Rio Medina Project

ERCOT Regional Planning Group Proposal

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TRANSMISSION PLANNING

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Executive Summary

South Texas Electric Cooperative, Inc. (STEC) proposes to construct a 138 kV line from STEC's Castroville substation to a new station named the Rio Medina station to serve a 129 MW load and to construct a 138 kV line from the new Rio Medina substation to the CPS Energy's transmission system. The total length of 138 kV line proposed is approximately 13 miles. The 138 kV transmission line will be constructed double circuit capable with two (2) conductor bundled 795 MCM ACSR. One circuit will be installed initially with a normal rating of 427MVA and an emergency rating of 474MVA. The 138 kV lines are expected to be in service

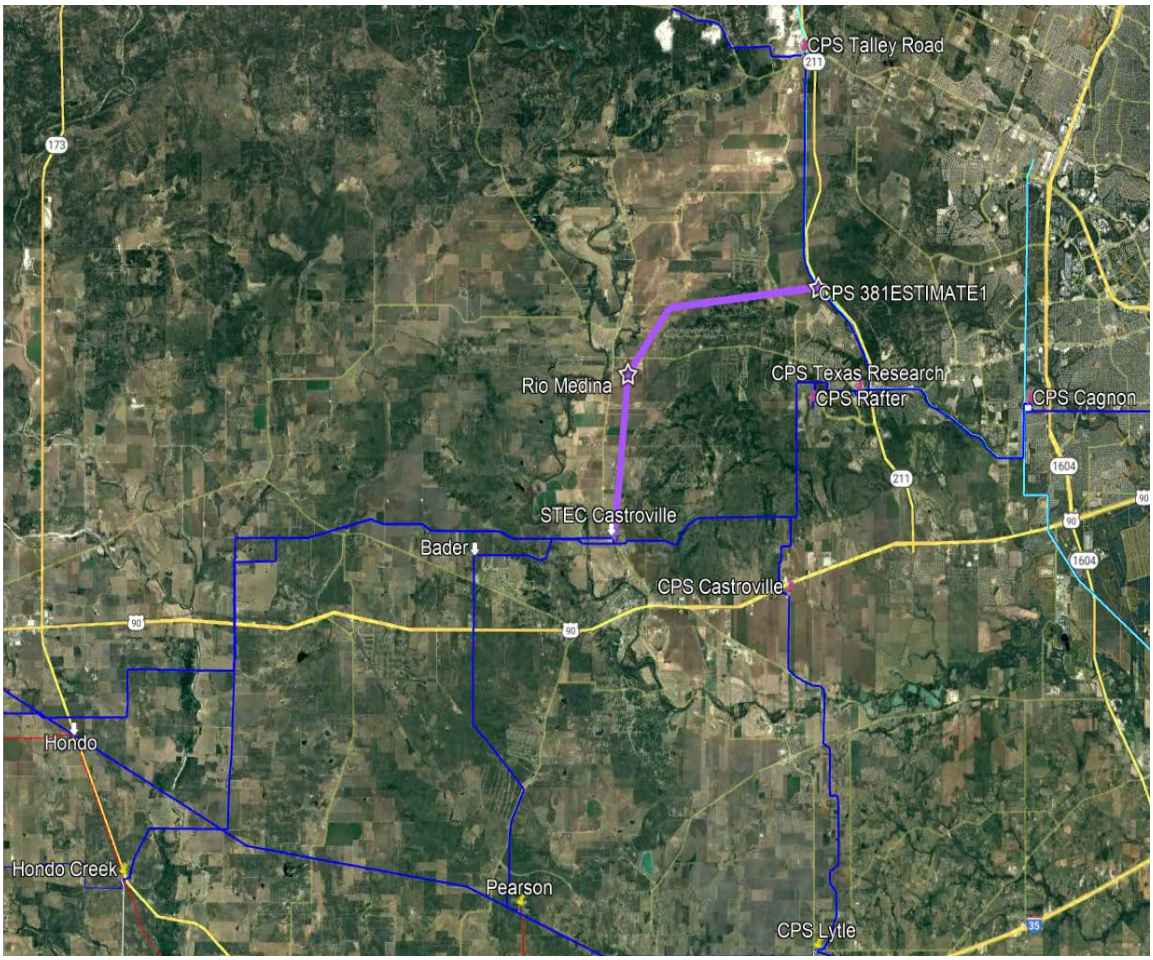

Figure 1: Aerial of proposed project

in January 2027.

The components of the proposed project include:

- A 138 kV terminal added to STEC's Castroville substation breaker and a half bus.

- 5 to 7 miles of 138 kV line from STEC's Castroville substation to a new Rio Medina substation. New Rio Medina substation which includes a 5-terminal 138 kV switching station and delivery point transformers.
- 6 to 7 miles of 138 kV line from the Rio Medina substation to a new CPS-owned station referred to as "381ESTIMATE1". New 3-terminal CPS switching station connected to the CPS 138 kV circuit between the Talley Road and Texas Research substations.

The proposed project is a Tier 2 project. The total estimated cost is $38 million and will require the approval of a CCN application.

Introduction

Medina Electric Cooperative has engaged to serve a 129 MW data center load located adjacent to the proposed Rio Medina station. Rio Medina will be a 138 kV connected station with three transformers stepping the voltage down to 34.5 kV to serve the load.

STEC is in the process of upgrading the Pearson to Hondo Creek 69 kV line to 138 kV, a project proposed in 22RPG022. Once completed, STEC's Castroville substation will be the closest 138 kV station to the Rio Medina load. The rebuild of the Castroville substation is already underway to accommodate service to the data center's initial load through distribution.

Also affecting the area transmission grid are two other data center loads that are planned in the immediate vicinity that are expected to be at or near the same loading. STEC has studied a 129 MW data center load that will connect to the 138 kV line between the Pearson and Bader stations. Medina Electric Cooperative has requested a substation named Dunlay to support this data center load. The Dunlay load was included in the base cases used in this study of the Rio Medina load. Another 129 MW data center load was proposed in a location that would connect it to the proposed line between the Rio Medina to CPS 381ESTIMATE1 station.

The proposed project focuses on service to the Rio Medina data center load but also accommodates the services to the two additional data centers mentioned above.

Description of Proposed Solution

The new Rio Medina load is located approximately 3.5 miles straight distance north of STEC's Castroville substation and approximately 5 miles straight line distance from CPS's double circuit line that supports the 138 kV circuit connecting the Talley Road to Texas Research substations as well as the 345 kV circuit from Howard Road to Kimble.

Routing considerations are expected to result in a 5 to 7 mile line length between STEC's Castroville substation and the Rio Medina substation. The Rio Medina load and the other loads in the area under study support the construction of a 138 kV line with a normal rating of 427MVA and an emergency rating of 474 MVA. To provide that capacity, a bundle of two 795 MCM ACSR per phase is required. The same construction is proposed for the new line

connecting the Rio Medina to the new CPS-owned station 381ESTIMATE1 that is proposed to be connected to the Talley Road to Texas Research 138 kV circuit. Routing considerations and potential changes necessary for the CPS station location are expected to result in a line that is 6 to 7 miles long.

Station work of the proposed scope of improvements includes the following:

- STEC Castroville: Addition of a 138 kV terminal. The station is presently under construction and will have seven 138 kV terminals.
- Rio Medina station: A 5-terminal, 138 kV breaker and a half bus arrangement including two line terminals and three transformer terminals.
- CPS 381ESTIMATE1 station: A 3-terminal 138 kV ring bus arrangement.

The estimated cost of the proposed transmission improvements is $38 million. Because the PUCT's approval of a CCN application is required, the project meets the Tier 2 criteria.

The estimated completion of the project is January 2027. The initial Rio Medina substation load is scheduled to be connected in 2024 and ramp up to the study load by 2027.

The buses and branches of the proposed improvement assuming completion of the Pearson to Hondo Creek line upgrade to 138 kV are as shown in Figure 3.

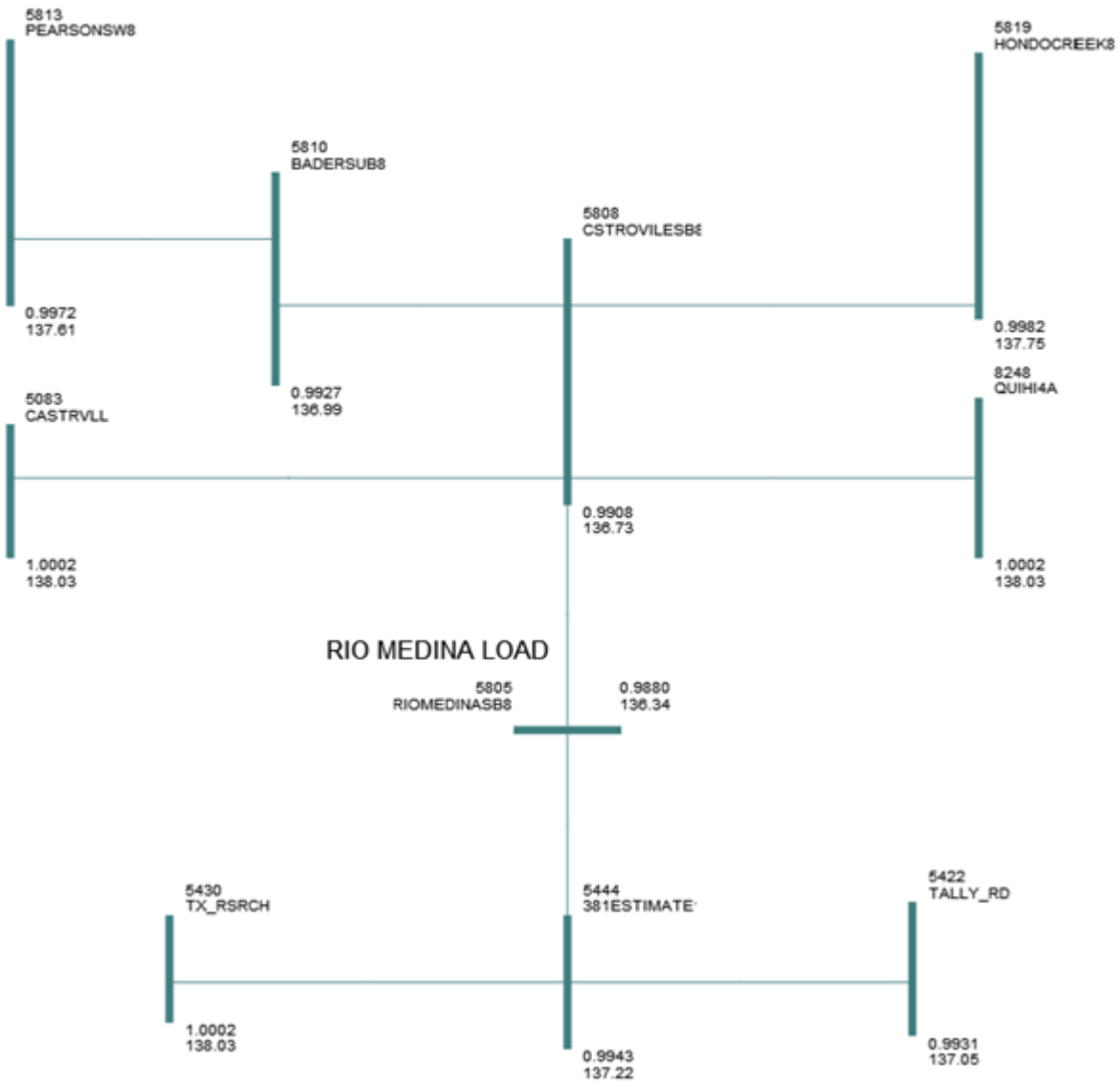

Figure 3

Study Assumptions and Methodology

The following study assumptions and data were used in the studies performed.

Study Cases

The following SSWG and SPWG base cases were used for the studies.

- 21SSWG_2025_SUM1_FINAL_06232021
- 21SSWG_2026_SUM1_FINAL_06232021
- 21SSWG_2027_SUM1_FINAL_06232021

- 21SSWG_2028_SUM1_FINAL_06232021
- 21SSWG_2027_SUM1_U2_02242022 (Dunlay & Rio Medina)
- 21SSWG_2028_SUM1_U2_02242022 (Dunlay & Rio Medina)
- DWG_FS_2020_21_Final_V1 (Rio Medina)
- DWG_FS_2021_22_Final_Pass (Dunlay & Rio Medina)
- 22_SPWG_2027_FY_06302022

Study Area

The Study Area was defined as the transmission system and generation in the following counties: Medina, Real, Bandera, Kerr, Gillespie, Kendall, Comal, Bexar, Guadalupe, Wilson, Atascosa, Frio, Zavala, and Uvalde, as depicted in Figure 4.

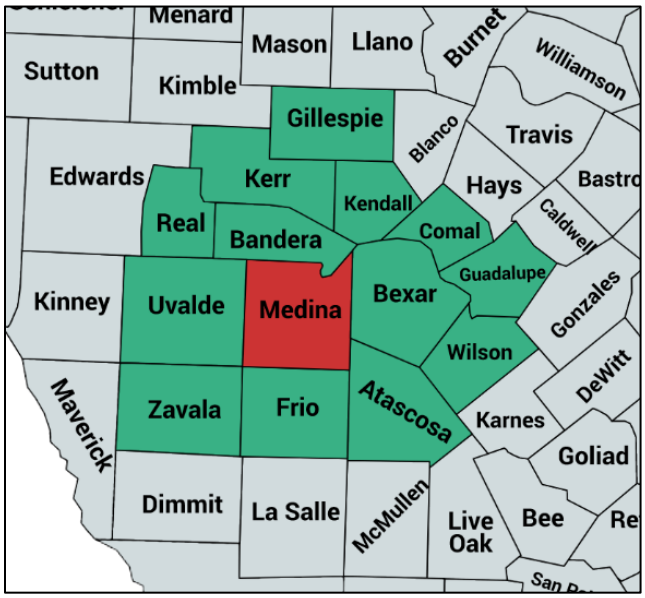

Figure 4 - Study Area

Contingencies

The following contingency categories in and around the study area were studied:

- Normal system condition (P0)
- N-1 conditions (P1, P2.1, P7/ERCOT1)
- Bus Fault, Internal Breaker Fault, Breaker Failure, and Relay Failure conditions (P2.2, P2.3, P4, and P5)
- N-G-1 (P3) conditions (G-1 + N-1)
- ERCOT2 (G-1 + ERCOT1)
- N-A-1 (ERCOT3) conditions (A-1 + N-1/ERCOT1)
- N-1-1 conditions (P6)

Study Criteria

Thermal

- The N-0 loading of transmission elements should be less than 100% of Rate A.
- The post-contingency loading of transmission elements should be less than 100% of Rate B.

Voltage

- Monitored all buses 69 kV and above in the study area.
- Under N-0 the bus voltages should be between 0.95 p.u. and 1.05 p.u.
- Under post-contingency conditions, the bus voltages should be between the following ranges:
    - AEP stations: 0.92 p.u. and 1.05 p.u.
    - STEC stations: 0.90 p.u. and 1.05 p.u.
    - LCRA stations: 0.92 p.u. and 1.05 p.u.
    - CPS stations:
        - For P1 contingencies: 0.95 and 1.05 p.u.
        - For P2, P7, and ERCOT1 contingencies: 0.92 p.u. and 1.05 p.u.
        - For P4, P5, P6, ERCOT2, and ERCOT3 contingencies: 0.90 p.u. and 1.05 p.u.
- Bus voltages shall not deviate beyond 8% on non-radial load buses.

Base Case Modifications

The following modifications were made to the study base cases to create the benchmark cases.

- Added Rio Medina initial loads of 10.9 MW at the Quihi substation (bus 8248) and 16 MW at the Castroville substation (bus 5808). Both loads were modeled at 0.96 pf.
- Added generation projects that met the requirements of ERCOT Planning Guide Section 6.9 per ERCOT's June 2022 Generator Interconnection Status report if they were missing from the study base cases.
- The Laredo VFT was disabled, and a pseudo generator was added to represent the power flows on the VFT for performing the steady state analysis in PowerGEM TARA.
- All relevant 21SSWG Off-Cycle Updates were applied to the base cases.
- Generators far outside the study area were adjusted to account for changes in generation and load within the Study Area.

Study Case Creation

The following changes were made to the benchmark cases to create the study cases.

