BTU Texas A&M University System RELLIS Campus Reliability Project – ERCOT Independent Review Project Update

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RPG Meeting
July 29, 2025

Recap – Introduction

- Bryan Texas Utilities (BTU) submitted the Texas A&M University System RELLIS Campus Reliability Project for Regional Planning Group (RPG) review in January 2025
  - This Tier 1 project is estimated to cost $271.5 million and will require a Certificate of Convenience and Necessity (CCN) filing
  - Estimated in-service date (ISD) is May 2029
  - Addresses the thermal overloads and voltage violations due to proposed load additions in Brazos County in the East weather zone
- BTU provided an overview presentation and ERCOT provided the study scope at the March RPG Meeting
  - https://www.ercot.com/calendar/03182025-RPG-Meeting
- ERCOT provided status update at the April RPG Meeting
  - https://www.ercot.com/calendar/04292025-RPG-Meeting
- This project is currently under ERCOT Independent Review (EIR)

Recap – Study Assumptions

- Study Region
  - East Weather Zone, focusing on the transmission elements in the Brazos and surrounding counties
- Steady-State Base Case
  - Final 2024RTP_2030_SUM_12202024
- Transmission
  - See Appendix A for the list of transmission projects added
  - See Appendix B for the list of placeholder projects that were removed
- Generation
  - See Appendix C for the list of generation projects added
- Load
  - Loads were maintained to be consistent with 2024 RTP
  - Newly confirmed loads (377.97 MW in 2030) in the study area were already modelled in the 2024 RTP

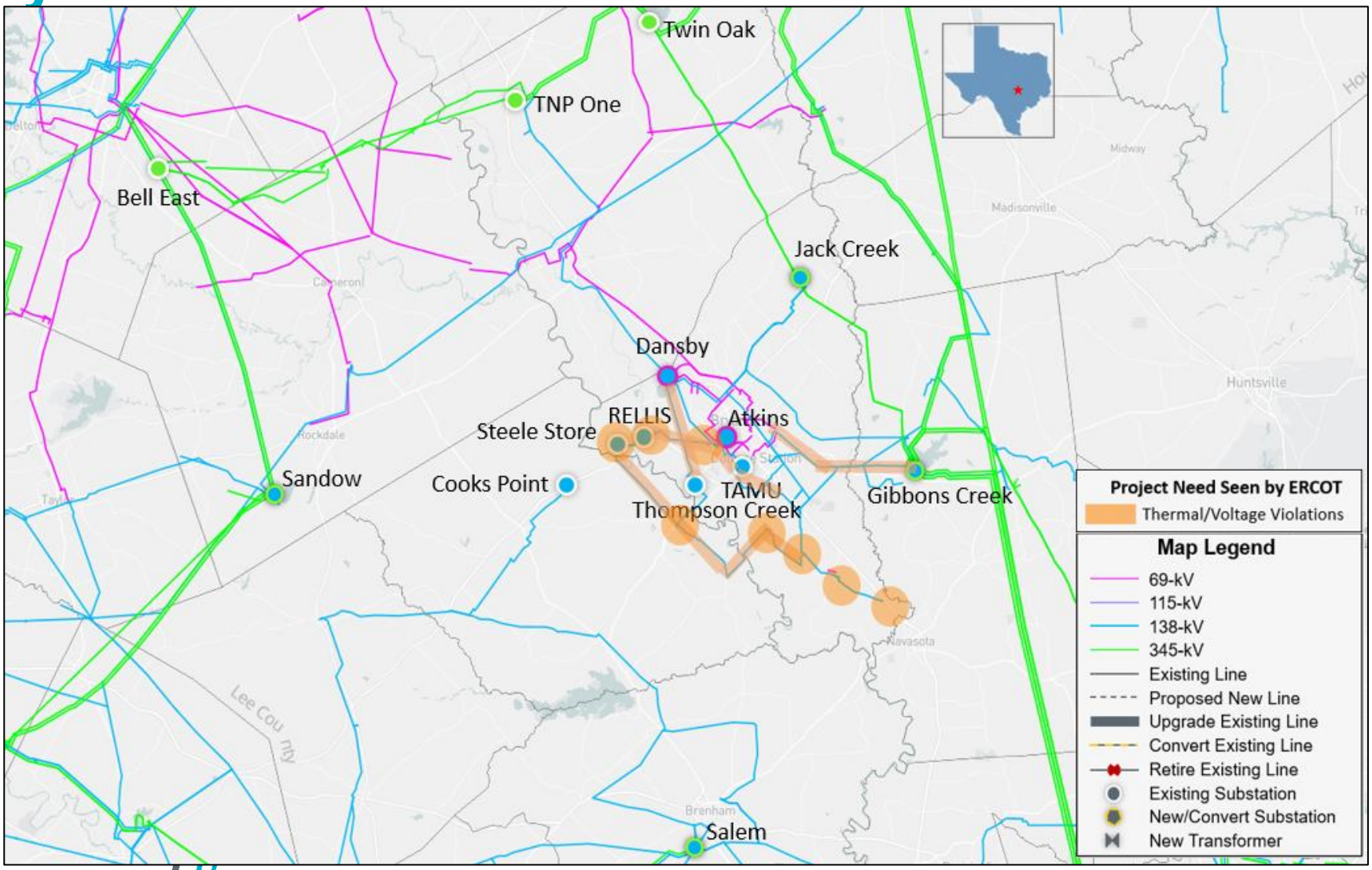
Recap – Preliminary Results of Reliability Assessment – Need Analysis

- ERCOT conducted steady-state load flow analysis for the study base case according to the NERC TPL-001-5.1 and ERCOT Planning Criteria

