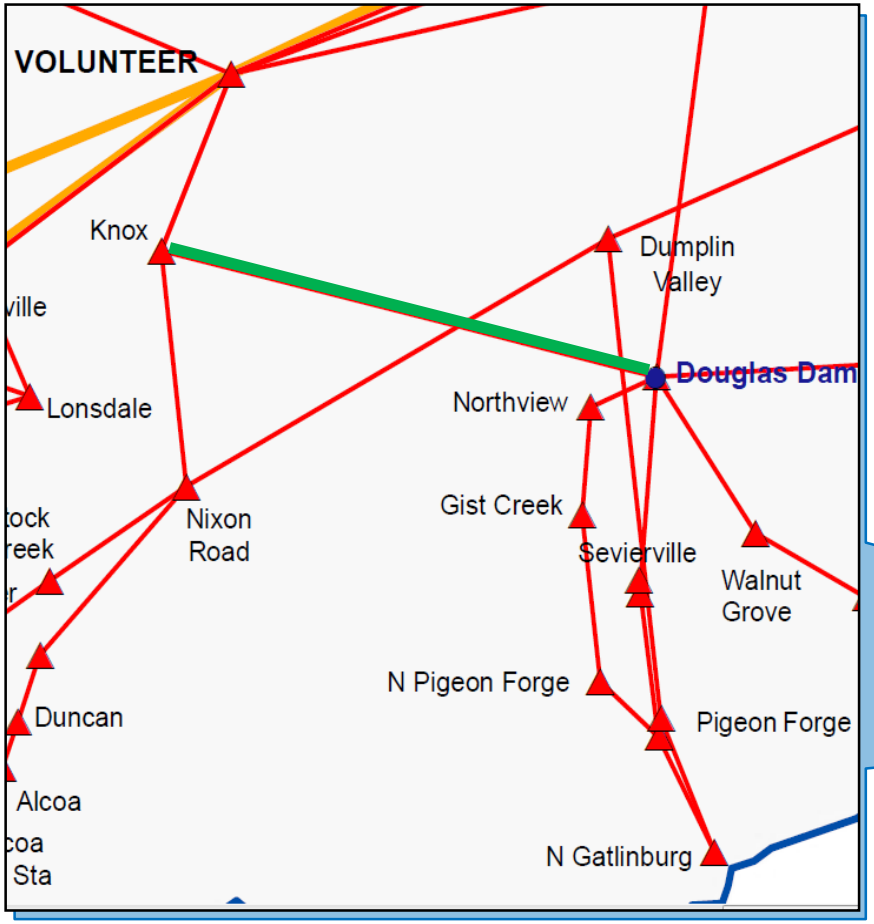
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

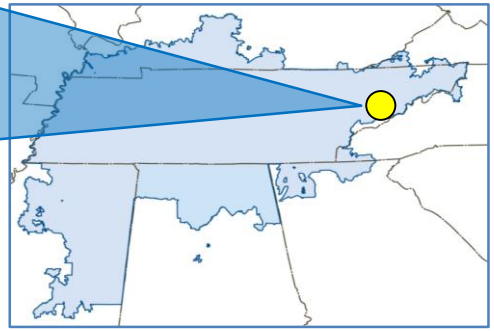
TVA – 4

• **2021**

KNOX – DOUGLAS 161 KV TRANSMISSION LINE.



- **DESCRIPTION:**
  - Rebuild approximately 15.0 miles of the Knox to Douglas 161 kV transmission line with 954 ACSS at 125°C.
- **SUPPORTING STATEMENT:**
  - The Knox to Douglas 161 kV transmission line overloads under contingency.