- Added the Hondo Creek to Pearson 138 kV transmission line rebuild project to all study cases
- AEP's upgrade of the Big Foot to CPS Lytle line from 69 kV to 138 kV.
- The Rio Medina station and load were added to the 2025 to 2028 cases. The Rio Medina load was modeled using a 0.96 lagging power. The addition of the Rio Medina load in the 2025 to 2028 cases included the following improvements:
    - Added the Rio Medina 138 kV station.
    - Added a 138 kV line from the Castroville station to the Rio Medina station.
    - Added a new station called 381ESTIMATE1 on the Texas Research to Talley Road 138 kV line.
    - Added a 138 kV line from Rio Medina station to the 381ESTIMATE1 station.
    - Added the Howard Road 345/138 kV Switching Station (RPG Project - 21RPG019)
        - Expanded the current 138 kV Howard Road station to a 345/138 kV station by cutting into the adjacent 345 kV transmission lines: Cagnon to Ave. Rosenburg and Cagnon to Spruce.
        - Added two new Howard Road 600 MVA 345/138 kV auto transformers.
        - Upgraded the Hamilton Wolfe to Medical Center 138 kV transmission line to 469 MVA.
        - Restored the full rating (213 MVA) of the Medina Base to 36th Street 138 kV line.
    - Added CPS's Talley Road to Ranch Town 138 kV Line.
- Added the 129 MW data center load at the new Dunlay substation to be connected at 138 kV between the Bader and Pearson stations to the 21SSWG_2027_SUM1_U2_02242022 and the 21SSWG_2028_SUM1_U2_02242022 cases. The 129 MW load was modeled using a 0.96 lagging power. The 2027 to 2028 cases also included the following improvements for the Dunlay data center load:
    - Added the new Dunlay 138 kV station between Bader and Pearson stations.
    - Added the San Antonio South Reliability Project (22RPG048), which adds a 345 kV double circuit between the Miguel to Howard Road stations.

Steady State Analysis

The N-0 and N-1 steady state analysis were performed using the benchmark and study cases above. The initial analysis considered the Hondo Creek to Pearson 138 kV transmission line rebuild completed and the Rio Medina initial loads added at Castroville and Quihi to determine impact on reliability.

The steady state analysis revealed a thermal overload of the STEC Hondo to Hondo Creek 69 kV line. No new voltage violations were identified after incorporating the Rio Medina initial load.

However, the Hondo Creek to Pearson 69 kV line upgrade to 138 kV results in the DHANISSUB9, HONDOSUB9, and HONDOCREEK9 stations becoming radial during a P6 contingency event. [redacted] The P6 contingency event results in low voltage at those 69 kV stations prior to adding the Rio Medina load. The voltage violations caused by the P6 contingency can be resolved with tap adjustments at the Downie autotransformer (5883-5885).

The thermal and voltage violations with the Rio Medina initial loads are shown in Tables 1 and 2 on page 11.

Table 1: Thermal Overloads (with Pearson to Hondo Creek at 138 kV and Rio Medina initial load)

Monitored Facility	Area	Rate Base (MVA)	Rate Cont (MVA)	Cont Name	Con Type	23SUM BASE (%)	23SUM Pearson - Hondo Creek 138 kV Upgrage (%)	24SUM BASE (%)	24SUM Pearson - Hondo Creek 138 kV Upgrage (%)	25SUM BASE (%)	25SUM Pearson - Hondo Creek 138 kV Upgrage (%)
5816 HONDOSUB9 69.0 5821 HONDOCREEK9 69.0 1	13	40	40	DB_ID_19797	P6.1	90.98	105.89	92.9	104.86	93.7	105.86

Table 2: Voltage Violations (with Pearson to Hondo Creek at 138 kV and Rio Medina initial load)

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The analysis of the full Rio Medina load at 129 MW included the elements of the proposed project and the Pearson to Hondo Creek 69 kV line upgrade to 138 kV recommended in 22RPG022. The analysis revealed thermal overloads and voltage violations at various stations, as indicated in Tables 3 and 4 on page 13. However, all of the overloads and voltage violations except one were resolved by incorporating CPS Energy's recently approved Howard Road 345/138 kV switching station recommended in 21RPG019 and the Talley Road to Ranch Town 138 kV line. The one exception is the 1.34 percent thermal overload in 2027 of the CPS-owned CPS Hondo to STEC Hondo Creek 138 kV line. This overload was able to resolve with load shedding of approximately 50 MW at nearby stations.

In addition to the preceding analysis, an additional 129 MW load at a new substation called Dunlay to be connected at 138 kV between the Bader and Pearson stations was added for evaluation in the 2027 and 2028 study cases. This analysis revealed new thermal overloads and voltage violations at various stations, as indicated in Table 5 on page 14. It was determined that most of the voltage violations could be solved with system adjustments.

Refer to Appendix A spreadsheets for the tables of buses with thermal and voltage performance criteria violations found in the studies.

To address the overloads and the remainder voltage violations, CPS Energy's San Antonio South Project 22RPG048 was incorporated, along with the addition of a 28.8 MVAR capacitor bank at the Castroville station and another at the new Dunlay substation serving the 129 MW load. Adding the San Antonio South Project to the model resulted in new thermal overloads, as depicted in Table 6 on page 14. Based on discussions with CPS, the Cagnon to Howard Road 345 kV is not a critical concern and will be addressed at a later time.

Regarding the overload of the Bergheim 345/138 kV transformer, further analysis determined that neither the Rio Medina load nor the additional loads were the driving factors behind the autotransformer overload. Specifically, applying only the Howard Road-related projects to the 2027 case resulted in the loading of the transformer above 100 percent.

Table 3: Thermal Overloads (with Pearson to Hondo Creek at 138 kV and Rio Medina improvements)

Monitored Facility					Area	Rate Base (MVA)	Rate Cont (MVA)	Cont Name	Con Type	25SUM BASE Pearson - Hondo Creek at 138 kV (%)	25SUM Included Rio Medina Improvements (%)	26SUM BASE Pearson - Hondo Creek at 138 kV (%)	26SUM Included Rio Medina Improvements (%)	27SUM BASE Pearson - Hondo Creek at 138 kV (%)	27SUM Included Rio Medina Improvements (%)	28SUM BASE Pearson - Hondo Creek at 138 kV (%)	28SUM Included Rio Medina Improvements (%)
5187 HAMWOLF	138	5300 MED_CTR	138		5	289	289	2-WINDING XFMR_5056;5055;2 + DB_ID_20352	ERCOT3	99.82	101.59	101.51	102.66	101.83	105.58	101.69	105.76
5187 HAMWOLF	138	5300 MED_CTR	138		5	289	289	3-WINDING XFMR_5056;5053;5060;4 + DB_ID_20352	ERCOT3	96.99	98.78	98.71	99.98	99.1	102.68	99.2	103.07
5187 HAMWOLF	138	5300 MED_CTR	138		5	289	289	3-WINDING XFMR_5056;5054;5059;3 + DB_ID_20352	ERCOT3	96.95	98.75	98.67	99.95	99.06	102.64	99.17	103.03
5187 HAMWOLF	138	5300 MED_CTR	138		5	289	289	3-WINDING XFMR_5056;5055;5057;1 + DB_ID_20352	ERCOT3	99.24	101	100.93	102.08	101.24	104.96	101.1	105.13
5225 HONDO	138	5819 HONDOCREEK8	138		5\13	143	143	BRNCH_5819;5808;1 + BRNCH_8221;5827;1	P6	93.05	102.06	92.39	100.14	93.98	104.89	94.97	106.37
5422 TALLY_RD	138	7432 L_MEDILA8_1Y	138		5\7	220	220	BRNCH_5444;5430;1_SCEN_B + BRNCH_5808;5805;1	P6	2.07	85.65	1.79	71.86	2.49	112.61	4.14	116.23
5430 TX_RSRCH	138	5444 381ESTIMATE1	138		5	220	220	BRNCH_5808;5805;1 + BRNCH_7437;7432;1	P6	Invalid	85.18	Invalid	75.58	Invalid	106.58	Invalid	110.65
5821 HONDOCREEK9	69.0	5857 DEVINESW9	69.0		13	40	40	BRNCH_5819;5225;1 + BRNCH_5819;5808;1	P6	89.88	97.9	89.04	95.26	90.78	101.51	91.68	103.07
5857 DEVINESW9	69.0	5858 NATALIASUB9	69.0		13	40	40	BRNCH_5819;5225;1 + BRNCH_5819;5808;1	P6	89.68	97.71	88.84	95.07	90.59	101.37	91.48	102.92
7138 L_KERRST8_1Y	138	7150 L_KENDAL8_1Y	138		7	223	223	DB_ID_21089	P2.3_HV	90.62	91.14	90.93	91.02	94.65	96.18	99.27	101.07
7432 L_MEDILA8_1Y	138	7437 L_PIPECR8_1Y	138		7	232	232	BRNCH_5444;5430;1_SCEN_B + BRNCH_5808;5805;1	P6	9.66	91.43	10.03	78.19	11.16	117.47	12.25	121

Table 4: Voltage Violations (with Pearson to Hondo Creek at 138 kV and Rio Medina improvements)

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Table 5: Thermal Overloads (with Pearson to Hondo Creek, Rio Medina improvements, Howard Road Project, and Dunlay Load)

Monitored Facility	Area Name	Rate Base (MVA)	Rate Cont (MVA)	Cont Name	Type	27SUM BENCH Pearson - Hondo Creek at 138 kV, Howard Rd Project, Dunlay Load (%Loading)	27SUM Included Rio Medina (%Loading)	28SUM BENCH Pearson - Hondo Creek at 138 kV, Howard Rd Project, Dunlay Load (%Loading)	28SUM Included Rio Medina (%Loading)
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_43638	P1.2/P2.1 HV	93.17	102.36	94.42	103.4
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_43638	P1.2/P2.1 HV	93.17	102.36	94.42	103.4
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_19570 + DB_ID_43638	P3	93.55	102.59	94.83	103.68
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	UNIT:170063 LEON__LCPCT1 13.8 905 1123 L1 + DB	P3	93.55	102.59	94.83	103.68
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	UNIT:170064 LEON__LCPCT2 13.8 905 1123 L2 + DB	P3	93.55	102.59	94.83	103.68
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	UNIT:170065 LEON__LCPCT3 13.8 905 1123 L3 + DB	P3	93.55	102.57	94.82	103.66
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	UNIT:170066 LEON__LCPCT4 13.8 905 1123 L4 + DB	P3	93.55	102.58	94.82	103.67
5231 HOWARD_5 345 5400 SPRUCE 345 1	CPS_TSP	1195	1195	DB_ID_19852	P7.1 EHV	Invalid	99.59	Invalid	100.59
5231 HOWARD_5 345 5475 VON_ROSE 345 1	CPS_TSP	1195	1195	DB_ID_19852	P7.1 EHV	Invalid	100.7	Invalid	101.54
5827 MOORESW8 138 5895 PEARSALLSUB8 138	STEC_TSP	411	457	DB_ID_11343	P7.1 EHV	92.5	100.69	93.87	102.18
5827 MOORESW8 138 5895 PEARSALLSUB8 138	STEC_TSP	411	457	DB_ID_19621	P7.1 EHV	92.5	100.69	93.87	102.18
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20066 + DB_ID_43638	ERCOT3	96.48	105.96	97.79	107.08
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20067 + DB_ID_43638	ERCOT3	96.67	106.16	97.99	107.29
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20068 + DB_ID_43638	ERCOT3	94.09	102.46	95.28	103.5
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20069 + DB_ID_43638	ERCOT3	94.09	102.45	95.29	103.5
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20245 + DB_ID_43638	ERCOT3	94.06	103.31	95.33	104.43
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20246 + DB_ID_43638	ERCOT3	93.91	103.18	95.17	104.27
5290 LYTLE 138 8962 LYTLE4A 138 1	CPS_TSP/AEP_TCC	191	191	DB_ID_20247 + DB_ID_43638	ERCOT3	93.92	103.18	95.18	104.27

Table 6: Thermal Overloads (with Pearson to Hondo Creek, Rio Medina improvements, Howard Road Project, Dunlay Load, and San Antonio Project)

Monitored Facility	Area Name	Rate Base (MVA)	Rate Cont (MVA)	Cont Name	Type	27SUM BENCH Pearson - Hondo Creek at 138 kV, Howard Rd Project, Dunlay & Rio Medina Loads (%Loading)	27SUM Study Included San Antonio South Project (%Loading)	28SUM BENCH Pearson - Hondo Creek at 138 kV, Howard Rd Project, Dunlay & Rio Medina Loads (%Loading)	28SUM Included San Antonio South Project (%Loading)
5056 CAGNON_5 345 5231 HOWARD_5 345 2	CPS_TSP	1195	1195	5056 CAGNON_5 345 5231 HOWARD_5 345	P1.2	Invalid	98.79	Invalid	100.64
5056 CAGNON_5 345 5231 HOWARD_5 345 2	CPS_TSP	1195	1195	DB_ID_19852	P7.1 EHV	invalid	98.64	Invalid	100.57
7770 L_BERGHE5_1Y 345 3WXFMR AMCAE _2 138	LCRA_TSC	336	370	DB_ID_23216	P7.1 EHV	98.27	101.11	102.29	105.16

Short Circuit Analysis

A short circuit analysis was performed to evaluate the fault duty performance using the Base Case with the Hondo Creek to Pearson 138 kV transmission line upgrade modeled with the Rio Medina substation service. The assessment was carried out using the 22_SPWG_2027_FY_06302022 case which includes applicable zero sequence and mutual coupling data. No devices were found subject to 90 percent or more of interrupting capacities as shown in Table 7.

Table 7: Short circuit duties

Facility	Hondo Creek – Pearson 138 kV Rebuild w/o Rio Medina Ph-G (A)	Hondo Creek – Pearson 138 kV Rebuild w/o Rio Medina 3-Ph (A)	Hondo Creek – Pearson 138 kV Rebuild w/ Rio Medina Ph-G (A)	Hondo Creek – Pearson 138 kV Rebuild w/ Rio Medina 3-Ph (A)
Bader	7675	12604	8470	14361
Castroville	9381	14847	11006	17947
Quihi	6429	10434	7047	11655
Rio Medina	- -	- -	8510	15244
Tally Rd	6663	11104	7692	12993
TX Research	14566	24354	14941	24935
381Estimate1	--	--	9933	16912

Dynamic Stability Analysis

STEC performed a dynamic stability analysis on the study cases to evaluate the system stability by applying dynamic contingencies and monitoring transmission buses and generators in the Study Area. The stability simulations were run for one second before applying each dynamic contingency event for P1, P2, P4, P5, and P7/ERCOT1 contingencies. For P3, P6, ERCOT2, and ERCOT3 contingencies, the stability simulations were run for 0.2 seconds before taking the first outage and then run for ten seconds before the second contingency event was applied. A no-disturbance simulation was performed for ten seconds to verify system stability under P0 conditions.

The addition of the Rio Medina and Dunlay data center loads as well as the transmission facilities to interconnect the data center loads did not cause any new stability issues. However, low voltages around the Dunlay 138 kV station were found and resolved by enabling the proposed banks located at the STEC Castroville and Dunlay 138 kV stations.

Sub-synchronous Resonance Analysis

Sub-synchronous resonance (SSR) impacts were not analyzed for this proposed project. According to ERCOT Protocol 3.22.1.3 (1), it is not required for the 69 kV or 138 kV transmission system, and there is a low probability of SSR interactions caused by the proposed project.

Descriptions of Alternative Solutions

Three alternatives for providing transmission service to the Rio Medina load were considered with the third alternative being the proposed project.

(1) Construct a 138 kV, 474 MVA transmission line from the STEC Castroville substation to the new Rio Medina substation then on to the existing CPS Texas Research substation.
(2) Construct a 138 kV, 474 MVA transmission line from the STEC Castroville substation to the new Rio Medina substation the on to the existing CPS Talley Road substation.
(3) Proposed Project: Construct a 138 kV 474 MVA transmission line from the STEC Castroville to the new Rio Medina station then on to a new station connected to the CPS line between the Texas Research and Tally Road substations.

Alternative 1 was rejected **in part due** to feedback from CPS Energy regarding the congestion around the Texas Research **station** which would make line routing from the Rio Medina substation difficult. Additionally, the line from Rio Medina to either the Texas Research or Rafter substation would **be of similar length** as the proposed project with more habitable structures **expected close the route**. The addition of a terminal at either of those stations **and a terminal for** a future second circuit would be difficult with associated **higher** costs **than** that of the **new** 3-terminal 138 kV station**, 381ESTIMATE1,** that is part of the proposed project.

Alternative 2 includes a 138 kV line between the Rio Medina and Talley Road stations that is at least 7 miles longer than the proposed project. The cost of the additional line length and a Talley Road station 138 kV terminal would be higher than the 138 kV the 3-terminal 381ESTIMATE1 station that is part of the proposed project described by Alternative 3.

Conclusion

The proposed project is the most cost-effective solution to providing the Rio Medina data center load with non-radial transmission service. The thermal overload and voltage performance criteria violations are effectively resolved by CPS Energy's proposed Howard Road 345/138 kV switching station recommended in 21RPG019 and Talley Road to Ranch Town 138 kV line. The thermal overload of the CPS 138 kV line from CPS Hondo to STEC's Hondo Creek was resolved with load shedding.

Appendix A

REDACTED

ERCOT Independent Review of the STEC Rio Medina Project

Document Revisions

Date	Version	Description	Author(s)
2/16/2024	1.0	Final Draft	Abishek Penti
		Reviewed by	Robert Golen, Prabhu Gnanam

Executive Summary

South Texas Electric Cooperative, Inc. (STEC) submitted the Rio Medina Project to the Regional Planning Group (RPG) in September 2023. STEC proposed this project to serve 129 MW of load at the new Rio Medina 138-kV substation and address thermal overloads and voltage violations in the South Central (SC) Weather Zone, located in Medina County.