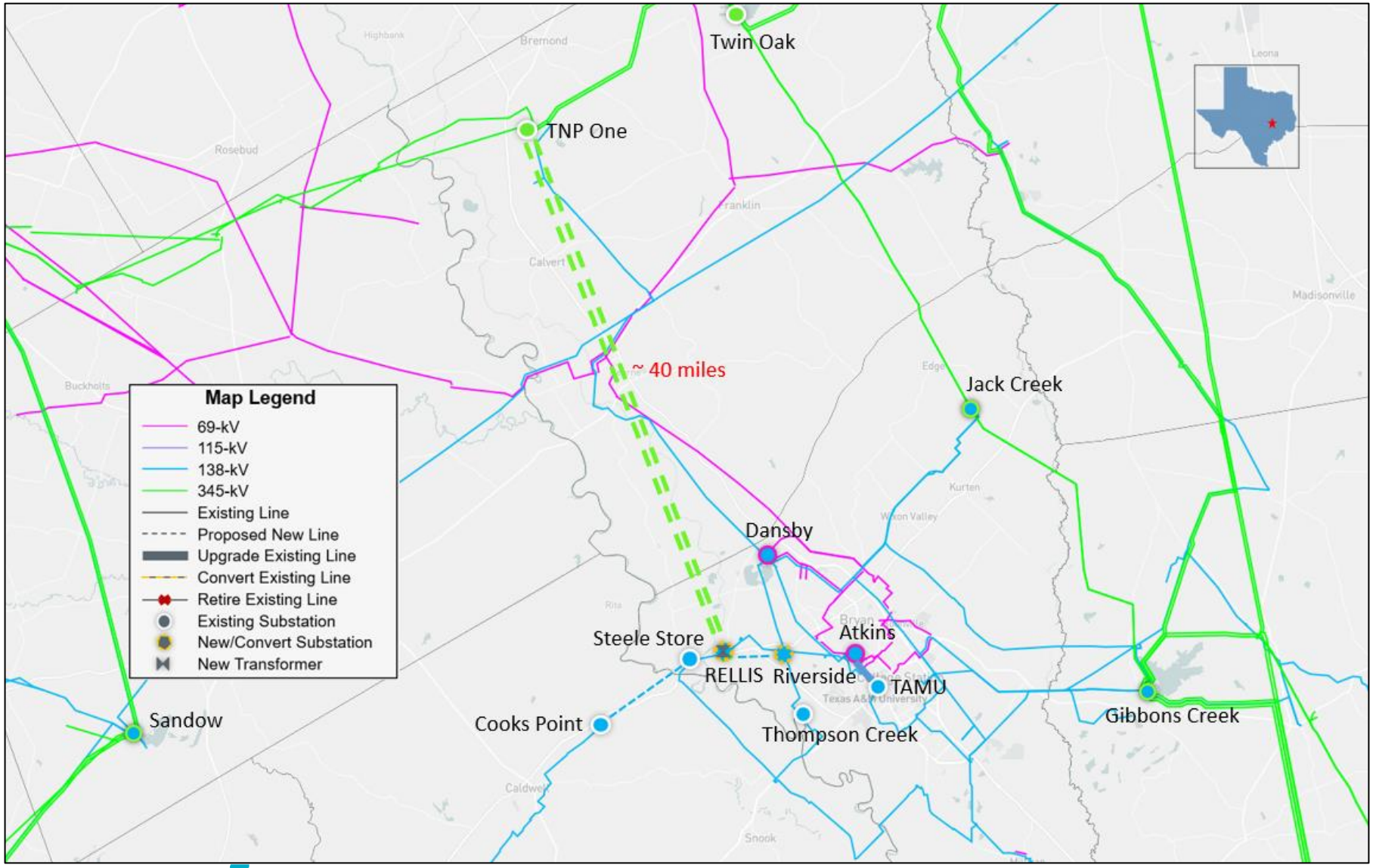
Contingency Category*	# of Unsolved Contingencies	# of Thermal Overloads	# of Bus Voltage Violations
N-0 (P0)	None	None	3
N-1 (P1, P2-1, P7)	None	11	12
G-1+N-1 (P3)*	None	3	None
X-1+N-1 (P6-2)**	None	1	None
Total	**None**	**15**	**15**

*G-1 Generator tested: Dansby Unit 1 and Frontier Combined Cycle Train
**X-1 Transformers tested: Jack Creek T1 and Gibbons Creek T2