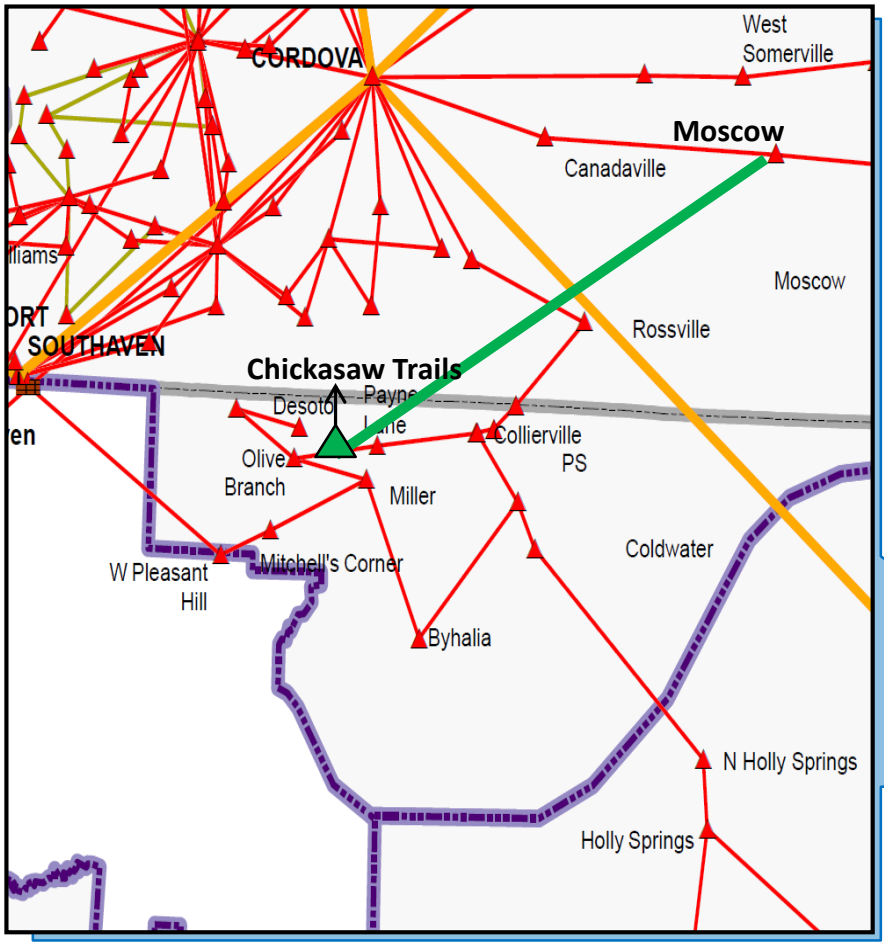
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

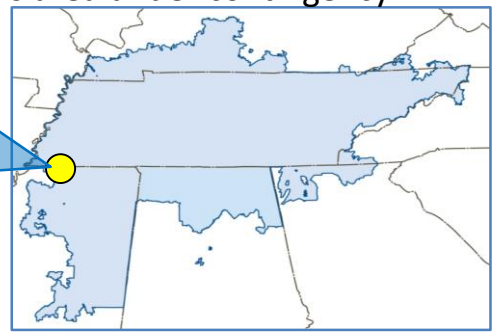
TVA – 5

- **2021**

MOSCOW – CHICKASAW TRAILS 161 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Construct the Chickasaw Trails 161 kV Substation and the Diffee 161 kV Substation. Construct approximately 17.0 miles for new Chickasaw Trails to Moscow 161 kV transmission line with 954 ACSR at 100°C. Loop existing Miller to Holly Springs 161 kV transmission line into the Chickasaw Trails Substation.
- **SUPPORTING STATEMENT:**
  - Thermal overloads and voltage support is needed in the Olive Branch and Chickasaw Trails area under contingency