The STEC-proposed project was estimated to cost $38.0 million and was classified as a Tier 2 project per ERCOT Nodal Protocol Section 3.11.4.3 since the proposed project would require a Certificate of Convenience and Necessity (CCN) application.

ERCOT performed an Independent Review and observed thermal overloads and voltage violations under the planned maintenance outage evaluation in Medina County.

The ERCOT Independent Review (EIR) evaluated six different transmission project options. Based on the study results described in Section 5 and 6 of this report, ERCOT recommends the following Option 5 to address the reliability issues mentioned above. Option 5 consists of the following:

- Construct a new Rio Medina 138-kV substation. A 5-terminal, 138-kV breaker and a half bus arrangement including two line terminals and three transformer terminals.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile. This transmission line will require new Right of Way (ROW).
- Construct a new 381Estimate1 138-kV substation in a 3-terminal ring bus arrangement, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media – 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 5.6-mile. This transmission line will require new ROW.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal and emergency ratings of at least 285 MVA.
- Rebuild the existing Tally Road – 381Estimate1 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 3.0-mile.
- Rebuild the existing 381Estimate1 – Texas Research 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 4.9-mile.
- Construct a new Ranch Town – Tally Road 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 12.0-mile. This transmission line will require new ROW.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

The cost estimate for this Tier 2 project is approximately $71.7 million. This project will require a CCN for the construction of a new 138-kV single-circuit transmission line from Castroville Sub 138-kV Substation to Rio Medina 138-kV Substation, a new 138-kV single-circuit transmission line from Rio

Medina 138-kV Substation to 381Estimate1 138-kV Substation, a new 138-kV single-circuit transmission line from Ranch Town 138-kV Substation to Tally Road 138-kV Substation. The expected In-Service Date (ISD) of this project is January 2027.

Table of Contents

1 Introduction

In September 2023, STEC submitted the Rio Medina Project to the Regional Planning Group (RPG) to address NERC TPL-001-5.1 reliability criteria violations (both thermal and voltage) due to 129 MW of new load in the area. This project is in the South-Central (SC) Weather Zone in Medina County.

This STEC proposed project was classified as a Tier 2 project pursuant to ERCOT Nodal Protocol Section 3.11.4.3, with an estimated cost of approximately $38.0 million. One or more CCN applications will be required for the construction of new 138-kV transmission lines from STEC's Castroville Substation to the new Rio Medina Substation and from the new Rio Medina Substation to the new CPS-owned 381ESTIMATE1 Substation due to approximately 11-14 miles of new ROW. The expected ISD of the project is January 2027.

ERCOT conducted an Independent Review for this RPG project to identify any reliability needs in the area including thermal overloads and voltage violation under maintenance outage and evaluate various transmission upgrade options. This report describes the study assumptions, methodology, and the results of ERCOT Independent Review of the project.

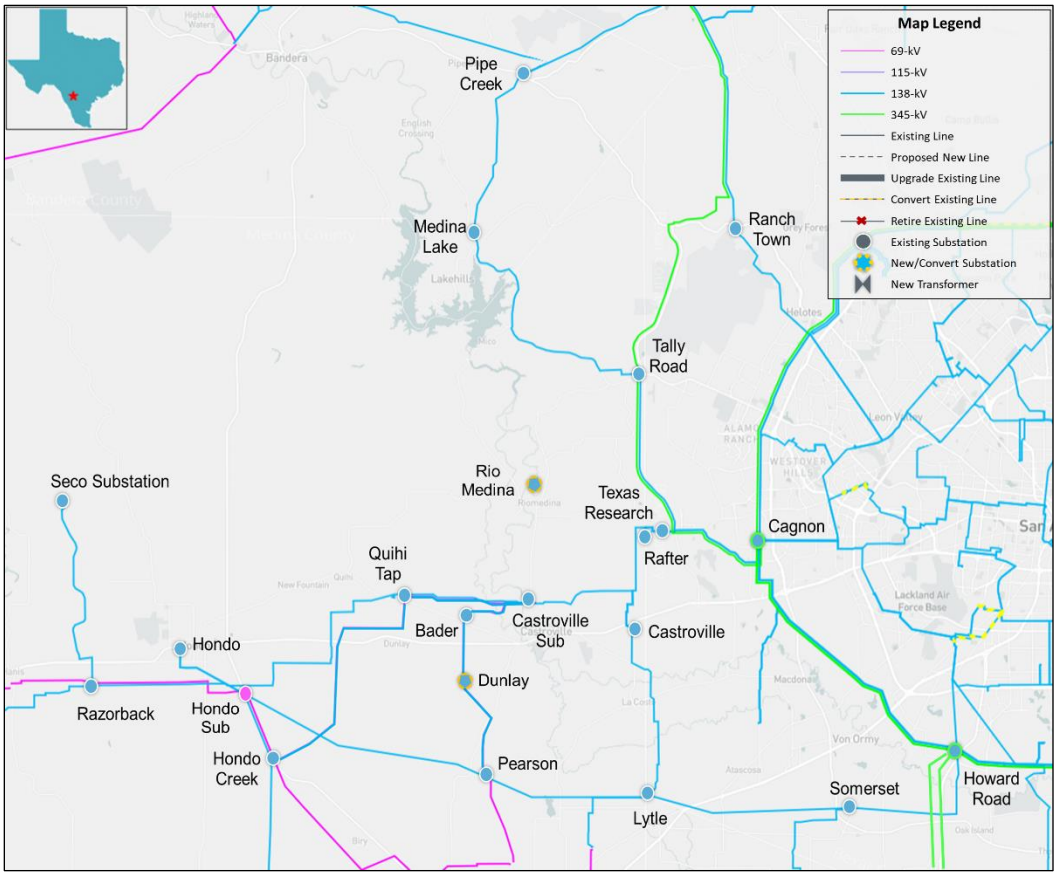

Figure 1.1: Map of Transmission System in The Medina County

2 Study Assumptions and Methodology

ERCOT performed studies under various system conditions to identify any reliability issue and to determine transmission upgrades to support the proposed Rio Medina Project if an upgrade is deemed necessary. This section describes the study assumptions and criteria used to conduct the independent study.

2.1 Study Assumptions for Reliability Analysis

This project is in the South-Central weather zone in Medina County. Nearby counties that will also be studied because they are electrically close via the Bulk Electrical System (BES) include Atascosa, Bandera, Bexar, Frio, Uvalde, and Zavala Counties.

2.1.1 Steady-State Study Base Case

The Final 2022 RTP cases, published on the Market Information System (MIS) on December 22, 2022, were used as reference cases in this study. Year 2027 Summer peak load case was selected for the long-term outlook. The steady-state study base case was constructed by updating transmission, generation, and loads of the following 2027 Summer peak load case for the South and South-Central (SSC) Weather Zones.

- Case: 2022RTP_2027_SUM_SSC_12222022[1]

2.1.2 Transmission Topology

Transmission projects within the SSC Weather Zone with ISDs through January 2027 were added to the study base case. The ERCOT Transmission Project Information and Tracking (TPIT)[2] report posted in June 2023 and October 2023 was used as reference. The added TPIT projects are listed in Table 2.1. These are classified as Tier 2, Tier 3, and Tier 4 projects. Recently approved Tier 1 CPS San Antonio South Reliability Project, Tier 2 Hondo Creek to Pearson 69-kV Transmission Line Rebuild Project, and Tier 4 Big Foot to Dilley Switch 138-kV Conversion Project are added to the study base case, which are also listed in Table 2.1.

Table 2.1: List of Transmission Projects Added to the Study Base Case

TPIT No	Project Name	Tier	Project ISD	TSP	County
22RPG048	San Antonio South Reliability Project	Tier 1	06/01/2027	CPS	Bexar, Atascosa
22RPG022	Hondo Creek to Pearson 69-kV Transmission Line Rebuild Project	Tier 2	12/01/2023, 06/01/2024	STEC	Medina
23RPG024	Big Foot to Dilley Switch 138-kV Conversion	Tier 4	08/30/2026	AEPSC	Frio
67992	CPSE 345-kV Howard Switching Station	Tier 3	16/02/2024	CPS	Bexar
68266	Dry Frio: Build new 138-kV station	Tier 4	14/05/2024	AEP TNC	Uvalde
70536	New 138-kV Verde Circle Substation	Tier 4	01/10/2024	CPS	Bexar

[1] 2022 Regional Transmission Plan Postings: https://mis.ercot.com/secure/data-products/grid/regional-planning
[2] TPIT Report: https://www.ercot.com/gridinfo/planning

TPIT No	Project Name	Tier	Project ISD	TSP	County
72500	Rio Lago - New 138-kV Substation	Tier 4	11/30/2024	BEC	Bandera
72268	CPSE New Ingram Rd Substation	Tier 4	05/01/2025	CPS	Bexar
76576	Asherton to Uvalde: Convert to 138-kV	Tier 3	5/31/2025	AEP TCC	Dimmit
76580	Poblano: Build new 138-kV station	Tier 3	5/31/2025	AEP TCC	Uvalde
71873	CPSE Hill Country Auto# 2 Impedance Upgrade	Tier 3	06/01/2025	CPS	Bexar
73063	Big Foot to Lytle: Convert to 138-kV	Tier 4	09/20/2025	AEP	Medina
67915	Asherton to West Basteville 138-kV line Rebuild	Tier 3	11/30/2026	AEP TNC	Dimmit
71871	CPSE Cagnon to Shepherd Rd Rebuild Phase A	Tier 4	05/15/2023	CPS	Bexar

Transmission projects, listed in Table 2.2, identified in the 2022 RTP as placeholders for the CPS San Antonio South Reliability Project were removed from study base case.

Table 2.2: List of Transmission Projects Removed from the Study Base Case

RTP Project ID	Project Name	TSP	County
2022-SC6	Howard – San Miguel 345-kV Double Circuit Line Addition and Beck Road 345/138-kV Substation Expansion	CPS, STEC	Bexar, Atascosa

2.1.3 Generation

Based on the September 2023 Generator Interconnection Status (GIS)[3] report posted on the ERCOT website on October 2, 2023, generators in the SC Weather Zone that met ERCOT Planning Guide Section 6.9(1) conditions with Commercial Operations Date (COD) prior to January 2027 were added to the study base case. These generation additions are listed in Table 2.3. All new generation dispatches were consistent with the 2022 RTP methodology.

Table 2.3: List of Generation Added to the Study Base Case Based on the September 2023 GIS Report

GINR	Project Name	Fuel	Project COD	Capacity (MW)	County
21INR0395	SunRay	SOL	5/23/2024	200.0	Uvalde
22INR0368	Padua Grid BESS	OTH	12/31/2024	51.4	Bexar
22INR0422	Ferdinand Grid BESS	OTH	5/31/2026	202.7	Bexar
23INR0381	Soportar ESS	OTH	3/15/2025	102.1	Bexar

The status of each unit that was projected to be either indefinitely mothballed or retired at the time of the study were reviewed. The units listed in Table 2.4 were opened (turned off) in the study base case to reflect their mothballed/retired status.

Table 2.4: List of Generation Opened to Reflect Mothballed/Retired Status

Bus No	Unit Name	Capacity (MW)	Weather Zone
170121	CALAVERS_JTD1	420.0	South Central
170122	CALAVERS_JTD2	420.0	South Central
150081	OLINGR_OLING_1	78.0	North Central
170381	OCI_ALM1_ASTRO	1.0	South Central

[3] GIS Report: https://www.ercot.com/mp/data-products/data-product-details?id=PG7-200-ER

110111	DOWGEN_DOW_G37	61.0	Coast
130003	FLCNS_UNIT3	70.0	Far West
142761	BRANDON_UNIT1	20.0	North
142714	MASSENGL_G6	18.0	North
142716	MASSENGL_G7	18.0	North
142713	MASSENGL_G8	38.0	North
143671	TY_COOKE_GT2	14.0	North
143672	TY_COOKE_GT3	17.0	North
110941	SL_SL_G1	65.0	Coast
110942	SL_SL_G2	65.0	Coast
110943	SL_SL_G3	30.0	Coast
110944	SL_SL_G4	30.0	Coast
140042	WFCOGEN_UNIT4	17.0	North
130121	SGMTN_SIGNALM2	6.6	Far West

Generation listed in Table 2.5 will be online (turned on) in the study base case to reflect the change in their Generation Resource as these resources are returning to year-round service.

Table 2.5: List of Generation online to Reflect Returning to Service Status

Bus No	Unit Name	Capacity (MW)	Weather Zone
110020	PNPI_GT2	71	Coast
150023	MCSES_UNIT8	568	North Central

2.1.4 Loads

Loads in the study area were updated based on the new confirmed loads. As a result of the update, 167.9 MW of additional loads were added to the study base case as shown in Table 2.6. Loads outside of study Weather Zone were adjusted as necessary to maintain the reserve consistent with the 2022 RTP methodology.

Table 2.6: New loads Added to the Study Base Case

Bus No	Substation Name	Load (MW)
5809	Dunlay	129.5
5355	Rafter	38.4*

*Load increased from 176.5 MW to 214.9 MW

2.1.5 Long-Term Load Serving Capability Assessment

ERCOT performed long-term load serving capability assessment under base case and higher load conditions to compare the performance of the study options.

In the higher load condition evaluation, loads at 138-kV substations in the study area were added and increased to reflect future load additions (customer with flexible loads remained at the same level as in the base case), and conforming loads outside of SC Weather Zone were decreased to balance power.

2.1.6 Maintenance Outage Scenario

ERCOT developed an off-peak maintenance season scenario to further evaluate the study options.

The load level in the SC Weather Zone was reduced to 83.7% of its summer peak load level in the study base case. This scaling is meant to reflect assumed off-peak season loads based on ERCOT load forecast, historical load, and ratio of residential/commercial load from TSP in the SC Weather Zone.

2.2 Study Assumptions for Congestion Analysis

Congestion analysis was conducted to identify any new congestion in the study area with the addition of the preferred transmission upgrade option.

The 2023 RTP 2028 economic case was updated based on the November 2023 GIS[4] report for generation updates and the June 2023 and October 2023 TPIT[5] reports for transmission updates to conduct congestion analysis. Additional ERCOT-confirmed loads listed in Table 2.6 were added. The 2028 study year was selected based on the proposed ISD of the project.

All transmission projects listed in Table 2.1 were added and the RTP projects shown in Table 2.2 that were used as placeholders for the CPS San Antonio South Reliability Project were removed from the economic base case.

New generation additions listed in Table A.1 in Appendix A were added to the economic base case and all generation listed in Table 2.4 were opened in the study base case to reflect their mothballed/retired status. Furthermore, generation listed in Table 2.5 were closed in the study base case to reflect the change in their Generation Resource as these resources are returning to year-round service.

2.3 Methodology

This section lists the Contingencies and Criteria used for project review along with tool used to perform the various analyses.

2.3.1 Contingencies and Criteria

The reliability assessments were performed based on NERC Reliability Standard TPL-001-5.1, ERCOT Nodal Protocol, and Planning Criteria[6].

Contingencies[7] were updated based on the changes made to the topology as described in Section 2.1 of this document. The following steady state contingencies were simulated for the study region:

- P0 (System Intact);
- P1, P2-1, P7 (N-1 conditions);

[4] GIS Report: https://www.ercot.com/mp/data-products/data-product-details?id=PG7-200-ER
[5] TPIT Report: https://www.ercot.com/gridinfo/planning
[6] ERCOT Planning Criteria: http://www.ercot.com/mktrules/guides/planning/current
[7] Details of each event and contingency category is defined in the NERC reliability standard TPL-001-5.1

- P2-2, P2-3, P4, and P5 (Extra High Voltage (EHV) only);
- P3-1: G-1 + N-1 (G-1: generation outages) {JK Spruce}; and
- P6-2: X-1 + N-1 (X-1: 345/138-kV transformers only) {Cagnon}.

All 69-kV and above buses, transmission lines, and transformers in the study region were monitored (excluding generator step-up transformers) and the following thermal and voltage limits were enforced:

- Thermal
  - Rate A (normal rating) for pre-contingency conditions;
  - Rate B (emergency rating) for post-contingency conditions;
- Voltages
  - Voltages exceeding pre-contingency and post-contingency limits; and
  - Voltage deviations exceeding 8% on non-radial load buses.

2.3.2 Study Tool

ERCOT utilized the following software tools to perform this independent study:

- PowerWorld Simulator version 23 for Security Constrained Optimal Power Flow (SCOPF) and steady-state contingency analysis and
- UPLAN version 11.4.0.27191 to perform congestion analysis.

3 Project Need

Steady-state reliability analysis was performed in accordance with NERC TPL-001-5.1 and ERCOT Planning Criteria described in Section 2.3 of this document. This analysis indicated no violations were observed under NERC TPL-001-5.1 and ERCOT planning criteria in the study area as shown in Table 3.1.

Table 3.1: Violations Observed under NERC TPL-001-5.1 and ERCOT Planning Criteria in the Study Area

NERC Contingency Category	Voltage Violations	Thermal Overloads	Unsolved Power Flow
N-0 (P0)	None	None	None
N-1 (P1, P2-1, P7)	None	None	None
G-1+N-1 (P3)	None	None	None
X-1+N-1 (P6-2)	None	None	None

Planned maintenance outage evaluation was also conducted on the base case to identify project need. This analysis indicated thermal overloads, voltage violations, and unsolved contingencies in the study area.