Recap – Study Area Map with Project Need Seen by ERCOT



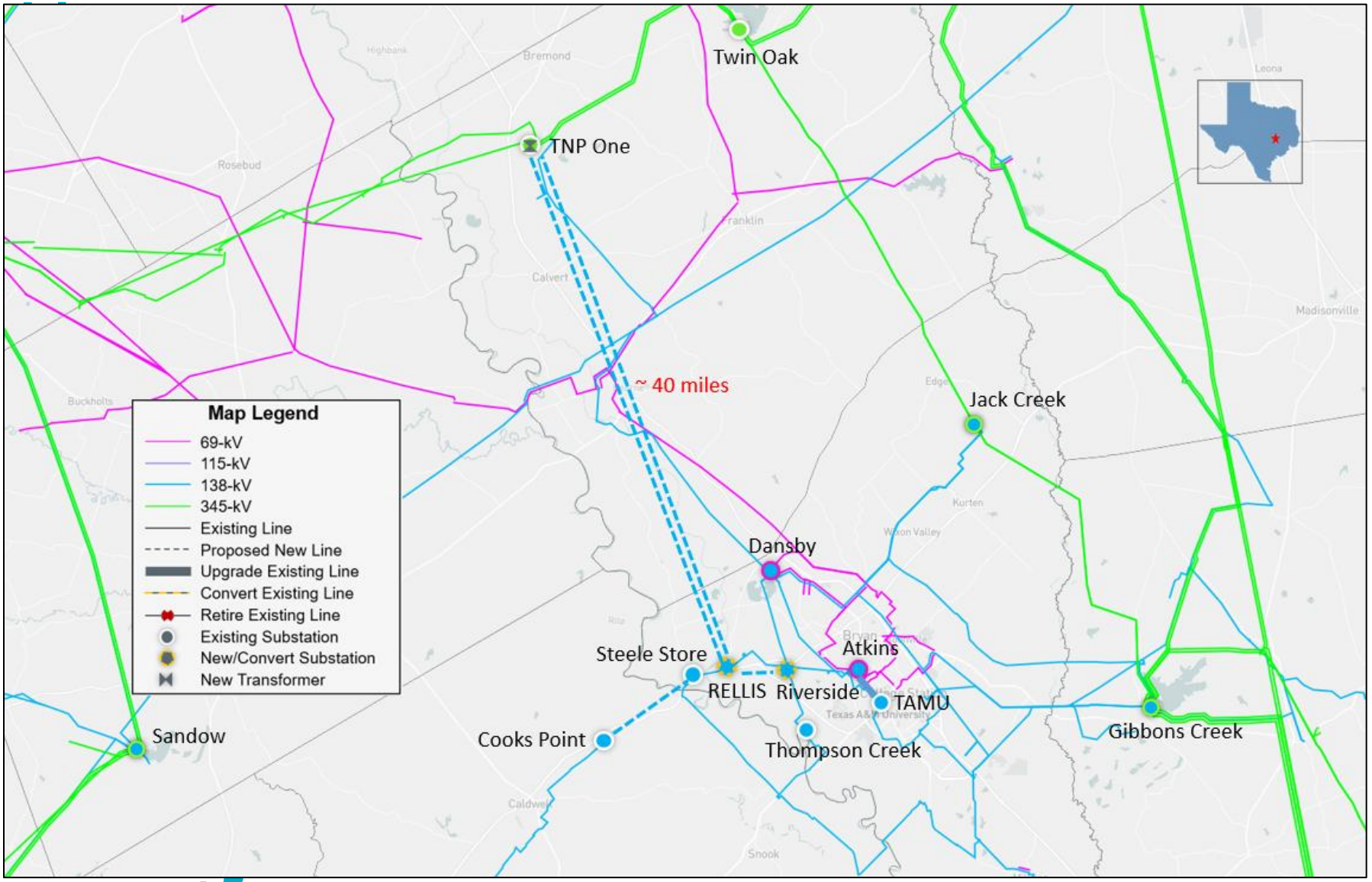
Recap – Option 1 (BTU Proposed Project)



Recap – Option 1 (BTU Proposed Project)

- Expand the existing RELLIS 138-kV substation to establish a new RELLIS 345/138-kV switchyard by installing four additional 138-kV breakers in the existing 138-kV ring bus and adding four 345-kV breakers in a ring bus configuration
  - Install two 345/138-kV autotransformers with normal and emergency rating of at least 600 MVA for each transformer
  - Install two capacitor banks (54 MVAr each) at RELLIS 138-kV substation
- Construct a new TNP One to RELLIS 345-kV double-circuit transmission line on double-circuit capable structures with both circuits in place with normal and emergency rating of at least 1765 MVA for each circuit, approximately 40 miles
- Construct a new Riverside 138-kV switching station by cutting into the existing Dansby to Thompson Creek 138-kV line using a 3-breaker ring bus configuration
- Construct a new RELLIS to Riverside 138-kV transmission line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 6.1 miles
- Construct a new Steele Store to Cooks Point 138-kV transmission line on single-circuit structures with normal and emergency rating of at least 440 MVA, approximately 7.2 miles
- Re-build the existing Atkins to TAMU 138-kV single-circuit line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 3.3 miles

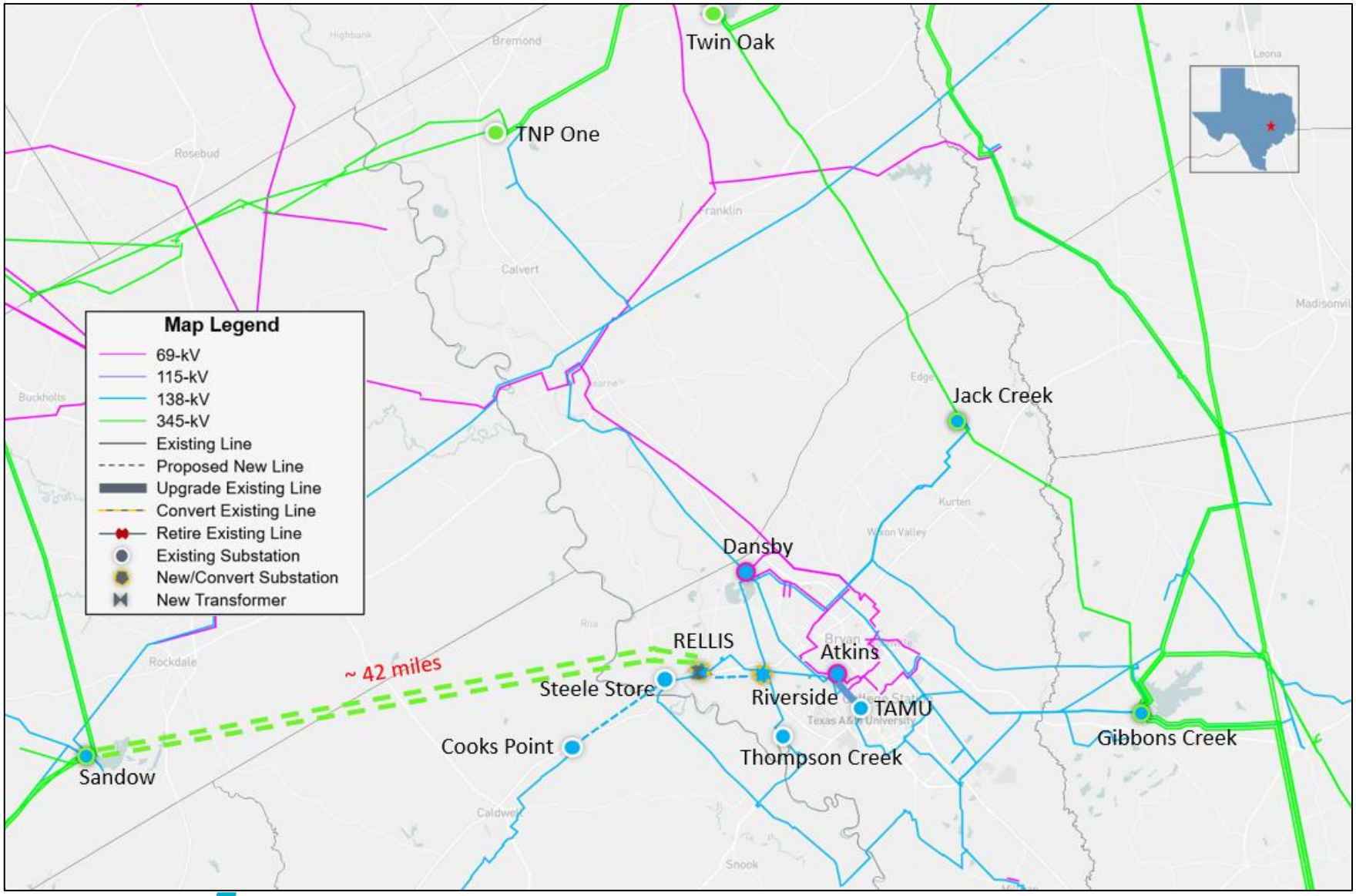
Recap – Option 2: TNP One to RELLIS 138-kV