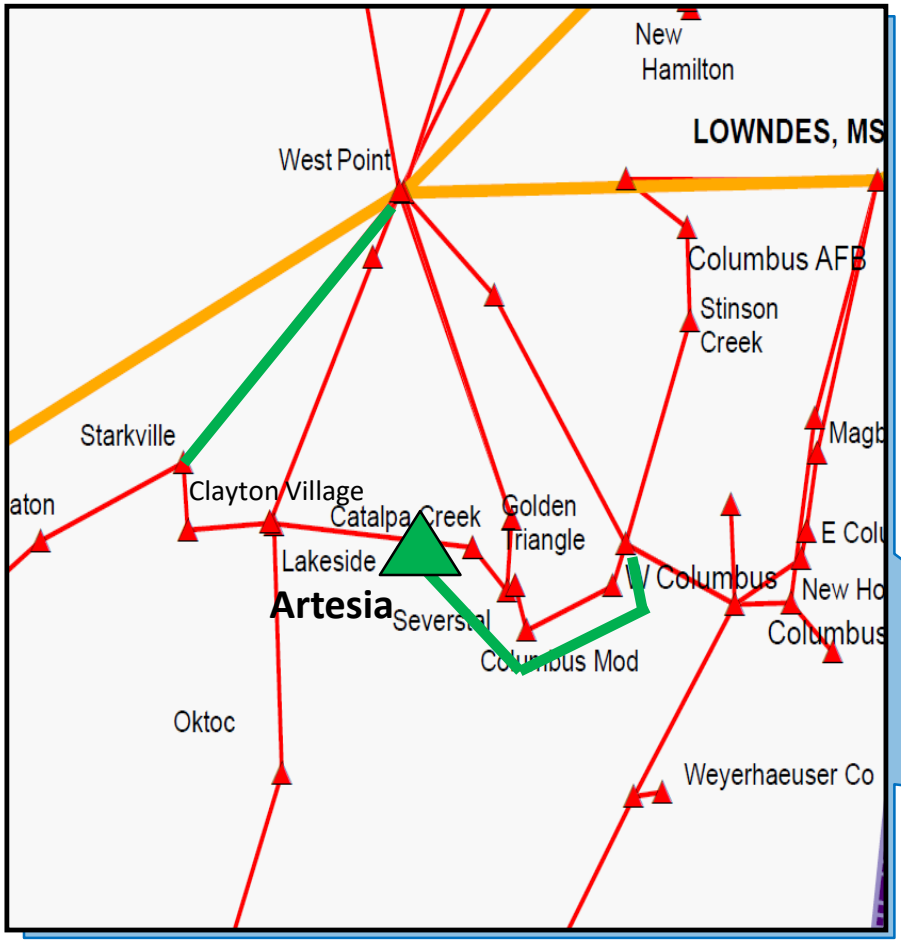
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

TVA – 6

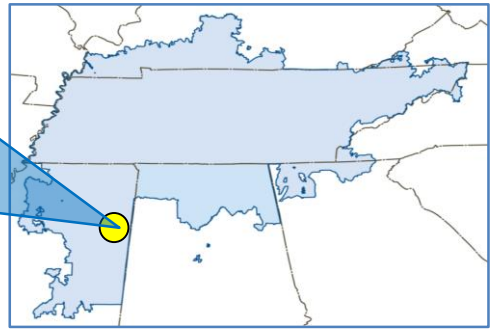
• **2022**

ARTESIA - W. COLUMBUS 161 KV TRANSMISSION LINE



- **DESCRIPTION:**
  - Construct the Artesia 161 kV Substation. Construct approximately 12.0 miles for Artesia to West Columbus with 954 ACSS at 150°C. Reconductor approximately 15.0 miles of West Point to Starkville 161 kV with 954 ACSS at 150°C.

- **SUPPORTING STATEMENT:**
  - Thermal overloads and voltage support is needed in the West Point and Columbus area under contingency.



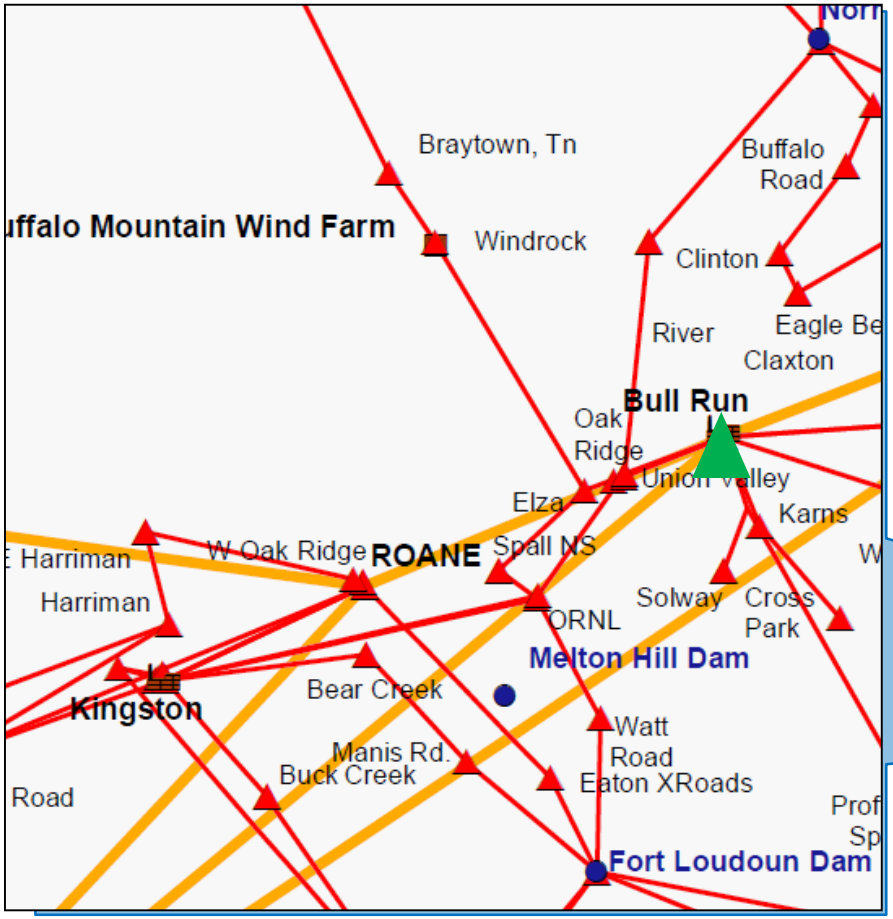
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