The two unsolved contingencies were observed under various planned maintenance outage conditions:

- REDACTED
- REDACTED

Twelve low voltage violations were observed under various planned maintenance outage conditions which are summarized in Table 3.2.

Table 3.2: Low Bus Voltages under Planned Maintenance Outage Evaluation in the Study Area

Bus Number	Bus Name	Bus Voltage (kV)	County	Min Voltage (pu)
705390	SODG_5390	138	BEXAR	0.88
5390	SOMERSET	138	BEXAR	0.88
5809	DUNLAY	138	MEDINA	0.89
5810	BADERSUB9	138	MEDINA	0.89
5813	PEARSONSW8	138	MEDINA	0.89
5083	CASTRVLL	138	MEDINA	0.89
5808	CSTROVILESB9	138	MEDINA	0.89
5290	LYTLE	138	BEXAR	0.89
705430	SODG_5430	138	BEXAR	0.89
5430	TX_RSRCH	138	BEXAR	0.89
5355	RAFTER	138	BEXAR	0.89
8248	QUIHITP4A	138	MEDINA	0.89

Four 138-kV transmission line overloads were observed under various N-1-1 contingency conditions. These issues are summarized in Table 3.3. Figure 3.1 visually illustrates these project need.

Table 3.3: Thermal Violations Observed under Planned Maintenance Outage Evaluation in the Study Area

Overloaded Element	Worst Contingency (N-1-1)	Length (miles)	Max Loading (%)
Hondo – Hondocreek 138-kV Line Ckt 1	Lytle – Pearson 138-kV Line Ckt 1 + Castroville – BaderSub 138-kV Line Ckt 1	9.61	108.38
Lytle – Somerset 138-kV Line Ckt 1	Hondocreek – Moores 138-kV Line Ckt 1 + Cagnon – Rafter 138-kV Line Ckt 1 Rafter – Texas Research 138-kV Line Ckt 1	9.45	108.85
Medina Lake – Pipecreek 138-kV Line Ckt 1	Howard – Somerset 138-kV Line Ckt 1 + Cagnon – Rafter 138-kV Line Ckt 1 Rafter – Texas Research 138-kV Line Ckt 1	7.83	134.56
Tally Rd – Medina Lake 138-kV Line Ckt 1	Howard – Somerset 138-kV Line Ckt 1 + Cagnon – Rafter 138-kV Line Ckt 1 Rafter – Texas Research 138-kV Line Ckt 1	12.36	128.15

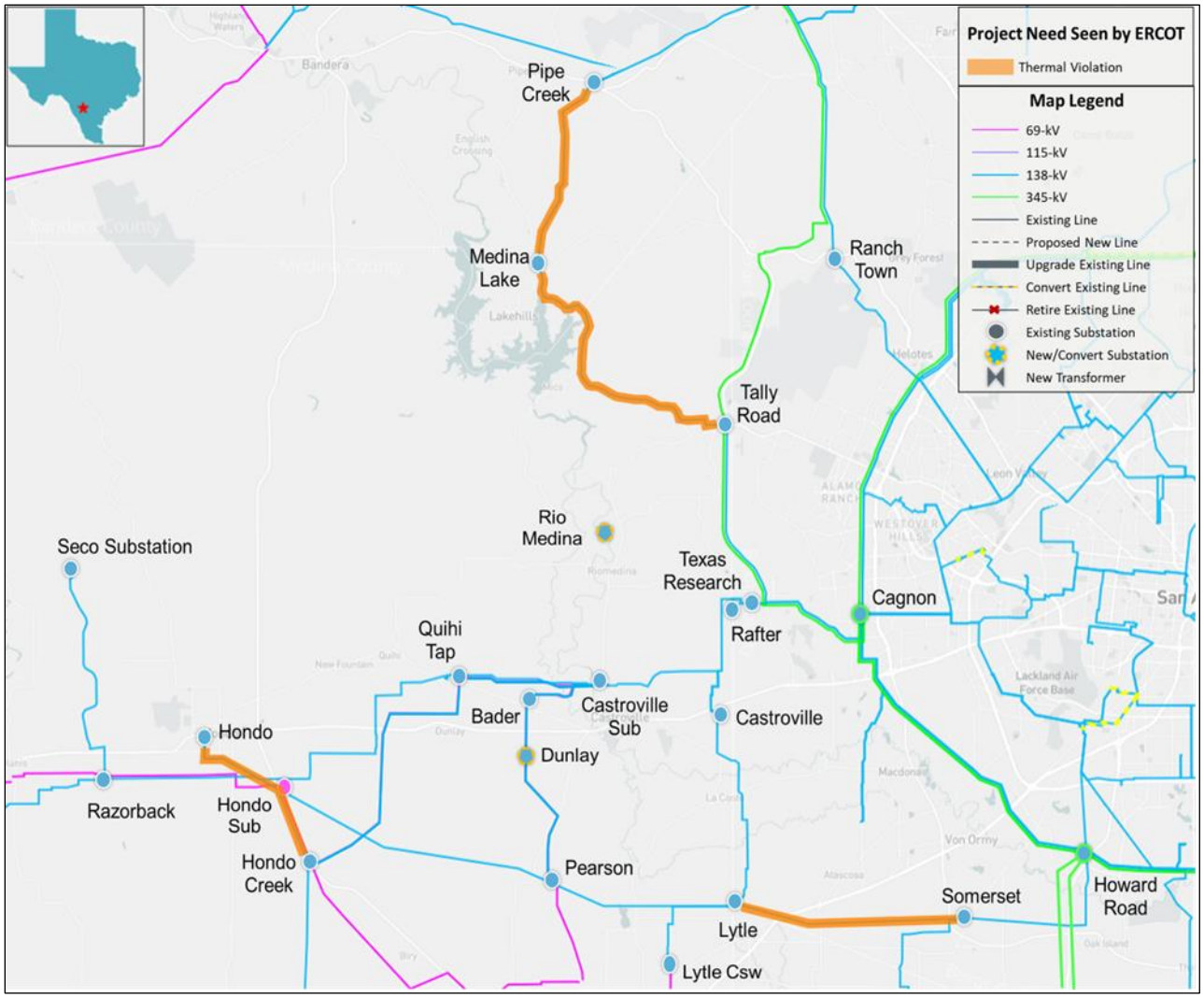

Figure 3.1: Study Area Map Showing Project Needs under Planned Maintenance Outage Evaluation

4 Description of Project Options

ERCOT initially evaluated six system-improvement options to address the thermal overloads and voltage violations under maintenance outage conditions that were observed in the study base case in the Medina County. All six options resolved reliability violations in the summer peak conditions in the study area.

Option 1 (STEC Proposed Solution) consists of the following:

- Construct a new Rio Medina 138-kV substation.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile.
- Construct a new 381Estimate1 138-kV substation, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media – 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 5.6-mile.

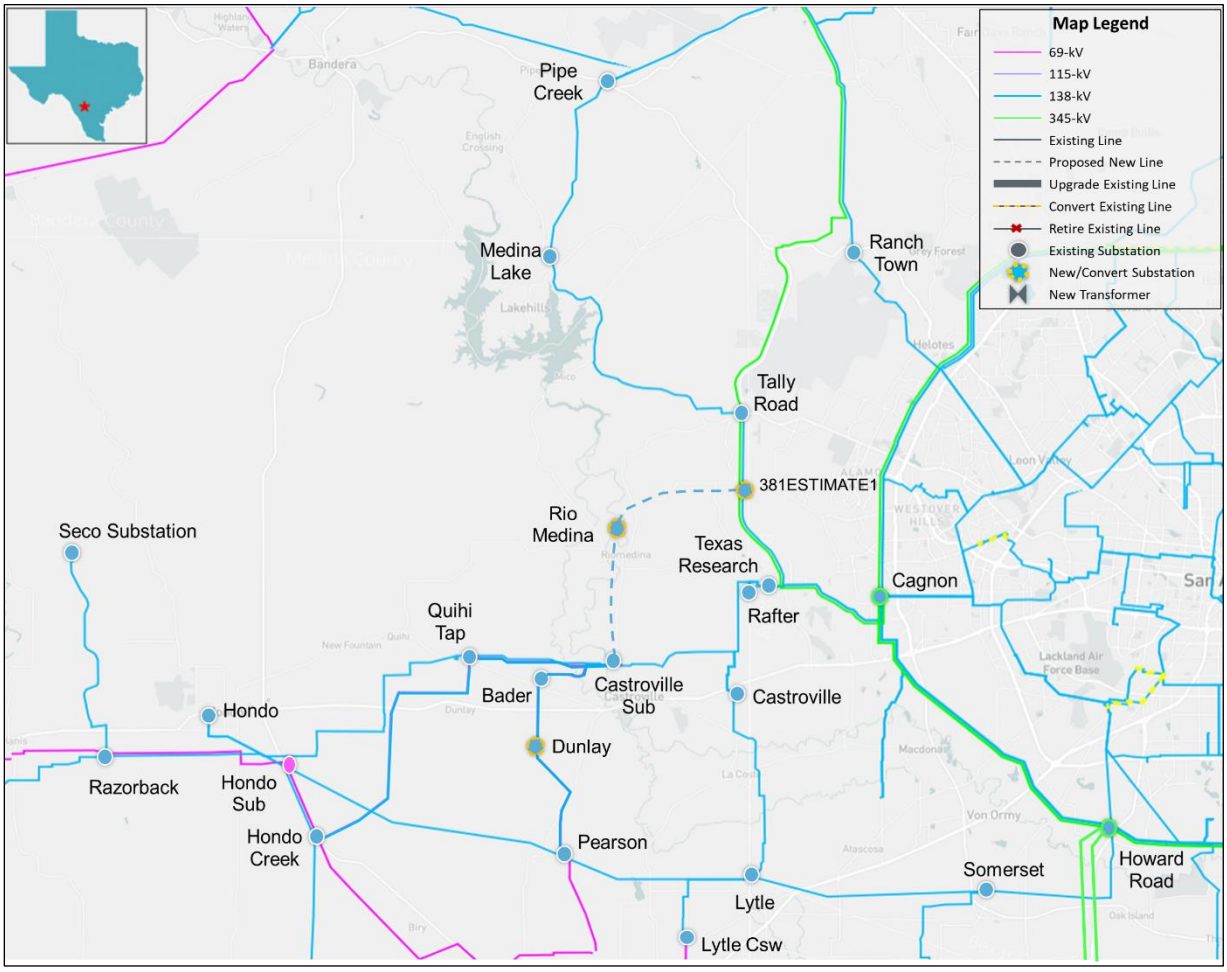

Figure 4.1: Map of Option 1

Option 2 consists of the following:

- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal/emergency ratings of at least 285 MVA, approximately 9.6-mile.
- Rebuild the existing Tally Road – Texas Research 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 7.9-mile.
- Construct a new Ranch Town – Tally Road 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 12-mile.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

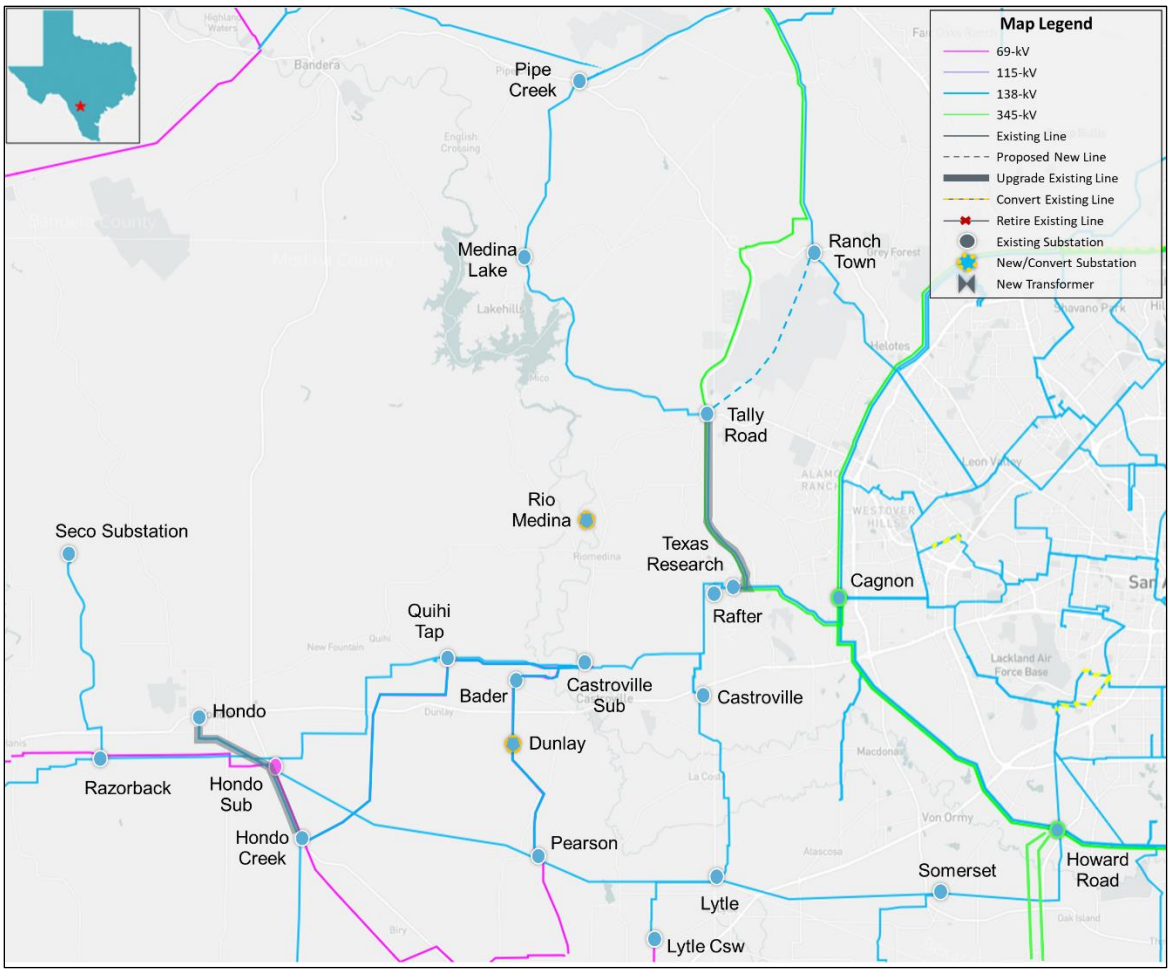

Figure 4.2: Map of Option 2

Option 3 consists of the following:

- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal/emergency ratings of at least 285 MVA, approximately 9.6-mile.
- Rebuild the existing Tally Road – Texas Research 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 7.9-mile.
- Rebuild the existing Pipe Creek – Medina Lake 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 7.8-mile.
- Rebuild the existing Medina Lake – Tally Road 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 12.4 mile.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

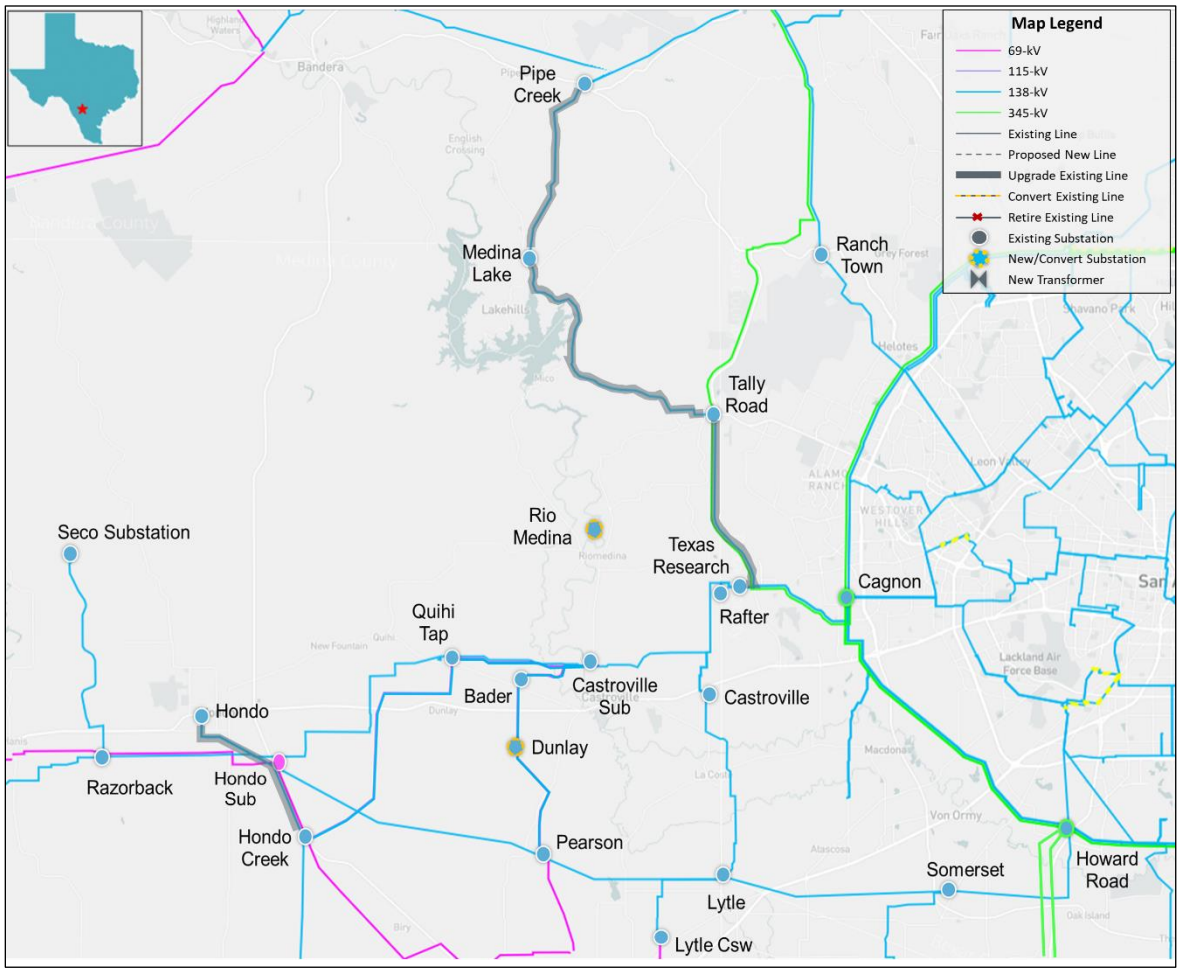

Figure 4.3: Map of Option 3

Option 4 consists of the following:

- Construct a new Rio Medina 138-kV substation.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile.
- Construct a new 381Estimate1 138-kV substation, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media - 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 5.6-mile.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal/emergency ratings of at least 285 MVA, approximately 9.6-mile.
- Rebuild the existing Tally Road – Texas Research 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 7.9-mile.
- Rebuild the existing Pipe Creek – Medina Lake 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 7.8-mile.
- Rebuild the existing Medina Lake – Tally Road 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 12.4-mile.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.
- Add a capacitor bank (Minimum: 36 MVAR) at Rio Medina 138-kV substation.