Recap – Option 2: TNP One to RELLIS 138-kV

- Establish a new 138-kV switchyard at the existing TNP One 345-kV substation and include two 345/138-kV autotransformers with normal and emergency rating of at least 600 MVA for each transformer
- Construct a new TNP One to RELLIS 138-kV double-circuit transmission line on double-circuit capable structures with both circuits in place with normal and emergency rating of at least 495 MVA for each circuit, approximately 40 miles
- Install two capacitor banks (54 MVAr each) at RELLIS 138-kV substation
- Construct a new Riverside 138-kV switching station by cutting into the existing Dansby to Thompson Creek 138-kV line using a 3-breaker ring bus configuration
- Construct a new RELLIS to Riverside 138-kV transmission line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 6.1 miles
- Construct a new Steele Store to Cooks Point 138-kV transmission line on single-circuit structures with normal and emergency rating of at least 440 MVA, approximately 7.2 miles
- Re-build the existing Atkins to TAMU 138-kV single-circuit line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 3.3 miles

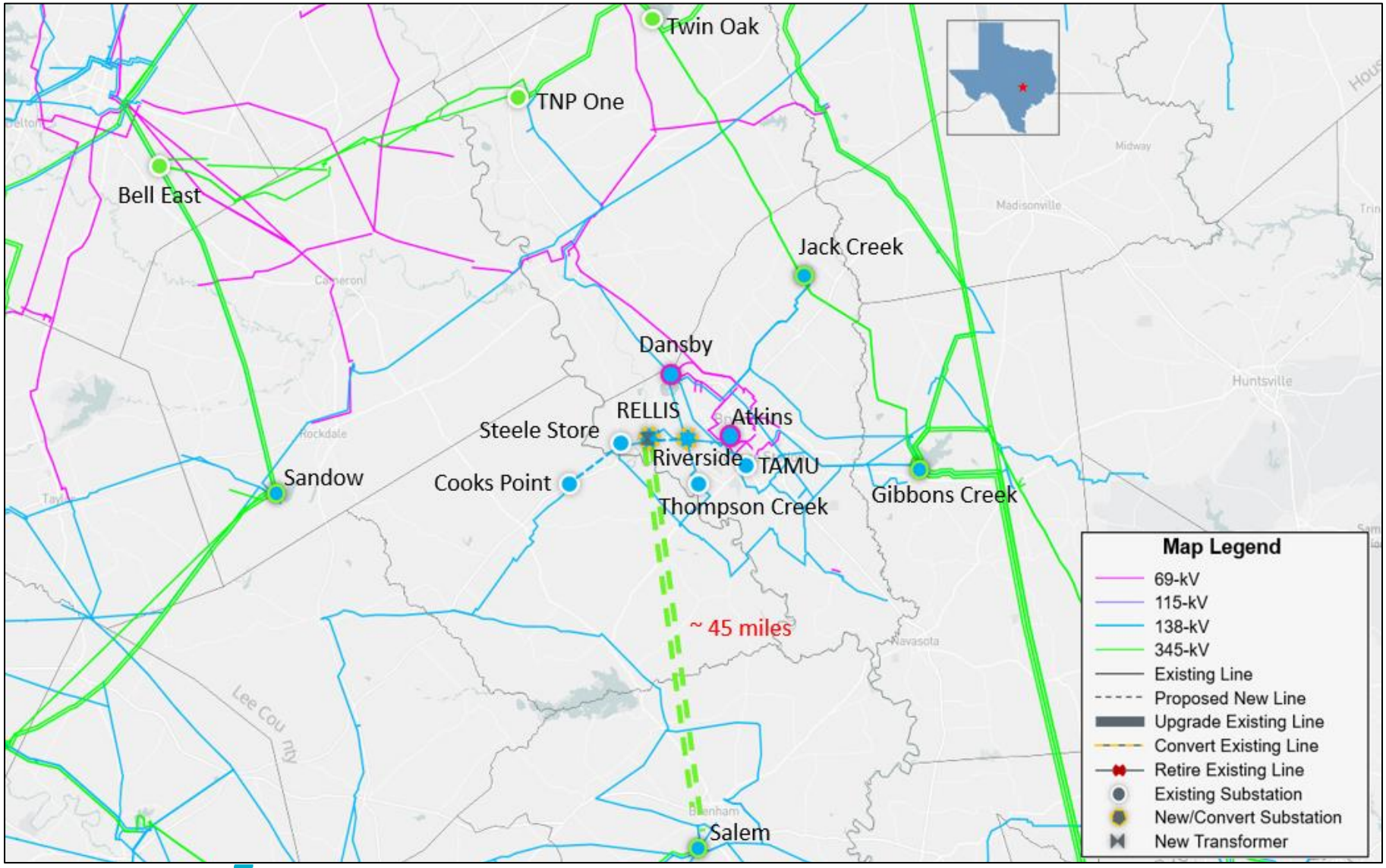
Recap – Option 3: Sandow to RELLIS 345-kV