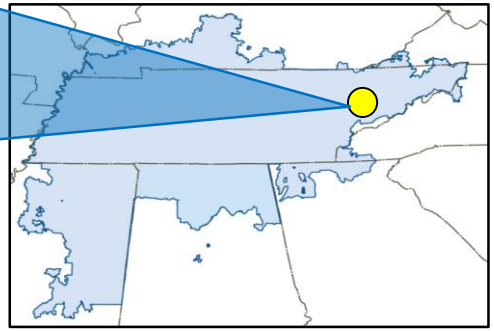
TVA – 7

- **2024**

BULL RUN FP 500 kV SUBSTATION



- **DESCRIPTION:**
  - Install a second 500/161 kV transformer at the Bull Run Fossil Plant Substation.
- **SUPPORTING STATEMENT:**
  - Area 500/161 kV transformer overloads under contingency.



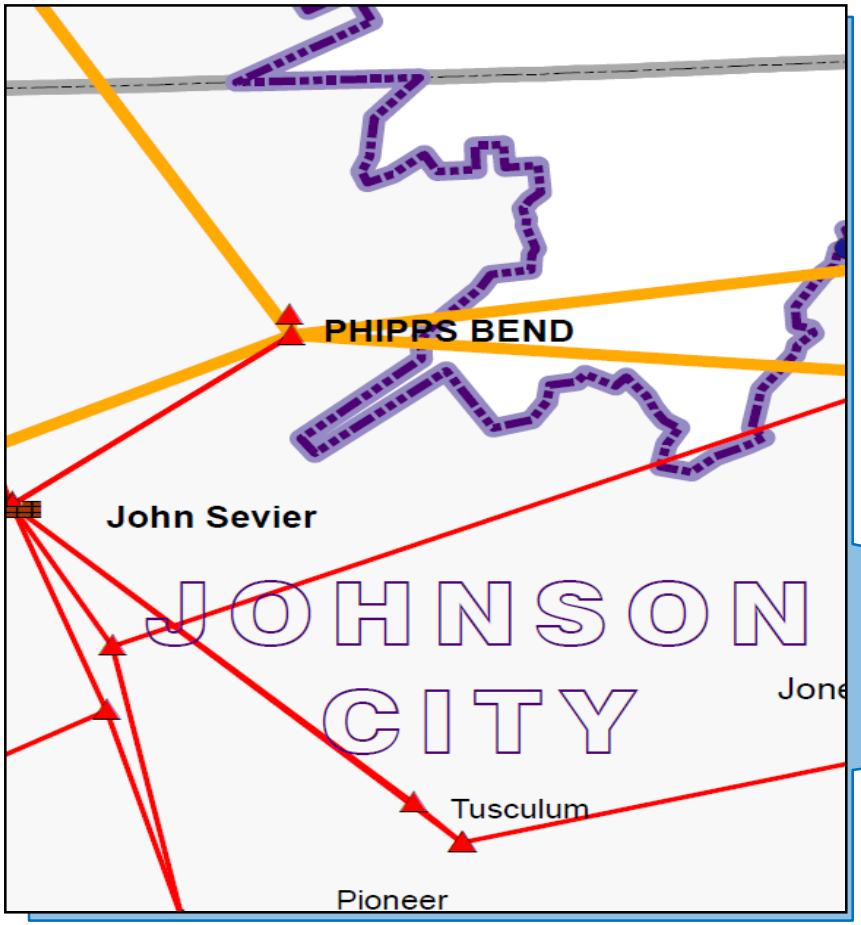
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