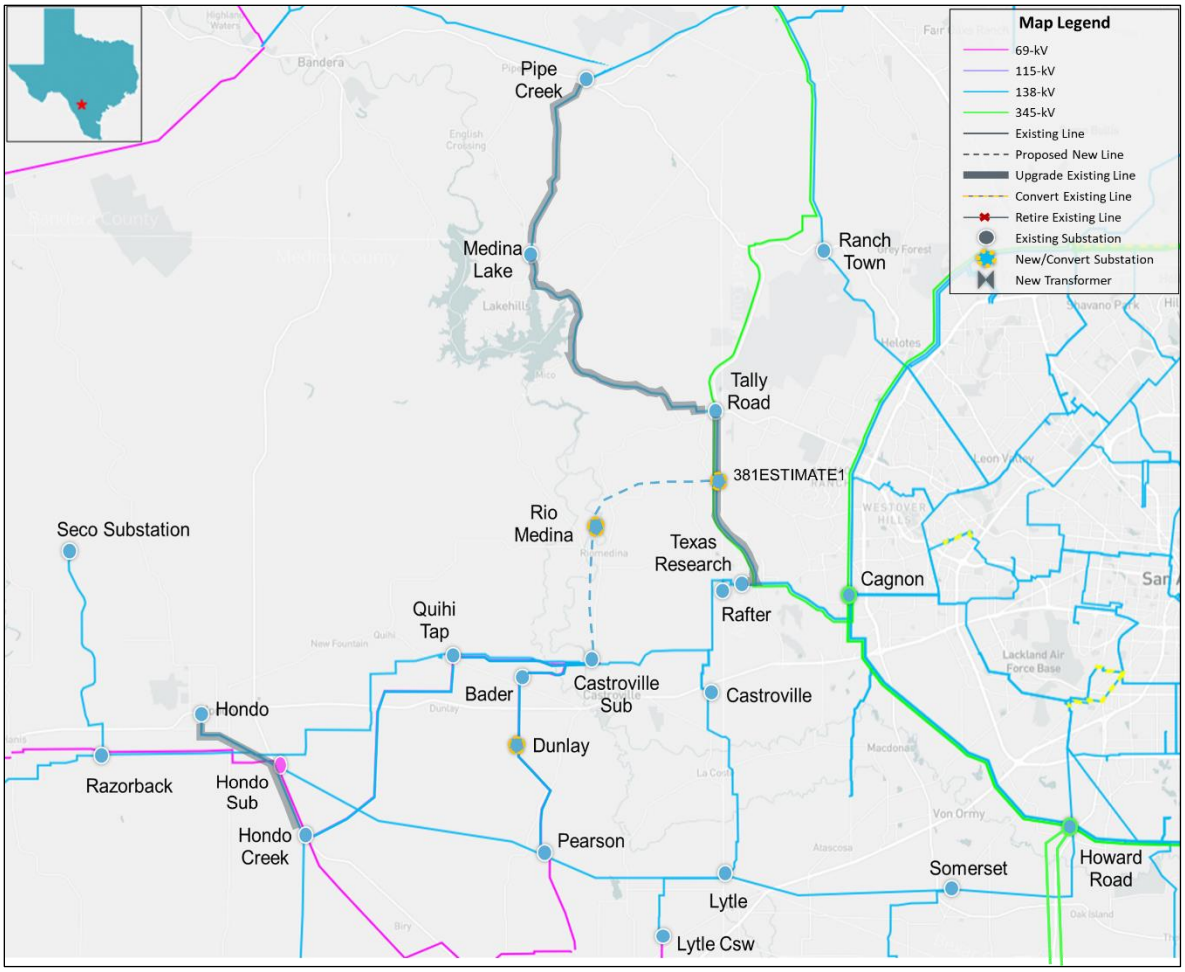

Figure 4.4: Map of Option 4

Option 5 consists of the following:

- Construct a new Rio Medina 138-kV substation.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile.
- Construct a new 381Estimate1 138-kV substation, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media - 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 5.6-mile.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal/emergency ratings of at least 285 MVA, approximately 9.6-mile.

- Rebuild the existing Tally Road – 381Estimate1 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 3-mile.
- Rebuild the existing 381Estimate1 – Texas Research 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 4.9-mile.
- Construct a new Ranch Town – Tally Road 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 12-mile.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

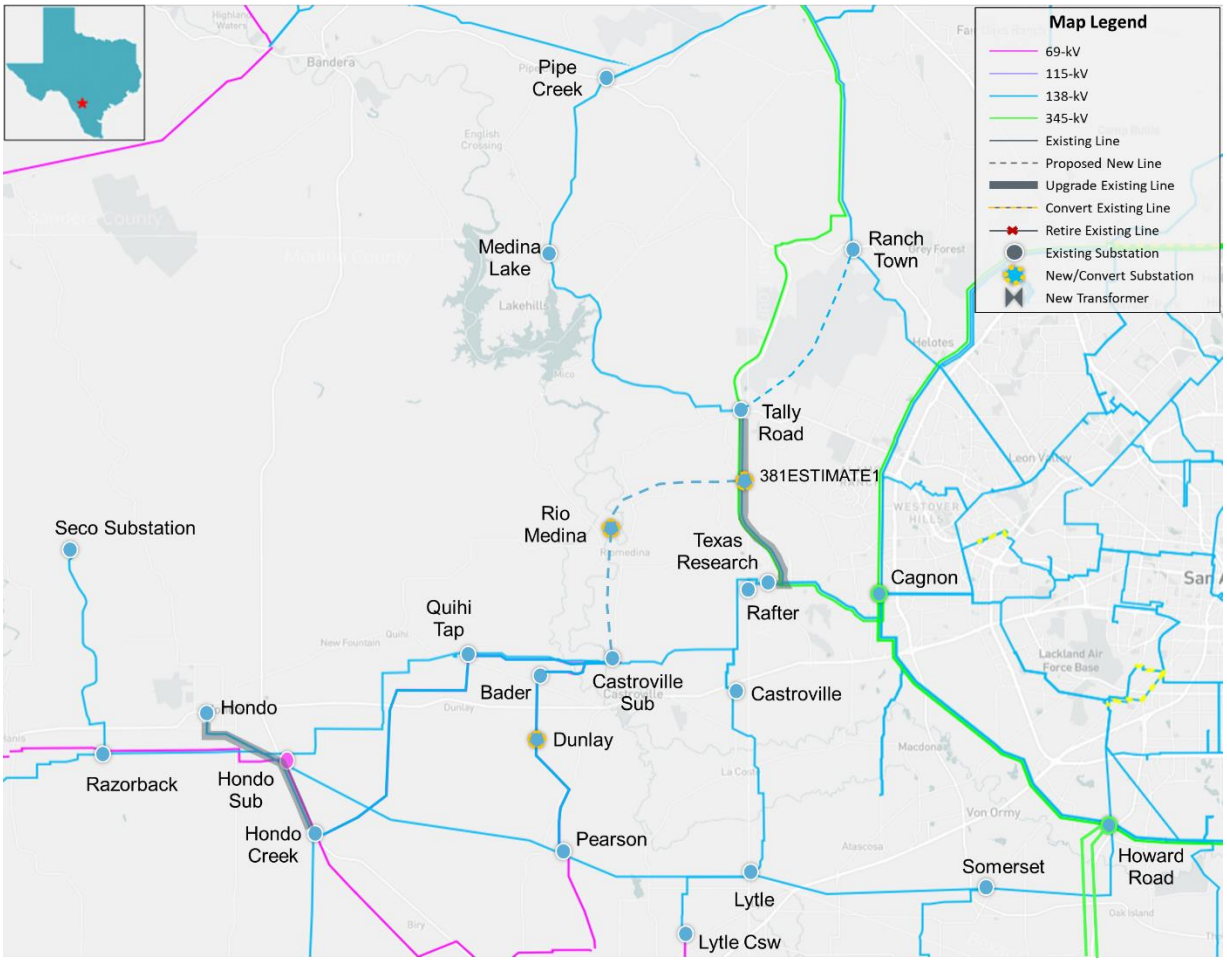

Figure 4.5: Map of Option 5

Option 6 consists of the following:

- Construct a new Rio Medina 138-kV substation.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile.

- Construct a new 381Estimate1 138-kV substation, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media – 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427474 MVA, approximately 5.6-mile.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal/emergency ratings of at least 285 MVA, approximately 9.6-mile.
- Rebuild the existing 381Estimate1 – Texas Research 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 4.9-mile.
- Construct a new Ranch Town – 381Estimate1 138-kV transmission line with normal/emergency ratings of at least 469 MVA, approximately 15.6-mile.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

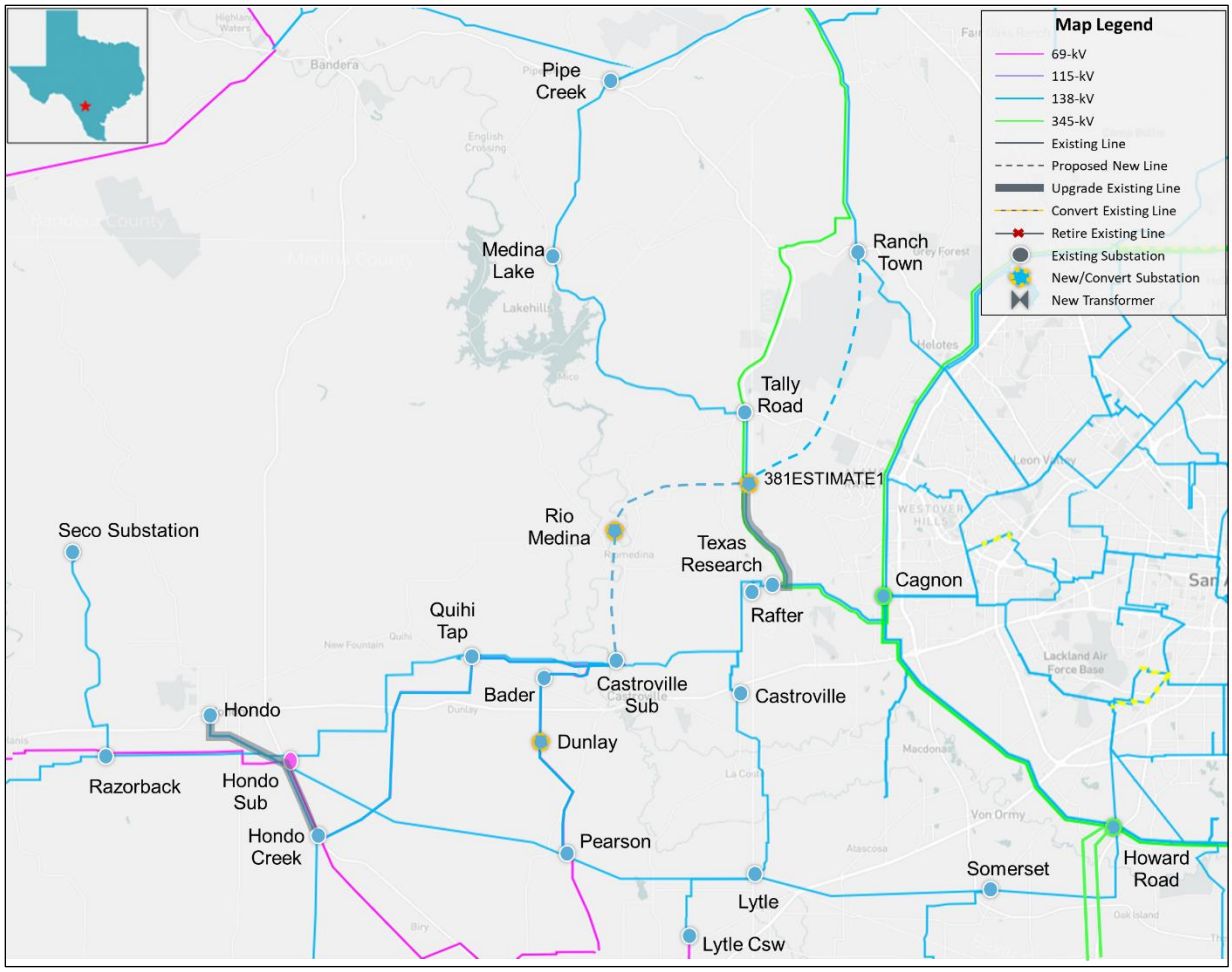

Figure 4.6: Map of Option 6

5 Option Evaluations

ERCOT performed reliability analysis, planned maintenance outage evaluation, and long-term load serving capability assessment to evaluate all six options and to identify any reliability impact of the options in the study area. This section details these studies and their results and compares the options.

5.1 Results of Reliability Analysis

All initial six options were evaluated based on the contingencies described in the methodology section of the report, and no reliability criteria violations were identified for Options 1 through 6 as shown in Table 5.1.

Table 5.1: Results of Initial Reliability Assessment for the Six Options

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

5.2 Planned Maintenance Outage Evaluation

Using the P1, P2.1, and P7 contingencies based on the review of the system topology of the area, ERCOT conducted an N-2 contingency analysis for each of the study options to represent system element outages under planned maintenance condition (N-1-1) in the area. Then, each N-2 violation was run as a N-1-1 contingency scenario, with system adjustments between the contingencies. The transmission elements in the local area of the Rio Medina Project were monitored in the maintenance outage evaluation.

As shown in Table 5.2, the results of this maintenance assessment indicates that Option 5 and Option 6 resolved all the reliability issues in the local area. Options 1, 2, 3 and 4 still had either the existing or new unsolved power flow issue along with voltage and/or thermal violations.

Table 5.2: Results of Planned Maintenance Outage Evaluation for the Six Options

Option	Voltage Violations	Thermal Overloads	Unsolved Power Flow
1	7	5	None
2	15	2	None
3	6	2	2
4	None	1	None
5	None	None	None
6	None	None	None

5.3 Short-listed Options

Based on the results shown in Table 5.2, Option 5 and Option 6 were selected as short-listed options for further evaluations. This section details these studies and their results and compares the short-listed options. Both the options are illustrated in Figures 5.1, and 5.2.