Recap – Option 3: Sandow to RELLIS 345-kV

- Expand the existing RELLIS 138-kV substation to establish a new RELLIS 345/138-kV switchyard by installing four additional 138-kV breakers in the existing 138-kV ring bus and adding four 345-kV breakers in a ring bus configuration
  - Install two 345/138-kV autotransformers with normal and emergency rating of at least 600 MVA for each transformer
  - Install two capacitor banks (54 MVAr each) at RELLIS 138-kV substation
- Construct a new Sandow to RELLIS 345-kV double-circuit transmission line on double-circuit capable structures with both circuits in place with normal and emergency rating of at least 1765 MVA for each circuit, approximately 42 miles
- Construct a new Riverside 138-kV switching station by cutting into the existing Dansby to Thompson Creek 138-kV line using a 3-breaker ring bus configuration
- Construct a new RELLIS to Riverside 138-kV transmission line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 6.1 miles
- Construct a new Steele Store to Cooks Point 138-kV transmission line on single-circuit structures with normal and emergency rating of at least 440 MVA, approximately 7.2 miles
- Re-build the existing Atkins to TAMU 138-kV single-circuit line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 3.3 miles

Recap – Option 4: Salem to RELLIS 345-kV



Recap – Option 4: Salem to RELLIS 345-kV

- Expand the existing RELLIS 138-kV substation to establish a new RELLIS 345/138-kV switchyard by installing four additional 138-kV breakers in the existing 138-kV ring bus and adding four 345-kV breakers in a ring bus configuration
  - Install two 345/138-kV autotransformers with normal and emergency rating of at least 600 MVA for each transformer
  - Install two capacitor banks (54 MVAr each) at RELLIS 138-kV substation
- Construct a new Salem to RELLIS 345-kV double-circuit transmission line on double-circuit capable structures with both circuits in place with normal and emergency rating of at least 1765 MVA for each circuit, approximately 45 miles
- Construct a new Riverside 138-kV switching station by cutting into the existing Dansby to Thompson Creek 138-kV line using a 3-breaker ring bus configuration
- Construct a new RELLIS to Riverside 138-kV transmission line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 6.1 miles
- Construct a new Steele Store to Cooks Point 138-kV transmission line on single-circuit structures with normal and emergency rating of at least 440 MVA, approximately 7.2 miles
- Re-build the existing Atkins to TAMU 138-kV single-circuit line on double-circuit capable structures with one circuit in place with normal and emergency rating of at least 495 MVA, approximately 3.3 miles

Recap – Preliminary Results of Reliability Assessment – Options

	N-1		G-1*+N-1		X-1**+N-1	
	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations
Option 1	None	None	None	None	None	None
Option 2	None	None	None	None	None	None
Option 3	5	None	3	None	1	None
Option 4	None	None	None	None	None	None

*G-1 Generator tested: Dansby Unit 1 and Frontier Combined Cycle Train
**X-1 Transformers tested: Jack Creek T1 and Gibbons Creek T2

- Option 1, Option 2, and Option 4 were short-listed for further evaluations

Recap – Planned Maintenance Outage Scenario Analysis

- ERCOT conducted planned maintenance outage analysis on three short-listed options to compare relative performance of the options
  - The final 2024 RTP 2030 maintenance outage case was updated reflecting the transmission and generation updates to perform this analysis
  - Based on the review of system topology of the area, ERCOT tested N-2 contingency combinations, and then tested all applicable contingency violations with system adjustments (N-1-1)
- Preliminary results of planned maintenance outage analysis

Option	Unsolved Power Flow	Thermal Overloads	Voltage Violations
1	None	None	None
2	None	None	None
4	None	None	None

Long-Term Load-Serving Capability Assessment

- Assumptions
  - Adjusted load up in the study area (Brazos County and nearby area), excluding Flexible Loads in the area
  - Adjusted conforming load down outside of the East Weather Zone and nearby area to balance power
  - Based on N-1 contingency
- Preliminary Findings

Option	Incremental Load-Serving Capability (~MW)
1	456
2	281
4	201

Comparison of Short-Listed Options

	Option 1	Option 2	Option 4
Meets ERCOT and NERC Reliability Criteria	Yes	Yes	Yes
Improves Long-Term Load-Serving Capability	Yes (Better)	Yes	Yes
Requires CCN (miles)	~ 46	~ 46	~ 51
Expected ISD	May 2029 October 2029	May 2029 October 2029	May 2029 September 2030
Cost Estimate* ($M)	~ 281.2	~ 199.5	~ 293.5
Feasible	Yes	Yes	Yes

* Cost estimates were provided by Transmission Service Providers (TSPs)

- Option 1 better improves long-term load-serving capability and better facilities transmission expansion for future load growth in the area
- Option 2 is the least cost option
- Option 1 and Option 2 were selected for additional sensitivity analyses

Additional Sensitivity Analyses

- Impact of Gen Hub
  - Removed the gen hubs near the study area
  - No negative impact for Option 1 and Option 2
- Impact of Permian Basin Reliability Plan 765-kV import paths
  - Modelled the Permian Basin Reliability Plan 765-kV import paths that PUCT recently approved
  - No negative impact for Option 1 and Option 2

Additional Sensitivity Analyses (cont.)