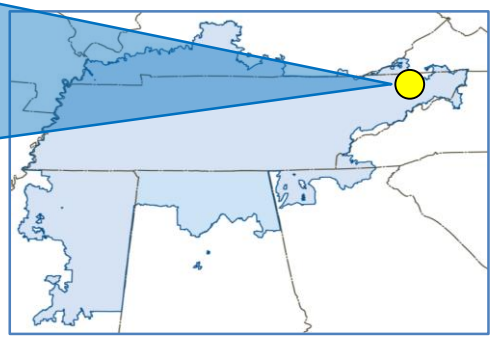
TVA – 8

• **2024**

PHIPPS BEND 500 kV Substation



- **DESCRIPTION:**
  - Install 500 kV breakers on the Pocket and Nagel transmission lines at the Phipps Bend 500 kV substation.
- **SUPPORTING STATEMENT:**
  - Multiple 161 kV transmission lines overload under contingency.



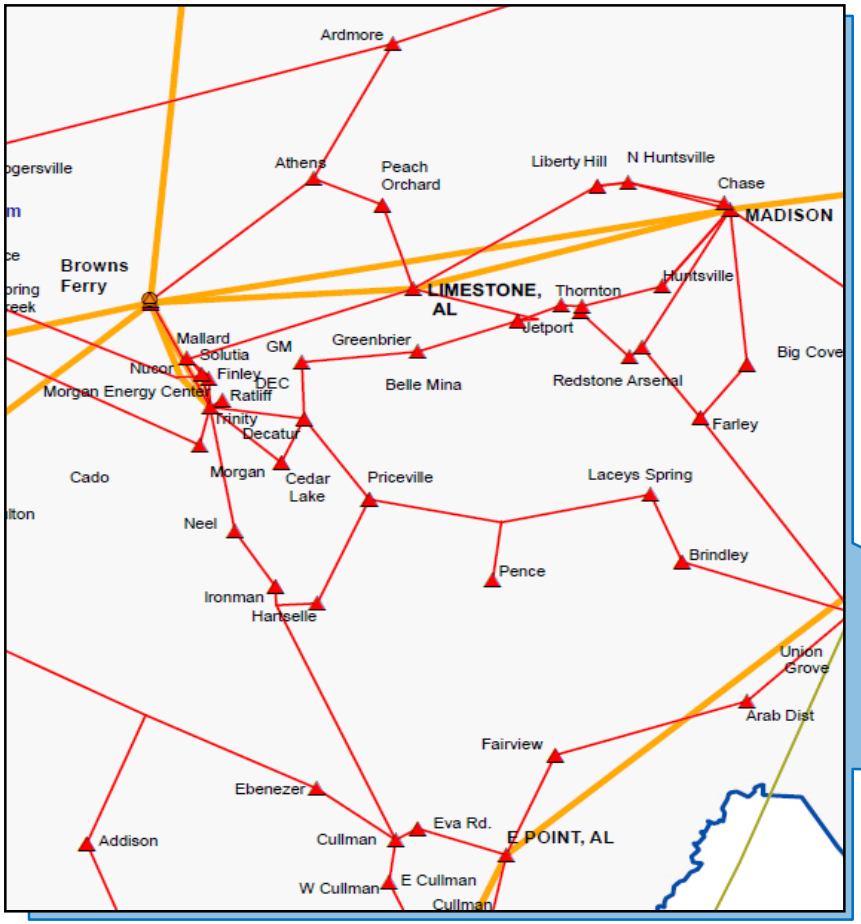
Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

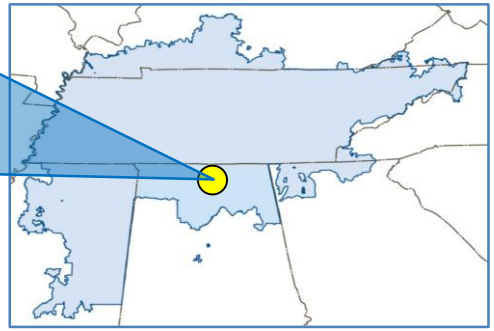
TVA – 9

- **2028**

LIMESTONE 500 kV Substation



- **DESCRIPTION:**
  - Install 500 kV breakers on the Browns Ferry and Madison lines at the Limestone 500 kV substation.
- **SUPPORTING STATEMENT:**
  - Area 500/161kV transformer overloads under contingency.