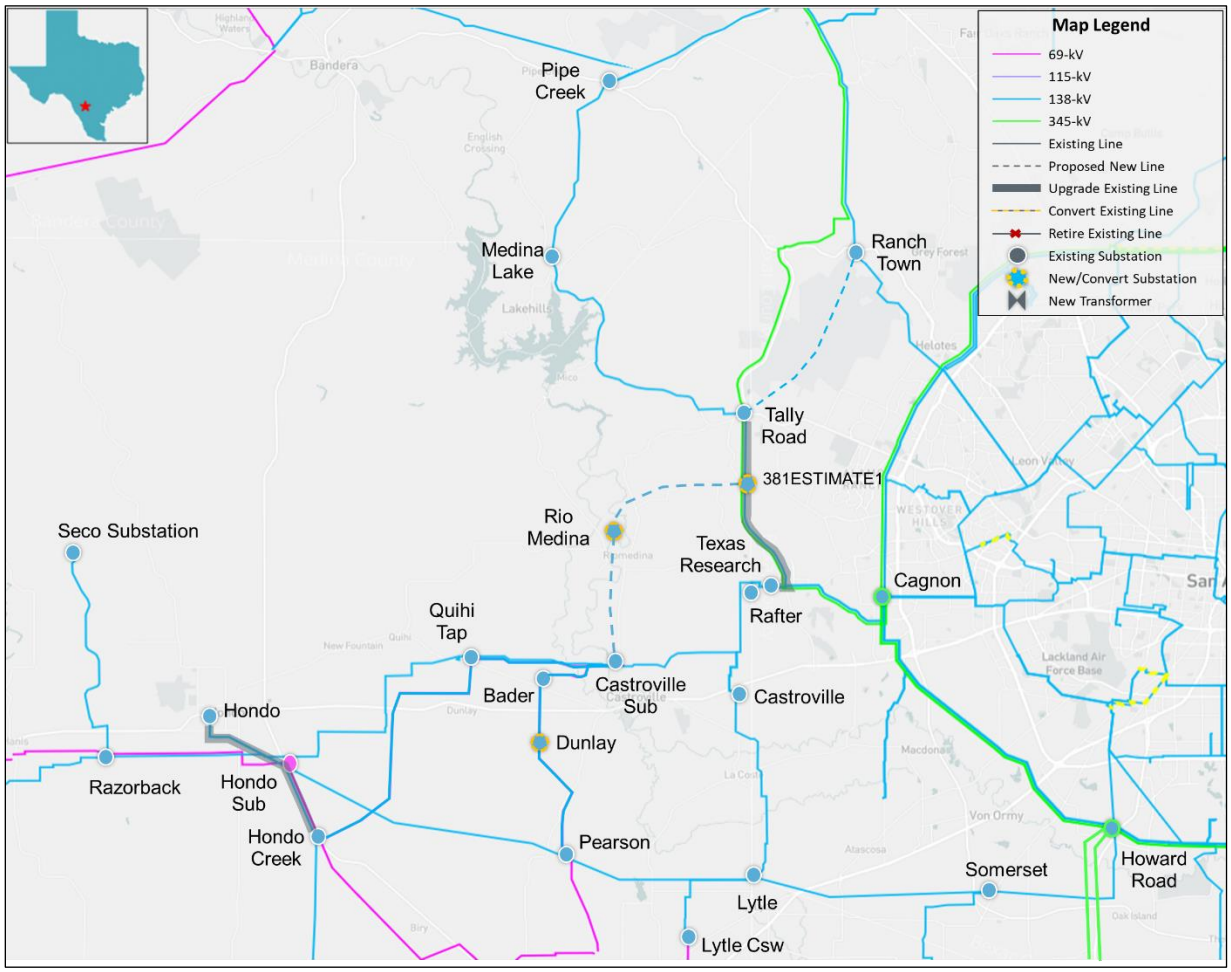

Figure 5.1: Map of Option 5

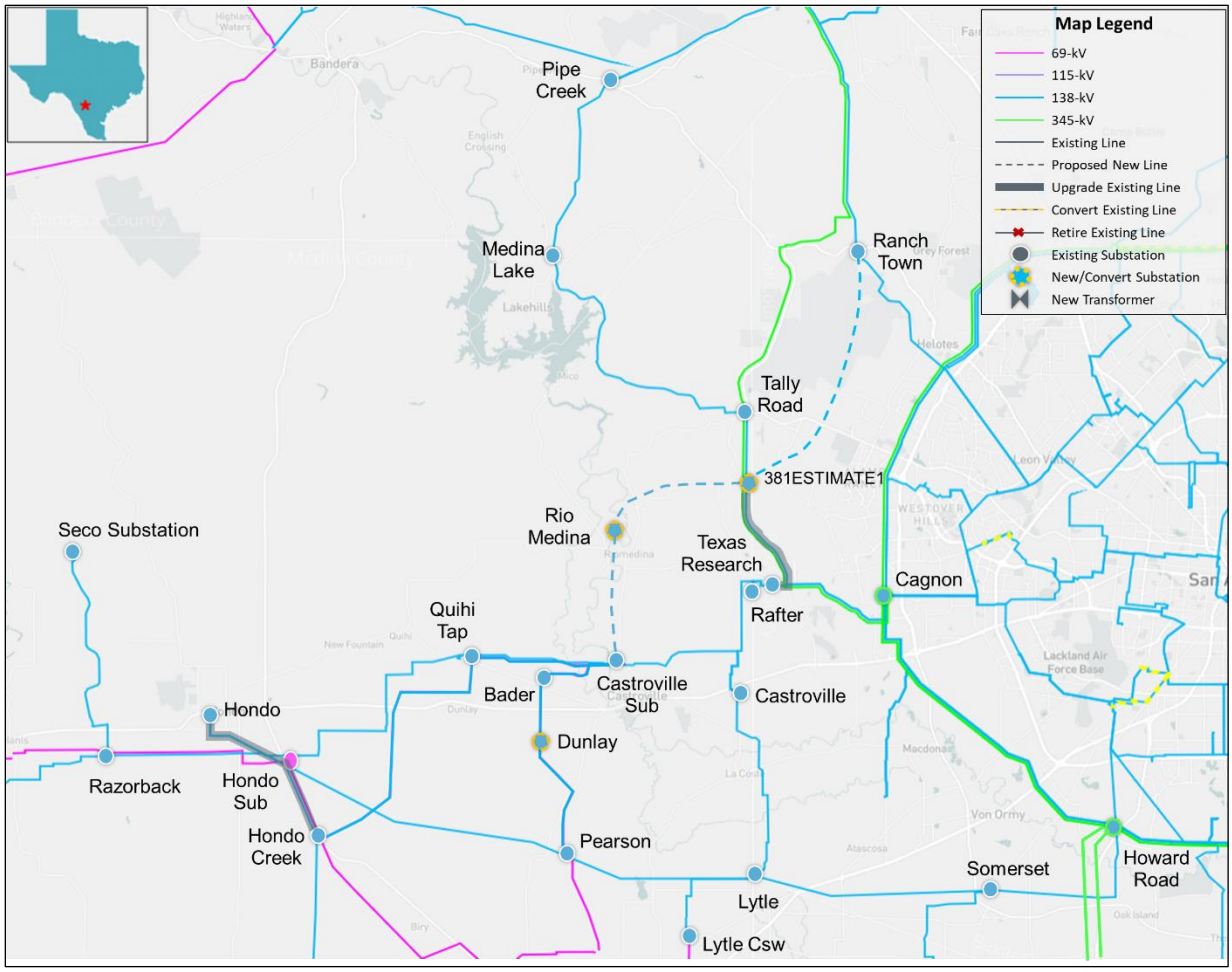

Figure 5.2: Map of Option 6

5.4 Long-Term Load Serving Capability Assessment

The need drivers for this RPG project are to meet the forecasted loads in the area and address the maintenance outage issues. Option 5 and Option 6 address these needs and were selected to perform the long-term load serving capability assessment.

The load serving capability analysis was performed based on N-1 contingency limits. The results show that Option 6 has a slightly higher long-term load serving capability than Option 5. The results are shown in Table 5.3.

Table 5.3: Results of the Long-Term Load Serving Capability Assessment of the Short-listed Options

Option	Incremental Load Serving Capability (MW)
5	416
6	444

5.5 Cost Estimate and Feasibility Assessment

STEC and CPS performed feasibility assessments and provided cost estimates for the two short-listed options. Table 5.4 summarizes the cost estimate, estimated mileage of CCN required, and option feasibility for both short-listed options.

Table 5.4: Cost Estimates and Feasibility of the Short-Listed Options

Option	Cost Estimates ($M)	CCN Required (Miles)	Feasible
5	71.7	22.1	Feasible
6	77.9	25.7	Feasible

6 Comparison of Short-listed Options

The comparison of Option 5 and Option 6, with corresponding cost estimates provided by STEC and CPSE are summarized in Table 6.1.

Table 6.1: Comparison of the Short-Listed Options

Monitored Line	Option 5	Option 6
Met ERCOT and NERC Reliability Criteria	Yes	Yes
Improved Operational Flexibility	Yes	Yes
Improves Long-Term Load Serving Capability	Yes	Yes (Better)
Requires CCN (Miles)	Yes (~22.1-mile)	Yes (~25.7-mile)
Cost Estimates ($M)	~71.7	~77.9

ERCOT recommends Option 5 as the preferred option to address the reliability need in the study area based on the following considerations:

- Option 5 meets both ERCOT and NERC reliability criteria;
- Option 5 is least cost solution;
- Option 5 improves long-term load serving capability; and
- Option 5 provides operational flexibility.

7 Congestion Analysis

ERCOT conducted a congestion analysis to identify any potential impact on system congestion related to the addition of the recommend project, Option 5, using the 2023 RTP 2028 final economic case.

The results of congestion analysis indicated Option 5 relieved one existing congestion and caused one new congestion as shown in Table 7.1.

Table 7.1: List of New and Existing Congestion Due to Transmission Upgrade of Option 5

Monitored Line	% Time of Congestion	New / Existing
Tally Road to Texas Research 138-kV Line	0.22	Existing
Medina Lake to Pipe Creek 138-kV Line	0.14	New

An additional test was conducted by upgrading Medina Lake to Pipe Creek 138-kV line to see if this alleviated the new congestion. Based on the results summarized in Table 7.2, the additional upgrade did not yield any economic benefit. Therefore, no upgrades will be recommended to solve this new congestion as part of Option 5.

Table 7.2: Test Results with Medina Lake to Pipe Creek 138-kV Line Upgrade

Upgrade Tested	Mileage (mi)	Passed Production Cost Savings Test	Passed Generation Revenue Reduction Test
Medina Lake to Pipe Creek 138-kV Line Upgrade	7.83	No	No

8 Conclusion

ERCOT evaluated the six transmission upgrade options to resolve the thermal overloads and voltage violations under maintenance outage conditions in the Medina County. Based on the results of the independent review, ERCOT recommends Option 5 as the preferred solution because it is the least cost option that addresses the thermal overloads and voltage violations under maintenance outage conditions with no reliability issues. Option 5 also provides operation flexibility, long-term load serving capability for future load growth in the area.

Option 5 consists of the following upgrades and is estimated to cost $71.7 million:

- Construct a new Rio Medina 138-kV substation. A 5-terminal, 138-kV breaker and a half bus arrangement including two line terminals and three transformer terminals.
- Construct a new Rio Media – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 4.5-mile. This transmission line will require new Right of Way (ROW).
- Construct a new 381Estimate1 138-kV substation in a 3-terminal ring bus arrangement, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Media – 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure with normal/emergency ratings of at least 427/474 MVA, approximately 5.6-mile. This transmission line will require new ROW.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal and emergency ratings of at least 285 MVA.
- Rebuild the existing Tally Road – 381Estimate1 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 3.0-mile.

- Rebuild the existing 381Estimate1 – Texas Research 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 4.9-mile.
- Construct a new Ranch Town – Tally Road 138-kV transmission line with normal and emergency ratings of at least 469 MVA, approximately 12.0-mile. This transmission line will require new ROW.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

This project will require a CCN for the ~22.1-mile of new 138-kV single circuit transmission line on a double-circuit structure from Castroville Sub 138-kV Substation to new Rio Medina 138-kV Substation, from Rio Medina 138-kV Substation to 381Estimate1 138-kV Substation, and from Ranch Town to Tally Road 138-kV Substation. The expected ISD of this project are January 2027.

Appendix A

Table A.1: List of Generation Added to the Economic Base Case Based on November 2023 GIS Report

GINR	Project Name	Fuel	Project COD	Capacity (~MW)	County
14INR0033	Goodnight Wind	WIN	12/30/2023	258.1	Armstrong
18INR0043	Lacy Creek wind	WIN	8/1/2023	301.3	Glasscock
18INR0058	Texana Solar	SOL	9/27/2024	152.3	Wharton
19INR0134	Cottonwood Bayou Solar	SOL	6/30/2024	351.4	Brazoria
19INR0177	Crawfish	WIN	12/31/2023	163.2	Wharton
19INR0203	Angelo Solar	SOL	5/3/2024	195.4	Tom Green
20INR0035	Angus Solar	SOL	4/1/2025	112.0	Bosque
20INR0047	Siete	WIN	10/31/2024	375.1	Webb
20INR0069	Danish Fields Solar	SOL	12/15/2023	602.8	Wharton
20INR0074	Pitts Dudik Solar	SOL	8/18/2023	49.6	Hill
20INR0080	Frye Solar	SOL	3/15/2024	514.1	Swisher
20INR0164	BPL Files Solar	SOL	7/26/2023	148.7	Hill
20INR0208	Signal Solar	SOL	3/15/2025	51.8	Hunt
20INR0210	Hopkins Solar	SOL	12/31/2023	253.1	Hopkins
20INR0246	Ryan Energy Storage	OTH	10/21/2024	50.0	Coryell
20INR0249	Appaloosa Run Wind	WIN	7/7/2023	175.0	Upton
20INR0250	Aguayo Wind	WIN	7/15/2023	196.0	Mills
20INR0269	Texas Solar Nova 2	SOL	12/29/2023	201.1	Kent
20INR0296	Sand Bluff Wind Repower	WIN	6/15/2023	89.5	Glasscock
21INR0012	Air Products GCA	GAS	11/30/2023	14.0	Galveston
21INR0019	Zier Solar	SOL	3/5/2024	163.0	Kinney
21INR0027	Zier Storage	OTH	3/5/2024	40.4	Kinney
21INR0203	Eastbell Milam Solar	SOL	11/30/2023	244.9	Milam
21INR0220	Maleza Solar	SOL	12/1/2024	254.9	Wharton
21INR0223	Tulsita Solar	SOL	12/31/2024	261.0	Goliad
21INR0253	Ulysses Solar	SOL	11/1/2024	150.0	Coke
21INR0257	Mercury Solar	SOL	6/30/2024	206.1	Hill
21INR0324	Board Creek Wind	WIN	7/30/2023	299.2	Navarro
21INR0325	Sheep Creek Wind	WIN	12/31/2023	153.0	Callahan
21INR0344	Lunis Creek Solar SLF	SOL	12/31/2024	617.1	Jackson
21INR0351	7V Solar	SOL	4/30/2024	240.6	Fayette
21INR0353	Big Elm Solar	SOL	7/31/2024	203.6	Bell
21INR0368	Eliza Solar	SOL	11/1/2024	151.9	Kaufman
21INR0389	Hollywood Solar	SOL	6/30/2024	353.4	Wharton
21INR0401	Young Wind	WIN	7/7/2023	499.1	Young
21INR0442	Myrtle Storage	OTH	12/15/2023	155.0	Brazoria
21INR0458	Porter Solar	SOL	3/31/2024	245.8	Denton
21INR0484	Mustang Creek Storage	OTH	8/15/2023	70.5	Jackson

GINR	Project Name	Fuel	Project COD	Capacity (~MW)	County
21INR0492	Stockyard Grid Batt	OTH	3/29/2024	150.6	Tarrant
21INR0499	Neptune Solar	SOL	12/22/2023	204.7	Jackson
21INR0511	Wolf Ridge Repower	WIN	12/31/2024	9.0	Cooke
21INR0515	Roadrunner Crossing Wind II	WIN	12/31/2023	126.7	Eastland
21INR0532	Brazos Wind Repower	WIN	8/14/2023	22.4	Scurry
22INR0223	Eiffel Solar	SOL	10/30/2023	241.0	Lamar
22INR0251	Shaula I Solar	SOL	10/30/2025	205.2	DeWitt
22INR0254	Pisgah Ridge Solar	SOL	5/15/2023	253.9	Navarro
22INR0260	Eliza Storage	OTH	11/1/2024	100.2	Kaufman
22INR0267	Shaula II Solar	SOL	5/30/2026	205.2	DeWitt
22INR0295	Coral Solar	SOL	12/15/2023	151.6	Falls
22INR0302	Bright Arrow Storage	OTH	9/19/2023	103.6	Hopkins
22INR0327	Hummingbird Storage	OTH	2/24/2024	103.8	Denton
22INR0335	Estonian Solar	SOL	10/15/2024	202.5	Delta
22INR0336	Estonian Storage	OTH	2/24/2024	101.6	Delta
22INR0338	Limousin Oak Storage	OTH	2/23/2024	104.6	Grimes
22INR0349	BRP Antlia BESS	OTH	12/1/2024	71.0	Val Verde
22INR0359	Dileo Solar	SOL	8/18/2023	71.4	Bosque
22INR0363	Hayhurst Texas Solar	SOL	11/1/2023	24.8	Culberson
22INR0366	BRP Libra BESS	OTH	11/27/2023	206.2	Guadalupe
22INR0368	Padua Grid BESS	OTH	12/31/2024	50.8	Bexar
22INR0397	Buckeye Corpus Fuels Solar	SOL	2/22/2025	57.6	Nueces
22INR0398	Sabal Storage	OTH	9/30/2023	18.0	Cameron
22INR0404	Fence Post Solar	SOL	7/12/2024	237.3	Navarro
22INR0405	Fence Post BESS	OTH	6/19/2024	71.6	Navarro
22INR0409	Stampede Solar	SOL	12/20/2024	255.7	Hopkins
22INR0410	Stampede BESS	OTH	9/21/2024	71.6	Hopkins
22INR0412	Andromeda Solar	SOL	8/30/2023	326.6	Scurry
22INR0429	Sun Valley BESS	OTH	9/10/2023	101.4	Hill
22INR0454	DR Solar	SOL	6/1/2024	46.0	Culberson
22INR0455	Blue Sky Sol	SOL	6/15/2024	101.2	Crockett
22INR0485	House Mountain	OTH	10/26/2023	63.0	Brewster
22INR0490	Callisto I Energy Center	OTH	6/1/2024	203.0	Harris
22INR0495	TIMBERWOLF BESS 2	OTH	9/1/2023	150.0	Crane
22INR0502	Shamrock	WIN	7/1/2024	223.9	Crockett
22INR0509	Turquoise Storage	OTH	7/31/2023	196.2	Hunt
22INR0524	St. Gall I Energy Storage	OTH	12/28/2023	102.6	Pecos
22INR0549	Tanzanite Storage	OTH	12/1/2024	257.7	Henderson
22INR0550	BLUE SUMMIT I REPOWER	WIN	7/1/2023	4.4	Wilbarger
22INR0551	Wolf Tank Storage	OTH	7/1/2023	155.5	Webb
22INR0552	Sowers Storage	OTH	12/1/2024	200.8	Kaufman
23INR0007	Outpost Solar	SOL	10/31/2024	513.7	Webb