- Economic Study
  - Economic study was performed for the Option 1 and Option 2 using the 2024 RTP 2029 economic case
  - The production cost saving for Option 1 is about $4 million when compared to the Option 2 under base case scenario as well as maintenance outage scenario. Option 1 (about $82 million more than the project cost for Option 2) is not economically justifiable under either Production Cost Savings test or Congestion Cost Savings test

	Production Cost Savings ($M)	Congestion Cost Savings ($M)	Production Cost Savings with Outages ($M)	Congestion Cost Savings with Outages ($M)
Option 1	3.5	0.7	4.0	1.6
Option 2*	0	0	0	0

* Option 2 is used as a reference case to compare the cost difference in this table

  - Both Option 1 and Option 2 did not result in significant new congestion within the study area

Additional Sensitivity Analyses (cont.)

- Impact of potential new large load confirmed by TSP Officer Letter
  - Modelled the 1000 MW of large load in the study area confirmed by TSP officer letter provided to ERCOT in May 2025
  - No reliability violations under summer peak condition for both Options 1 and 2
  - Both options have reliability violations under N-1-1 maintenance outage conditions. Option 1 has less unsolvable contingencies than Option 2

	N-1-1 Thermal Overloads	N-1-1 Voltage Violations	N-1-1 Unsolvable Contingencies
Option 1	3	0	2
Option 2	4	0	12

  - Additional transmission will be needed to address the reliability violations under maintenance outage condition

Additional Sensitivity Analyses (cont.)

- Impact of potential new large load with formal Interconnection Request
  - Modelled the 1200 MW of large load with formal interconnection request in the study area provided by TSP in June 2025
  - Lots of reliability violations for both Option 1 and Option 2 under N-1 contingency condition

	N-0 Thermal Overloads	N-1 Thermal Overloads	N-1 Unsolvable Contingencies
Option 1	0	8	1
Option 2	10	25	4

  - Additional transmission will be needed to serve this load when it is materialized. Option 1 will better facilitate future transmission expansion in the area
  - Preliminary study showed that Option 2 would cost at least more than $100 million than Option 1 to meet the reliability needs under N-0 and N-1 contingency condition

Further Comparison of Option 1 and Option 2

	Option 1	Option 2
Meets ERCOT and NERC Reliability Criteria	Yes	Yes
Improves Long-Term Load-Serving Capability	Yes (Better)	Yes
Requires CCN (miles)	~ 46	~ 46
Expected ISD	May 2029 October 2029	May 2029 October 2029
Cost Estimate* ($M)	~ 281.2	~ 199.5
Feasible	Yes	Yes
Economic Benefit	Better	N/A
Facilitates Transmission Expansion for Future New Large Loads	Yes	No

* Cost estimates were provided by Transmission Service Providers (TSPs)

- Option 1 better improves long-term load-serving capability and better facilities transmission expansion for future load growth in the area
- Option 2 is the least cost option

Preferred Option

- Option 1 was selected as the ERCOT preferred option because it
  - Addresses the project need in the study area
  - Improves long-term load-serving capability for future load growth in the area
  - Better facilitates the future transmission expansion in the area
  - Requires the least amount of CCN mileage

Generation Addition and Load Scaling Sensitivity Analyses

- Generation Addition Sensitivity Analysis
  - Per Planning Guide Section 3.1.3(4)(a), ERCOT performed a generation addition sensitivity by adding the new generation listed in Appendix D to the preferred option case. The additional resources were modeled following the 2024 RTP methodology. ERCOT determined relevant generators do not impact the preferred option
- Load Scaling Sensitivity Analysis
  - Planning Guide Section 3.1.3(4)(b) requires an evaluation of the potential impact of load scaling on the criteria violations seen in this EIR. Starting 2024, ERCOT RTP adopted a new methodology of having one summer peak case for each study year with non-coincident peaks for each of the Weather Zones, which would eliminate the load scaling impact. The study case did not include load scaling as such load scaling sensitivity analysis is no longer needed