TVA Balancing Authority Area

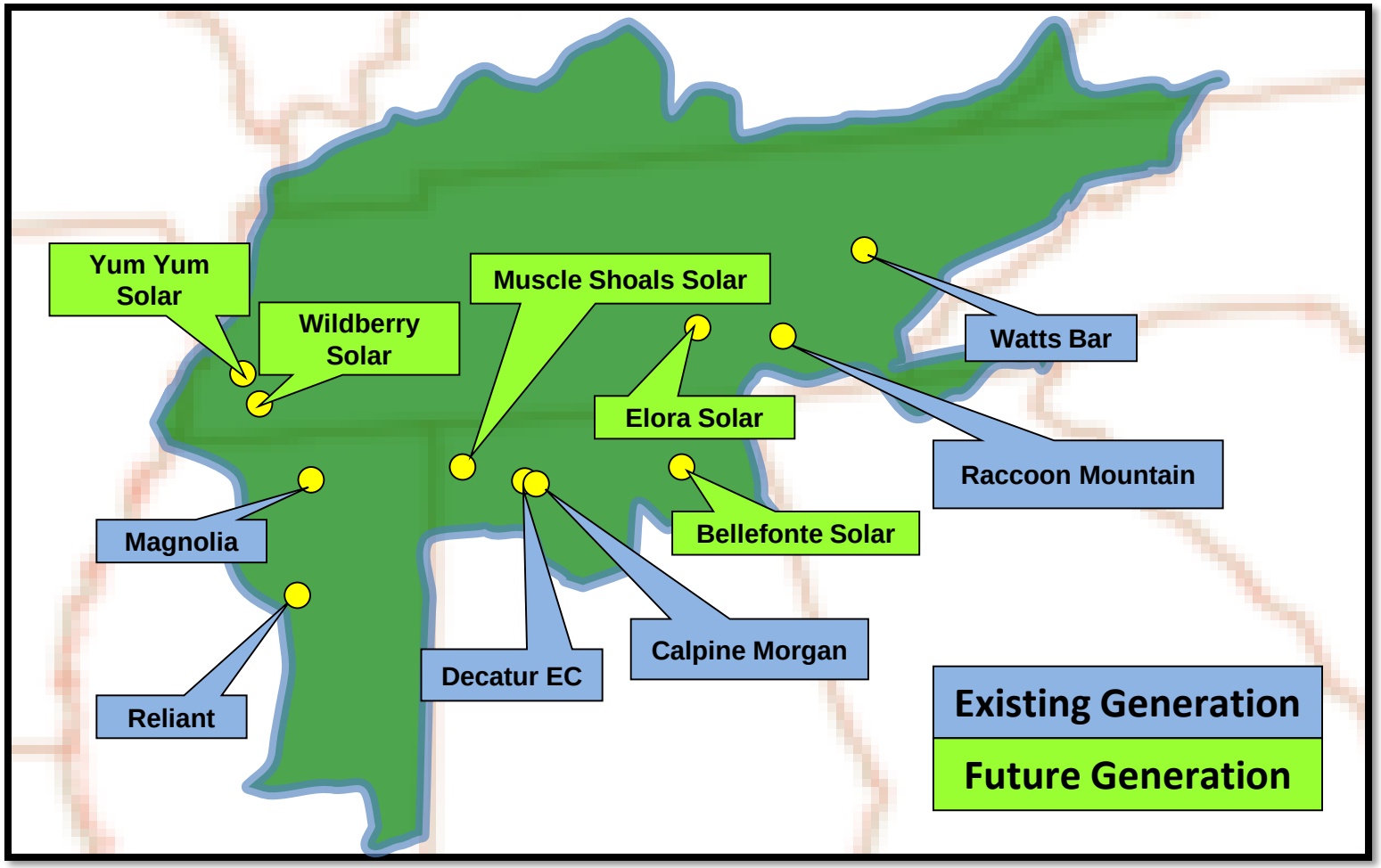
Upcoming 2019 Generation Assumptions

Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

TVA – Generation Assumptions

The following diagram depicts the location of generation assumptions <u>that change</u> throughout the ten year planning horizon for the 2019 SERTP Process.