GINR	Project Name	Fuel	Project COD	Capacity (~MW)	County
23INR0047	Charger Solar	SOL	5/31/2025	406.8	Refugio
23INR0054	Tanglewood Solar	SOL	1/16/2025	257.0	Brazoria
23INR0062	Noria Storage	OTH	9/1/2025	75.0	Nueces
23INR0111	GULF STAR SOLAR	SOL	2/1/2024	300.5	Wharton
23INR0124	Coral Storage	OTH	12/15/2023	99.0	Falls
23INR0153	Mercury II Solar	SOL	6/30/2024	206.1	Hill
23INR0154	Ebony Energy Storage	OTH	4/1/2024	208.4	Comal
23INR0159	Five Wells Storage	OTH	12/29/2023	220.8	Bell
23INR0160	Grimes County Solar	SOL	3/15/2025	210.0	Grimes
23INR0162	Redonda Solar	SOL	12/1/2024	253.2	Zapata
23INR0166	Great Kiskadee Storage	OTH	8/1/2024	103.1	Hidalgo
23INR0223	Garcitas Creek Solar	SOL	3/31/2025	201.9	Jackson
23INR0239	Giga Texas Energy Storage	OTH	12/15/2023	131.1	Travis
23INR0331	Talitha BESS	OTH	6/30/2024	61.4	Jim Wells
23INR0339	Remy Jade Power Station	GAS	4/1/2024	408.0	Harris
23INR0343	Guajillo Energy Storage	OTH	9/30/2024	201.1	Webb
23INR0363	Brazos Bend BESS	OTH	4/15/2024	101.6	Fort Bend
23INR0369	Anemoi Energy Storage	OTH	12/20/2023	205.0	Hidalgo
23INR0371	Rodeo Ranch Energy Storage	OTH	11/6/2023	307.5	Reeves
23INR0387	Pioneer DJ Wind	WIN	4/20/2024	140.3	Midland
23INR0408	TECO GTG2	GAS	2/18/2024	50.0	Harris
23INR0418	Angelo Storage	OTH	5/3/2024	103.0	Tom Green
23INR0419	SOHO BESS	OTH	1/1/2025	206.3	Brazoria
23INR0460	GULF STAR STORAGE	OTH	2/1/2024	301.0	Wharton
23INR0472	Frontera Energy Center	GAS	7/14/2023	524.0	Hidalgo
23INR0506	Beachwood II Power Station	GAS	3/1/2024	102.0	Brazoria
23INR0524	Temple II Repower	GAS	10/15/2023	0.0	Bell
23INR0551	Brotman II Power Station	GAS	8/7/2023	102.0	Brazoria
23INR0637	Goodnight Wind II	WIN	12/30/2023	258.3	Armstrong
24INR0015	Five Wells Solar	SOL	12/29/2023	322.8	Bell
24INR0147	Citadel BESS	OTH	5/7/2024	201.3	Harris
24INR0427	CPS AvR CT1 Rotor Replacement	GAS	1/30/2024	11.3	Bexar
23INR0470	BoCo BESS	OTH	6/22/2024	155.5	Borden
22INR0353	BRP Carina BESS	OTH	12/31/2024	151.9	Nueces
21INR0450	Danish Fields Storage	OTH	2/15/2024	152.4	Wharton
22INR0261	Dorado Solar	SOL	12/31/2025	406.3	Callahan
20INR0040	Montgomery Ranch Wind	WIN	2/29/2024	200.2	Foard
21INR0424	Tierra Bonita Solar	SOL	8/1/2024	309.7	Pecos
23INR0296	Trojan Solar	SOL	2/28/2026	151.3	Cooke
24INR0382	Remy Jade II Power Station	GAS	11/30/2024	102.0	Harris
21INR0444	Long Point Storage	OTH	12/1/2025	100.6	Brazoria
21INR0505	Ramsey Storage	OTH	6/1/2024	510.4	Wharton

GINR	Project Name	Fuel	Project COD	Capacity (~MW)	County
22INR0422	Ferdinand Grid BESS	OTH	5/31/2026	202.7	Bexar
23INR0219	Dogfish BESS	OTH	12/31/2024	75.0	Pecos
23INR0381	Soportar ESS	OTH	3/15/2025	102.1	Bexar
24INR0039	SP Jaguar BESS	OTH	6/30/2025	300.0	McLennan
24INR0109	Oriana BESS	OTH	7/2/2025	60.3	Victoria
24INR0265	Ironman BESS	OTH	11/1/2024	304.2	Brazoria
24INR0281	Red Egret BESS	OTH	6/1/2025	309.0	Galveston
24INR0436	Carambola BESS	OTH	5/31/2026	97.4	Hidalgo
25INR0162	SOHO II BESS	OTH	1/1/2025	206.3	Brazoria
21INR0302	Aureola Solar	SOL	6/28/2024	203.0	Milam
21INR0303	Mandorla Solar	SOL	1/2/2024	254.0	Milam
21INR0304	Halo Solar	SOL	6/20/2024	254.0	Bell
22INR0354	XE MURAT Solar	SOL	5/13/2024	60.4	Harris
23INR0367	Fewell Solar	SOL	9/9/2025	203.5	Limestone
24INR0038	SP Jaguar Solar	SOL	6/30/2025	300.0	McLennan
19INR0054	Monte Cristo 1 Wind	WIN	12/31/2024	236.9	Hidalgo
20INR0248	Second Division Solar	SOL	9/17/2024	100.3	Brazoria
23INR0026	Baker Branch Solar	SOL	8/1/2024	469.4	Lamar
23INR0525	Pyron Wind Repower	WIN	2/1/2024	19.9	Nolan
24INR0070	Sypert Branch Solar Project	SOL	6/1/2025	261.8	Milam
24INR0609	Rodeo Ranch Energy Storage II	OTH	11/6/2023	307.5	Reeves
25INR0223	Uhland Maxwell	GAS	4/15/2025	188.4	Caldwell
25INR0232	Isaac Solar	SOL	3/31/2026	51.6	Matagorda
22INR0555	Guevara Storage	OTH	7/15/2025	125.4	Rockwall
24INR0100	Sheep Creek Storage	OTH	7/1/2024	142.0	Callahan
24INR0138	Midpoint Storage	OTH	8/30/2025	52.2	Hill
24INR0140	Gaia Storage	OTH	7/31/2025	76.8	Navarro
24INR0273	Al Pastor BESS	OTH	9/2/2024	100.8	Dawson
24INR0295	Lucky Bluff BESS	OTH	5/31/2025	100.8	Erath
23INR0349	Tokio Solar	SOL	8/25/2025	177.6	McLennan
24INR0010	Pinnington Solar	SOL	10/15/2025	666.1	Jack
24INR0139	Midpoint Solar	SOL	8/30/2025	103.8	Hill
24INR0141	Gaia Solar	SOL	7/31/2025	152.7	Navarro

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May 28, 2024

Mr. Clif Lange
General Manager
South Texas Electric Cooperative
PO BOX 119
Nursery, TX 77976

Kenneth Bowen
Manager, Transmission Planning & Operations Engineering
CPS Energy
500 McCullough Avenue
San Antonio, Texas 78215

RE: STEC Rio Medina Project

Dear Mr. Lange and Mr. Bowen:

On February 16, 2024, the Electric Reliability Council of Texas (ERCOT) endorsed the following Tier 2 transmission project in accordance with ERCOT Protocol Section 3.11.4:

STEC Rio Medina Project:

- Construct a new Rio Medina 138-kV substation. A 5-terminal, 138-kV breaker and a half bus arrangement including two line terminals and three transformer terminals.
- Construct a new Rio Medina – Castroville Sub 138-kV single-circuit transmission line on a double-circuit structure, approximately 4.5-mile with normal and emergency ratings of at least 427 and 474 MVA respectively. This transmission line will require new Right of Way (ROW).
- Construct a new 381Estimate1 138-kV substation in a 3-terminal ring bus arrangement, by cutting into the existing Texas Research – Tally Road 138-kV transmission line.
- Construct a new Rio Medina – 381Estimate1 138-kV single-circuit transmission line on a double-circuit structure, approximately 5.6-mile with normal and emergency ratings of at least 427 and 474 MVA respectively. This transmission line will require new ROW.
- Upgrade the existing Hondo – Hondo Creek 138-kV transmission line with normal and emergency ratings of at least 285 MVA.
- Rebuild the existing Tally Road – 381Estimate1 138-kV transmission line, approximately 3.0-mile with normal and emergency ratings of at least 469 MVA.
- Rebuild the existing 381Estimate1 – Texas Research 138-kV transmission line, approximately 4.9-mile with normal and emergency ratings of at least 469 MVA.
- Construct a new Ranch Town – Tally Road 138-kV transmission line, approximately 12.0-mile with normal and emergency ratings of at least 469 MVA. This transmission line will require new ROW.
- Add a capacitor bank (Minimum: 18 MVAR) at Dunlay 138-kV substation.

Should you have any questions please contact me at any time.

Sincerely,

Kristi Hobbs
Vice President, System Planning and Weatherization
Electric Reliability Council of Texas

cc:

Pablo Vegas, ERCOT
Woody Rickerson, ERCOT
Prabhu Gnanam, ERCOT
Robert Golen, ERCOT
Brandon Gleason, ERCOT

STEC Medina Load Project – ERCOT Independent Review (EIR) Scope

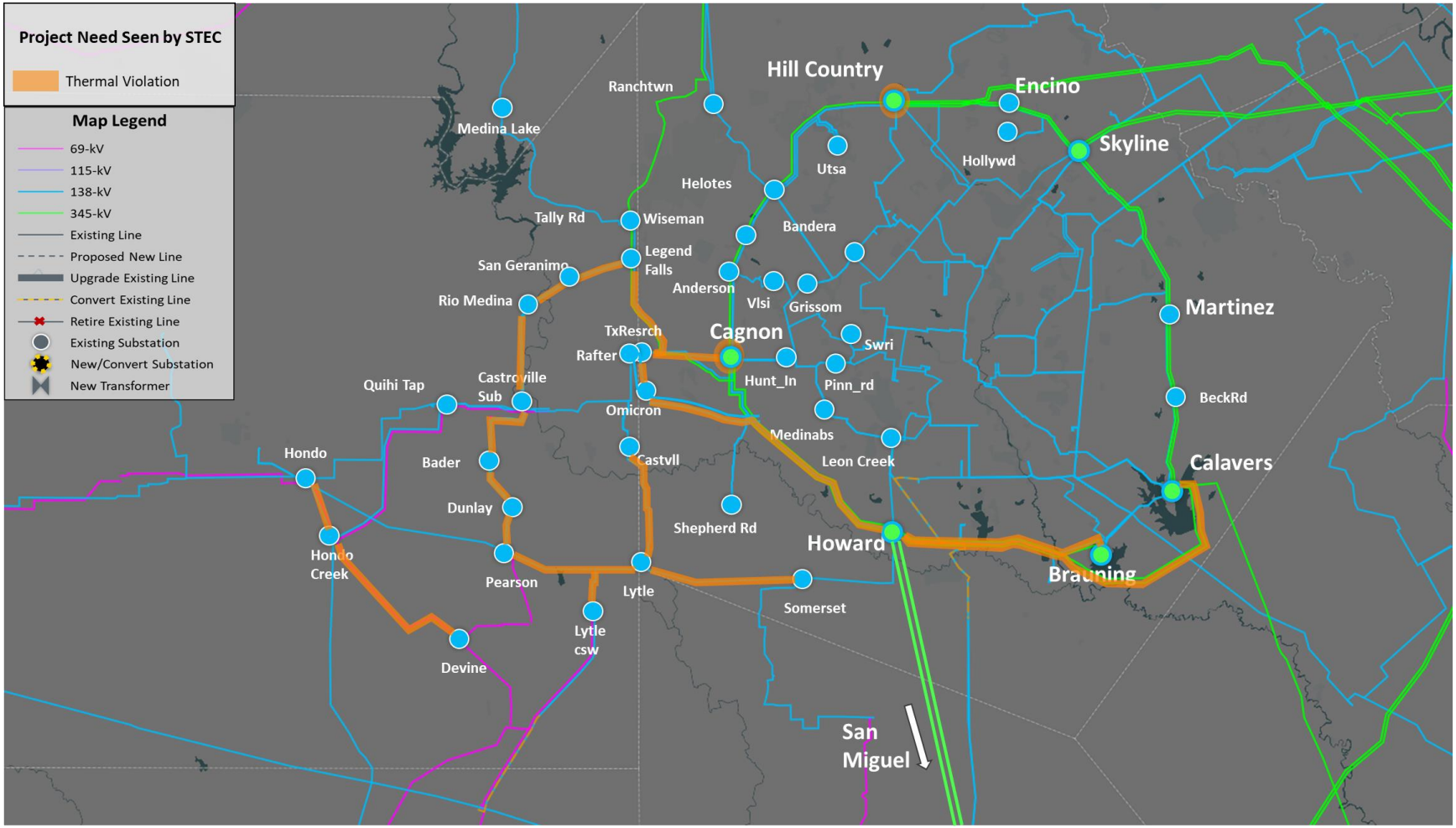
Abishek Penti

RPG Meeting
February 2, 2026

Introduction

- STEC submitted the Medina Load Project for Regional Planning Group (RPG) review in December 2025.
  - This Tier 1 project is estimated to cost $492 million and will require a Certificate of Convenience and Necessity (CCN)
  - Estimated in-service date (ISD) is June 2031
  - To address the reliability concerns seen by STEC with addition of approximately 1 GW Load
- ERCOT will incorporate this ERCOT Independent Review (EIR) into the ongoing EIR for the CPS Large Load Project (25RPG020)

Study Area Map with the violations as seen by STEC



Project Proposed by STEC

- Add the second 138 kV circuit to the existing Pearson to Castroville corridor, which includes the following line segments: Pearson to Dunlay, Dunlay to the new STEC Alsatian station, new STEC Alsatian station to Bader, and Bader to Castroville, with a rating of 426/474 MVA Normal/Emergency rating.
- Construct a new STEC-owned Alsatian 345/138 kV station on the Bader to Pearson 138 kV line approximately 0.8 miles from the Bader station with two parallel 345/138 kV autotransformers with at least 675/675 MVA Normal/Emergency rating.
- Install a new 162 MVAr capacitor bank on the 138 kV side of the new STEC-owned Alsatian 345/138 kV station (Rodgers and Edwards POI).
- Construct a new CPS Energy-owned three-terminal 345 kV switching station on the Kendall to Cagnon 345 kV line approximately 5 miles from Cagnon station.
- Construct a new 345 kV transmission line from CPS Howard station to the new STEC-owned Alsatian 345/138 kV station with at least 1746/1746 MVA Normal/Emergency ratings. This line will have a single circuit installed with double circuit capable structures and will require a CCN.

Project Proposed by STEC

- Construct a new 345 kV transmission line from a new CPS 345 kV switching station in the Cagnon to Kendall 345 kV transmission line to the new STEC-owned Alsatian 345/138 kV station with at least 1746/1746 MVA Normal/Emergency ratings. This line will have a single circuit installed with double circuit capable structures and will require a CCN.
- Install a new capacitor bank with at least 19.2 MVAr at STEC's Natalia 69 kV station.
- Rebuild STEC's Palo Duro to Dilley 138 kV line with a conductor rated at least 312/312 MVA Normal/Emergency rating.
- Install a new capacitor bank with at least 134 MVAr at AEP's Lytle 138 kV station.
- Install a new capacitor bank with at least 5.6 MVAr at AEP's Asherton 138 kV station.
- Rebuild CPS Energy's Bandera to Hamilton Wolf 138 kV line with conductors rated at least 371/371 MVA Normal/Emergency rating.
- Rebuild CPS Energy's Cachena to Elmcreek 345 kV line with conductors rated at least 1250/1250 MVA Normal/Emergency rating.