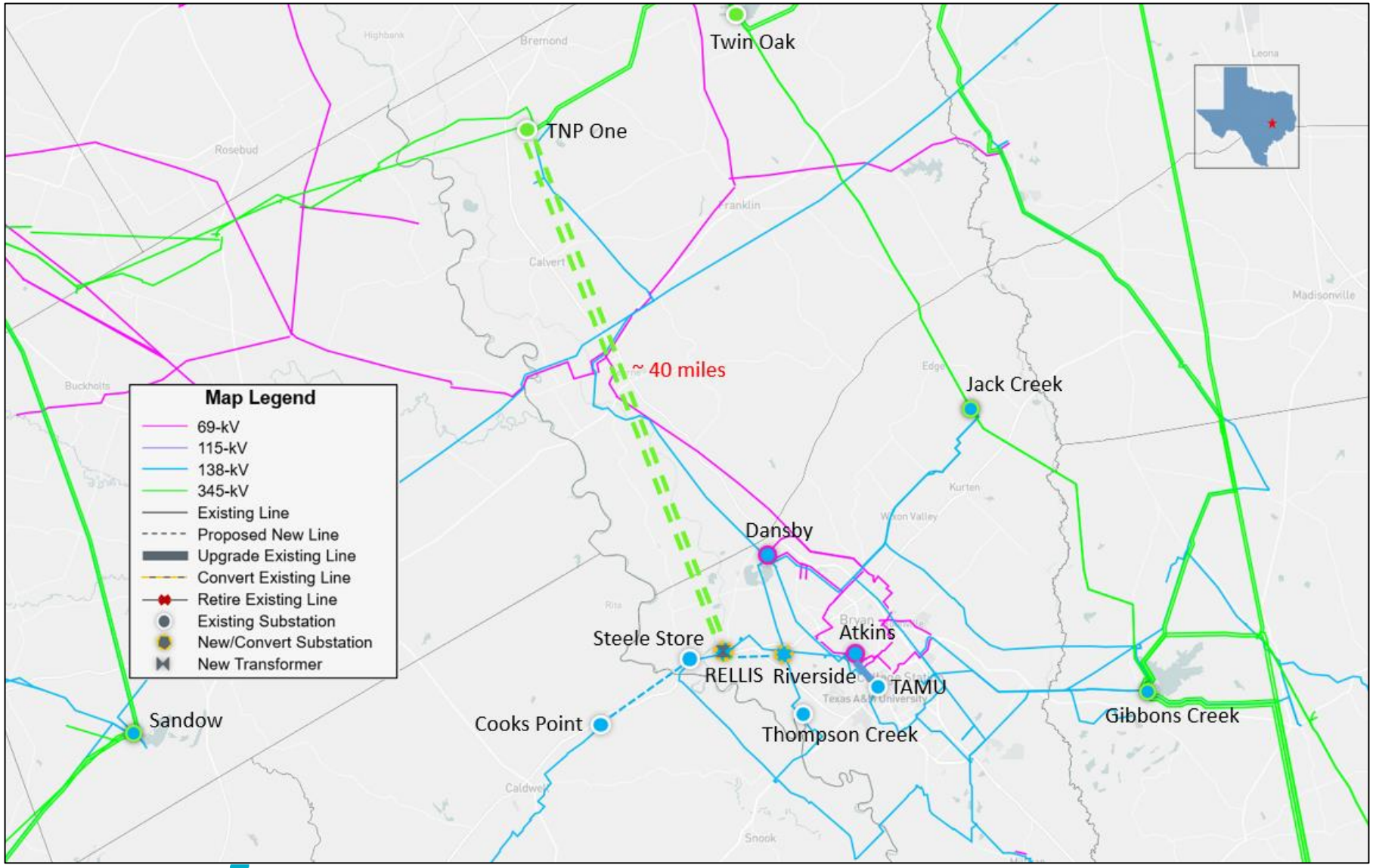
Subsynchronous Resonance (SSR) Assessment

- Subsynchronous Resonance (SSR) Assessment
  - Subsynchronous Resonance (SSR) Assessment was conducted for the preferred option per Nodal Protocol Section 3.22.1.3
  - ERCOT found no adverse SSR impacts to the existing and planned generation resources at the time of this study

ERCOT Recommendation

- ERCOT recommends Option 1
  - Estimated Cost: approximately $281.2 million
  - Expected ISD: May 2029 to October 2029
    - The expected ISD is tentative and are subject to change based on requirements for various approvals, ROW acquisition, and/or construction progress
  - CCN filling will be required to
    - Construct the new 345-kV double-circuit line from TNP One to RELLIS, requiring approximately 40-mile new ROW; Construct the new 138-kV single-circuit transmission line from Steele Store to Cooks Point, approximately 7.2 miles, with 5.7 miles on new single-circuit structures, requiring approximately 5.7-mile new ROW

Map of ERCOT Recommended Option



ERCOT Recommended Option

- Expand the existing RELLIS 138-kV substation to establish a new RELLIS 345/138-kV switchyard by installing four additional 138-kV breakers in the existing 138-kV ring bus and adding four 345-kV breakers in a ring bus configuration
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Next Steps and Tentative Timeline

- Tentative timeline
  - EIR report to be posted in the MIS in August 2025
  - EIR recommendation to TAC in August 2025
  - Seek ERCOT Board of Directors endorsement in September 2025

Thank you!

Stakeholder comments also welcomed through:

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Appendix A – Transmission Projects

- List of transmission projects to be added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	From County
87395	LCRATSC_Caldwell_Substation_Addition	Tier 4	May-25	Burleson
80404	Reroute East to Rodgers 69kV line to create East to Rayburn 69kV line to accommodate the TXDOT SH6 project	Tier 4	Jun-26	Brazos
80424	Rebuild / Reconductor Dansby to Business Park 69kV for Rail Spur	Tier 4	Jun-26	Brazos
78175	BEPC_27TPIT78175_Franklin_Capacitor	Tier 4	Oct-26	Robertson
80342	BEPC_TPIT80342_HILLTOPLAKES_SECONDAUTO	Tier 4	Mar-27	Leon
80340	BEPC_TPIT80340_KEITHSW_IOLA	Tier 4	Mar-27	Grimes
80346	BEPC_TPIT80346_SANDYSW_CRUTCHFIELD	Tier 4	Mar-29	Grimes
80373	BEPC_TPIT80373_IOLA_CRUTCHFIELD	Tier 4	Mar-29	Grimes

Appendix B – Transmission Projects

- List of transmission projects to be removed from the study base case

RTP Project ID	Project Name	County
2024-E4	Bryan Area Project	Brazos, Burleson, Robertson