Southeastern Regional TRANSMISSION PLANNING

TVA Balancing Authority Area

TVA – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
WATTS BAR UNIT 2	1216	1216	1216	1216	1216	1216	1216	1216	1216	1216
RACOON MTN GEN 1	429	440	440	440	440	440	440	440	440	440
RACOON MTN GEN 2	413	440	440	440	440	440	440	440	440	440
RACOON MTN GEN 3	413	413	440	440	440	440	440	440	440	440
RACOON MTN GEN 4	440	440	440	440	440	440	440	440	440	440
MAGNOLIA CC	984	984	984	984	984	984	984	984	984	984
CALPINE MORGAN CC	614	614	614	614	614	614	0	--	--	--
DECATUR EC CC	700	700	700	0	--	--	--	--	--	--

TVA – Generation Assumptions

The following table depicts the generation assumptions that change throughout the ten year planning horizon for the 2019 SERTP Process. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
BELLEFONTE SOLAR	--	--	150	150	150	150	150	150	150	150
ELORA SOLAR	--	--	150	150	150	150	150	150	150	150
MUSCLE SHOALS SOLAR	--	227	227	227	227	227	227	227	227	227
WILDBERRY SOLAR	15	15	15	15	15	15	15	15	15	15
YUM YUM SOLAR	--	--	147	147	147	147	147	147	147	147

Southeastern Regional
TRANSMISSION PLANNING

TVA Balancing Authority Area

TVA – Generation Assumptions (Point-to-Point)

The following table depicts generation assumptions based upon expected long-term firm point-to-point commitments. The years shown represent Summer Peak conditions.

SITE	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
RELIANT	800	800	800	800	800	800	800	800	800	800

SERTP

Regional Transmission Analyses Overview

Regional Transmission Analyses Overview

- Assess if the then current regional transmission plan addresses the Transmission Provider's transmission needs

- Assess whether there may be more efficient or cost effective transmission projects to address transmission needs

Regional Transmission Analysis

Assessment of Current Regional Plan

- **SERTP Sponsors developed 12 coordinated regional models***
- **Models include latest transmission planning model information within the SERTP region**
- **Contingency analysis was performed to identify potential constraints that may result from the regional coordination of latest input assumptions**

*Available on the secure area of the SERTP website upon satisfying access requirements

No.	Season	Year
1	SUMMER	2019
2		2021
3		2023
4		2024
5		2026
6		2028
7	SHOULDER	2021
8		2023
9		2026
10		2028
11	WINTER	2023
12		2028

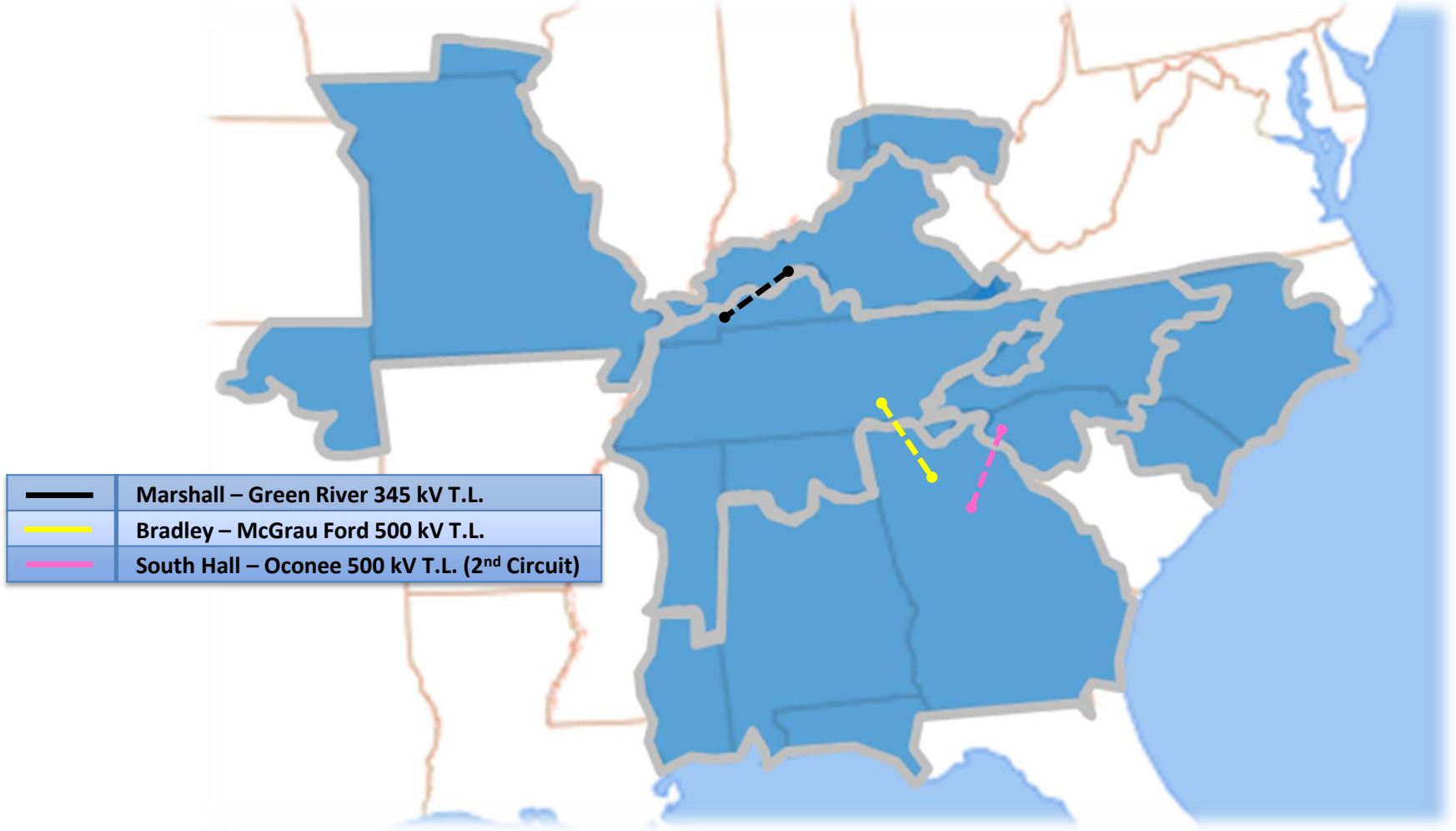
Alternative Regional Transmission Projects

Alternative Regional Transmission Projects	Miles	From	To
		BAA (State)	BAA (State)
Marshall – Green River 345 kV T.L.	85	TVA (TN)	LG&E/KU (KY)
Bradley – McGrau Ford 500 kV T.L.	73	TVA (TN)	SBAA (GA)
South Hall – Oconee 500 kV T.L. (2nd Circuit)	70	SBAA (GA)	DEC (SC)

Southeastern Regional
TRANSMISSION PLANNING

2018 Regional Transmission Analyses

Alternative Regional Transmission Projects



Regional Transmission Analyses Overview

- **No significantly constrained transmission facilities were identified in the assessment of the current regional transmission plan.**

- **No evaluated transmission project alternatives were found to be more efficient or cost effective.**
  - Estimated cost of transmission project alternatives significantly outweighed potential benefits.

- **The regional transmission analyses summary is posted on the SERTP website.**

SERTP

Miscellaneous Updates

Regional Planning Updates

- Version 3 SERTP Regional Models available on SERTP Website

- Exchanged the latest transmission models for the ten year planning horizon with FRCC
  - FRCC models will be incorporated into subsequent regional power flow models

Upcoming 2019 SERTP Process

- **SERTP 1st Quarter – *1st RPSG Meeting & Interactive Training Session***

  March 2019

  – Form Regional Planning Stakeholder Group "RPSG"
  – Select Economic Planning Studies
    - RPSG Economic Study Request Form
  – Interactive Training Session

- **SERTP 2nd Quarter – *Preliminary Expansion Plan Meeting***

  June 2019

  – Review Modeling Assumptions
  – Preliminary 10 Year Expansion Plan
  – Stakeholder Input & Feedback Regarding the Plan

Upcoming 2019 SERTP Process

- **SERTP 3rd Quarter – *2nd RPSG Meeting***

  September 2019
  - Preliminary Results of the Economic Studies
  - Stakeholder Input & Feedback Regarding the Study Results
  - Discuss Previous Stakeholder Input on the Expansion Plan

- **SERTP 4th Quarter – *Annual Transmission Planning Summit & Input Assumptions***

  December 2019
  - Final Results of the Economic Studies
  - Regional Transmission Plan
  - Regional Analyses
  - Stakeholder Input on the 2020 Transmission Model Input Assumptions

2018 SERTP

Questions?

www.southeasternrtp.com