Appendix C – New Generation Projects to Add

GINR	Project Name	Fuel	Projected COD	Capacity (~MW)	County
21INR0359	Hickerson Solar	SOL	03/01/2026	316.3	Bosque
22INR0525	St. Gall II Energy Storage	OTH	07/01/2025	100.2	Pecos
23INR0372	Cross Trails Storage	OTH	05/26/2025	58.3	Scurry
24INR0493	Crowned Heron BESS 2	OTH	07/31/2025	154.2	Fort Bend
24INR0578	Panther Creek 1 Repower	WIN	04/01/2025	11.0	Glasscock
24INR0582	Panther Creek 2 Repower	WIN	04/01/2025	8.0	Glasscock
24INR0631	Radian Storage SLF	OTH	04/22/2025	160.3	Brown
25INR0231	Apache Hill BESS	OTH	11/15/2026	200.9	Hood
25INR0578	Forest Creek Wind Repower	WIN	12/15/2025	125.1	Glasscock
25INR0672	Fagus Solar Park 2 SLF	SOL	02/11/2026	166.6	Childress
26INR0524	Fagus Solar Park 3 SLF	SOL	04/01/2026	186.8	Childress
20INR0162	Diamondback solar	SOL	12/31/2027	203.8	Starr
22INR0239	Rockefeller Storage	OTH	06/01/2027	206.8	Schleicher
22INR0437	TORMES SOLAR	SOL	03/31/2027	382.1	Navarro
22INR0457	Anson BAT	OTH	05/29/2026	150.6	Jones
23INR0181	Starling Storage	OTH	05/15/2027	63.6	Gonzales
23INR0244	Tiger Solar	SOL	06/30/2027	255.0	Jones
24INR0126	High Noon Storage	OTH	12/01/2027	94.0	Hill
24INR0188	Tehuacana Creek Solar SLF	SOL	03/10/2027	505.5	Navarro
24INR0189	Tehuacana Creek BESS SLF	OTH	03/10/2027	419.0	Navarro

Appendix C – New Generation Projects to Add (cont.)

GINR	Project Name	Fuel	Projected COD	Capacity (~MW)	County
24INR0201	Short Creek Solar	SOL	03/02/2029	625.0	Wichita
24INR0305	MRG Goody Storage	OTH	01/31/2026	52.3	Lamar
24INR0355	Anatole Renewable Energy Storage	OTH	01/11/2026	207.8	Henderson
24INR0364	Pitts Dudik II	SOL	01/29/2026	30.2	Hill
24INR0386	Black & Gold Energy Storage	OTH	06/30/2027	254.6	Menard
24INR0498	Fort Watt Storage	OTH	04/20/2027	205.4	Tarrant
24INR0528	Blanquilla BESS	OTH	05/15/2026	200.8	Nueces
24INR0584	Houston IV BESS	OTH	06/03/2026	168.6	Harris
25INR0018	Yellow Cat Wind	WIN	09/30/2026	301.2	Navarro
25INR0046	Blue Skies BESS	OTH	12/31/2027	306.3	Hill
25INR0103	Elio BESS	OTH	12/02/2026	317.2	Brazoria
25INR0282	Hornet Solar II SLF	SOL	06/01/2026	209.0	Swisher
25INR0283	Hornet Storage II SLF	OTH	06/01/2026	208.0	Swisher
25INR0319	Northington Solar	SOL	07/15/2027	129.8	Wharton
25INR0391	Purple Sage BESS 1	OTH	05/30/2027	156.0	Collin
25INR0392	Purple Sage BESS 2	OTH	05/30/2027	156.0	Collin
25INR0425	Aldrin 345 BESS	OTH	12/01/2027	362.0	Brazoria
25INR0492	Blue Summit Energy Storage	OTH	07/01/2026	100.0	Wilbarger
26INR0034	Bracero Pecan Storage	OTH	06/01/2026	232.0	Reeves
26INR0189	Skipjack Energy Storage	OTH	04/05/2027	150.6	Brazoria

Appendix C – New Generation Projects to Add (cont.)

GINR	Project Name	Fuel	Projected COD	Capacity (~MW)	County
26INR0226	First Capitol BESS	OTH	05/01/2026	257.5	Brazoria
26INR0269	Moccasin Solar	SOL	06/01/2027	806.8	Stonewall
26INR0296	Sherbino II BESS SLF	OTH	02/08/2026	77.4	Pecos
26INR0333	VERTUS ENERGY STORAGE	OTH	02/01/2026	401.4	Galveston
26INR0447	Honey Mesquite Wind Farm	WIN	12/15/2026	180.5	Glasscock
26INR0452	Cannibal Draw Solar	SOL	04/10/2028	149.5	Glasscock
26INR0453	Cannibal Draw Storage	OTH	04/10/2028	98.6	Glasscock
26INR0543	Three Canes Solar SLF	SOL	12/31/2026	333.0	Navarro

Appendix D – List of Units for Generation Addition Sensitivity Analysis

GINR	Project Name	Fuel	Projected COD	Max Capacity (~MW)	County
22INR0605	Camino Santiago Solar	SOL	02/18/2027	196.3	Milam
23INR0502	Adelite Storage	OTH	06/30/2026	231.9	Milam
24INR0422	Hollow Branch Creek Solar	SOL	12/31/2027	460.0	Leon
25INR0230	Great Rock BESS	OTH	12/20/2026	300.9	Leon
25INR0382	Happy Dog Solar	SOL	09/14/2026	85.5	Milam
25INR0442	Happy Dog Storage	OTH	09/14/2026	104.5	Milam
26INR0431	Big Rooter West Solar SLF	SOL	07/01/2027	403.4	Robertson
22INR0504	Barton Branch IA	OTH	03/01/2026	203.6	Robertson
24INR0476	DOS RIOS ENERGY STORAGE SLF	OTH	03/15/2027	164.5	Milam
29INR0017	Big Rooter East Solar SLF	SOL	12/31/2028	554.9	Robertson
29INR0018	Big Rooter East Storage SLF	OTH	12/31/2028	553.7	Robertson