Project Proposed by STEC

- Rebuild CPS Energy's Howard to Spruce 345 kV line with conductors rated at least 1580/1580 MVA Normal/Emergency rating.
- Rebuild CPS Energy's Howard to Braunig 345 kV with conductors rated at least 1457/1457 MVA Normal/Emergency rating.
- Rebuild CPS Energy's/AEP's Lytle to Lytle 138 kV line with conductors rated at least 354/354 MVA Normal/Emergency rating.
- Upgrade CPS Energy's Hill Country 345/138 kV autotransformers #3 and #4 to at least 740/740 MVA Normal/Emergency rating.

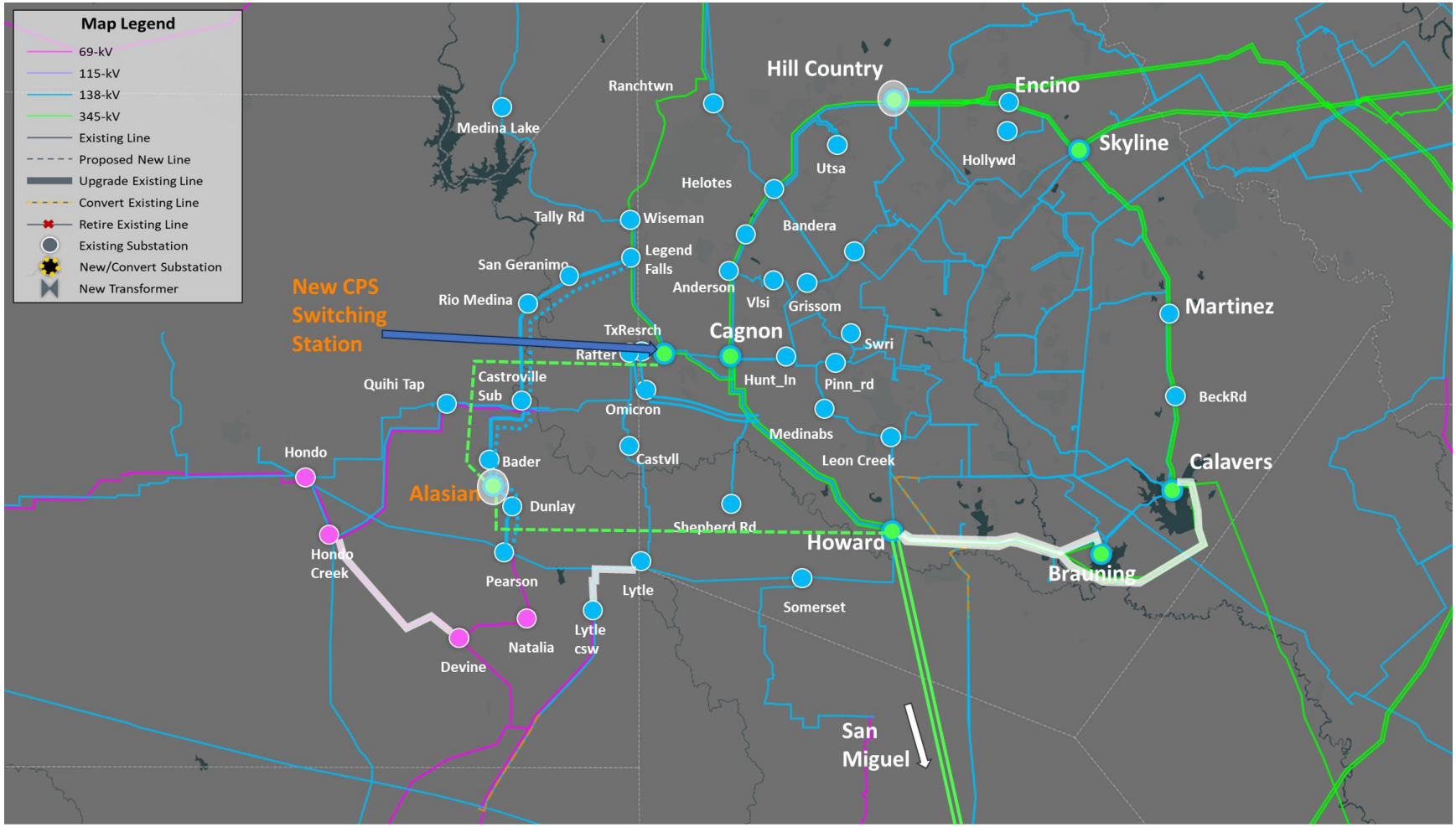
Additional Project Upgrades Proposed by STEC

- Install a third 345/138kV autotransformer in parallel at the new Alsatian 345/138 kV station with at least 675/675 MVA Normal/Emergency rating.
- Add the second 138 kV circuit along the existing Legend Falls to STEC Castroville corridor, which includes the following line segments: Legend Falls to San Geronimo new station, San Geronimo to Rio Medina, and Rio Medina to Castroville, with a rating of 426/474 MVA Normal/Emergency rating.
- Install an additional 223 MVAr of reactive support at the new Alsatian 345/138 kV Station.
- Install a new capacitor bank with at least 55.01 MVAr at Pearsall Switching Station 69 kV bus.
- Rebuild STEC's Hondo Creek to Devine 69 kV line with conductors rated at least 109/109 MVA Normal/Emergency rating.
- Install a new capacitor bank with at least 9.2 MVAr at CPS Energy's Somerset 138kV station.
- Rebuild AEP's Big Foot to Pleasanton 138 kV line with conductors rated at least 147/147 MVA Normal/Emergency rating.

Additional Project Upgrades Proposed by STEC

- Rebuild CPS Energy's Lytle to Somerset 138 kV line with conductors rated at least 339/339 MVA Normal/Emergency rating.
- Rebuild CPS Energy's Omicron to Rafter 138 kV line with conductors rated at least 642/642 MVA Normal/Emergency rating.
- Rebuild CPS Energy's Cagnon to Texas Research 138 kV with conductors rated at least 465/465 MVA Normal/Emergency rating.

Project Proposed by STEC



Study Assumptions Base Case

- Study Region
  - Bexar county in South Central Weather Zone, focusing on the transmission elements near the Medina, Atacosa, Bandera, Kendal, Comal, Wilson and Guadalupe Counties.
  - Monitor surrounding counties that are electrically close to the area
- Steady-State Base Case
  - Final 2025 Regional Transmission Planning (RTP) 2031 summer peak case was used as a seed case, posted in Market Information System (MIS), will be updated to construct the summer peak load study base case
    - Case: 2025RTP_2031_SUM_12222025
    - Link: https://mis.ercot.com/secure/data-products/grid/regional-planning

Study Assumptions – Transmission

- Based on the October 2025 Transmission Project and Information Tracking (TPIT) posted on MIS, projects with in-service dates before June 1, 2031, within the study area will be added to the study base case if not already modeled in the case
  - TPIT Link: https://www.ercot.com/gridinfo/planning
  - See Appendix A for a list of transmission projects added
- Transmission projects identified in the 2025 RTP as placeholder projects within the study area will be removed to develop the study base case
  - See Appendix B for a list of placeholder projects removed
- The following projects are also included in the base case development
  - CPS Helotes 345/138-kV Switching Station and Autotransformer Addition at Eastside Switching Station Project and Reactive Power Planning Project

Study Assumptions – Generation

- New generation that met Planning Guide Section 6.9(1) condition with Commercial Operation Date (COD) before the end of June 1, 2031, in the study area at the time of the study, but not already modeled in the RTP cases, will be added to the case based on the December 2025 Generator Interconnection Status (GIS) report posted in MIS in January 2026
  - GIS Link: https://www.ercot.com/gridinfo/resource
  - See Appendix C for a list of generation projects added
- Generation will be dispatched consistent with the 2025 RTP methodology
- All recent retired/indefinitely mothballed units will be reviewed and opened (turned off), if not already reflected in the 2025 RTP final case

Study Assumptions – Load & Reserve

- Load in study area
  - New loads in the study area will be added to the study base case
- Reserve
  - Load outside of study Weather Zone(s) will be adjusted to maintain the reserve consistent with the 2025 RTP

Contingencies & Criteria

- Contingencies for Study Region
  - NERC TPL-001-5.1 and ERCOT Planning Criteria
  - Link: http://www.ercot.com/mktrules/guides/planning/current)
    - P0 (System Intact)
    - P1, P2-1, P7 (N-1 conditions)
    - P2-2, P2-3, P4, and P5 (345-kV only)
    - P3: G-1+N-1 (G-1: Leon Creek U1, San Miguel U1, Sunray Solar U1, JK Spruce U1 Units)
    - P6: X-1+N-1 (X-1: Cagnon, Hill Country, Howard 345/138-kV transformer)
- Criteria
  - Monitor all 60-kV and above busses, transmission lines, and transformers in the study region (excluding generator step-up transformers)
    - Thermal
      - Use Rate A for normal conditions
      - Use Rate B for emergency conditions
    - Voltage
      - Voltages exceeding their pre-contingency and post-contingency limits
      - Voltage deviations exceeding 8% on non-radial load buses

Study Procedure

- Need Analysis
  - The reliability analysis will be performed to identify the need to serve the projected area load using the study base case
- Project Evaluation
  - Project alternatives will be tested to satisfy the NERC and ERCOT reliability requirements
  - ERCOT may also perform the following studies
    - Planned maintenance outage
    - Long-Term Load-Serving Capability Assessment
  - TSP(s) will provide Cost and Feasibility Assessment
- Generation Addition and Load Scaling Sensitivity Analyses
  - Planning Guide Section 3.1.3(4)
- Subsynchronous Oscillation (SSO) Assessment
  - Nodal Protocol Section 3.22.1.3(2)
- Congestion Analysis
  - Congestion analysis may be performed based on the recommended transmission upgrades to ensure that the identified transmission upgrades do not result in new congestion within the study area

Deliverables

- Tentative Timelines
  - Status updates at future RPG meetings
  - Final recommendation – Q2 2026

Thank you!

Stakeholder comments also welcomed through:

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Appendix A – Transmission Projects

- List of transmission projects added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	TSP
67329	San Miguel to Cruce 345 kV lines	Tier 1	Dec-26	STEC
99207	Rebuild (5.4 miles) Cagnon to VLSI transmission line to at least 698MVA	Tier 1	May-28	CPS
99857	LCRATSC_Gooseneck_Substation_Addition	Tier 1	Sep-28	LCRATSC
99922	Green Valley Substation Addition	Tier 1	Dec-28	LCRATSC
91312	Austrop - Zorn Transmission Line Upgrade	Tier 1	May-29	LCRATSC
98595	Solstice to Howard: Construct New 765 kV Single Circuit Line	Tier 1	Dec-30	AEP TNC
81594	Dunlay substation	Tier 2	Apr-26	STEC
71917	Upgrade STEC castroville to Pearson to 138kV	Tier 2	Apr-26	STEC
73098	Castroville Cut-in 138 kV	Tier 2	Oct-26	ETT
81590	Rio Medina substation	Tier 2	Jan-27	STEC
85008	Add Rio Medina - Legend Falls Tline	Tier 2	Jul-27	STEC
99784	Lytle: Expand 345 kV Station	Tier 2	Nov-30	AEP TCC
61404	Boerne Split-Welfare Transmission Line Upgrade	Tier 3	Jan-26	LCRATSC
76576	Asherton to Uvalde: Convert to 138 kV	Tier 3	Mar-26	AEP TCC
76569	Asherton: Rebuild 138 kV station	Tier 3	Dec-26	AEP TCC
61406	Kendall - Welfare Transmission Line Upgrade	Tier 3	Jun-27	LCRATSC
91392	Bergheim_Autotransformer_Upgrade	Tier 3	Dec-27	LCRATSC

Appendix A – Transmission Projects Cont.

- List of transmission projects added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	TSP
100285	Comfort_Kendall_Transmission_Line_Upgrade	Tier 3	May-28	LCRATSC
67915	Asherton to West Batesville: Rebuild 138 kV Line	Tier 3	Nov-31	AEP TCC/ETT
99187	This involves moving Harmony to a different bus/bay at Hill Country to alleviate the loading on HC auto 3 & 4.	Tier 4	Jan-26	CPS
44946	CPSE_New_Scenic_Loop_138kV_Load_Serving_Station	Tier 4	Jan-26	CPS
80319	Devine: Install Cap Bank	Tier 4	Mar-26	ETT
71319	Upgrade Pearsall Station	Tier 4	May-26	STEC
99904	Install a new 138kV transmission line approximately .1 miles long to connect the generator's interconnection facilities to Leon Creek Switchyard.	Tier 4	May-26	CPS
99185	This involves moving Potranco to a different bus/bay at Cagnon to alleviate the loading on Cagnon auto 3 & 4.	Tier 4	May-26	CPS
45029	Grandview Highland Hills Rebuild	Tier 4	Jun-26	CPS
76242	Lytle: Construct New 138 kV Terminal	Tier 4	Aug-26	ETT
73063	Big Foot to Lytle: Convert to 138 kV	Tier 4	Aug-26	AEP TCC
72268	CPSE_New Ingram Rd Substation	Tier 4	Oct-26	CPS
45136	CPSE_New Midtown Substation	Tier 4	Dec-26	CPS
92743	Rebuild ~3 miles of double-ckt from VLSI to Grissom transmission line with normal and emergency ratings of at least 478MVA	Tier 4	May-27	CPS

Appendix A – Transmission Projects Cont.

- List of transmission projects added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	TSP
100257	Hill Country Auto #4 will be replaced Summer 2027 to a 10% impedance auto.	Tier 4	May-27	CPS
91708	New San Geronimo Substation	Tier 4	Jul-27	STEC
80315	Big Foot to Pearsall: Convert to 138 kV	Tier 4	Dec-27	AEP TCC
80317	Dilley Switch to Pearsall: Convert to 138 kV, Reroute from Dilley to Dilley Switch, Rebuild Dilley to Dilley Switch 69 kV, and Double Circuit Dilley Switch to Pearsall with Dilley to Dilley Switch	Tier 4	Dec-27	AEP TCC
99802	Aetos: Construct New 138 kV Station	Tier 4	Dec-27	AEP TCC
73100	Asherton to Piloncillo: Rebuild 138 kV Line	Tier 4	Dec-27	AEP TCC
76768	Upgrade Pearson -Pearsall	Tier 4	May-28	STEC
45125	Quintana Rd to South San Rebuild	Tier 4	May-28	CPS
2308	36th St to Merida - 138 kV Transmission Line Rebuild	Tier 4	May-28	CPS
81659	Lytle: Construct New 138 kV Terminal	Tier 4	Dec-28	AEP TCC/ETT
3021	Sulpher Springs - New 138kV Substation	Tier 4	May-29	CPS
4320	CPSE_Brooks to Chavaneaux MLSE	Tier 4	Jan-30	CPS
2304	Chavaneaux_Chavaneaux Tap Rebuild (Brooks to Chavaneaux ckt)	Tier 4	Jan-30	CPS
1549	Devine Switch breaker addition	Tier 4	Dec-30	STEC

Appendix A – Transmission Projects Cont.

- List of transmission projects added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	TSP
45068	Merida to Harlandale Rebuild	Tier 4	May-31	CPS
57910	Uvalde to West Batesville: Rebuild 138 kV Line	Tier 4	Nov-31	AEP TCC
50647	CPSE_Merida to Westside MLSE	Tier 4	Jan-32	CPS
76790	Upgrade Pearsall Auto	Tier 4	May-32	STEC
2306	Randolph - 138 kV Substation Equipment Upgrade	Tier 4	Jun-32	CPS
3334	Fort Sam to Kirby and Fort Sam to Tenth Street MLSE Upgrade	Tier 4	Dec-32	CPS
73364	CPSE_New_Omicron_Substation	Tier 4	Oct-25	CPS
88046	Rebuild Omicron to Rafter	Tier 2	Oct-25	CPS
55873	Upgrade Moore to Hondo Creek 138 kV line	Tier 2	Dec-25	STEC
70536	New 138 kV Verde Circle Substation	Tier 4	Dec-25	CPS

Appendix B – Transmission Projects

- List of transmission projects removed from the study base case

TPIT No	Project Name	County
2025-SC07	Medina (5305) to 36th St (5427) 138-kV Line Upgrade	Bexar
2025-SC11	Lytle (5290) Area 138-kV Line Upgrades	Medina
2025-SC15	Omicron (5326) Area 138-kV Line Additions and Upgrades	Bexar
2025-SC16	Hamwolf (5187) to Bandera (5020) 138-kV Line Upgrade	Bexar
2025-SC17	Martinez (5295/5294) 345/138-kV Transformer Addition	Bexar
2025-W03	Carver (60412) to Poblano (8009) 69-kV to 138-kV Line Conversion	Edwards, Sutton, Uvalde

Appendix C – New Generation Projects to Add

GINR	Project Name	Fuel	Projected COD	Max Capacity (~MW)	County
21INR0334	Nightfall Solar	SOL	06/30/2026	180.9	Uvalde
23INR0479	Taormina Storage	BAT	05/26/2029	231.9	Bexar
24INR0533	Padua Grid BESS Unit 2	BAT	03/16/2026	150.9	Bexar
26INR0407	Rock Creek BESS	BAT	03/29/2028	251.1	Kendall
28INR0024	Padua Grid BESS Unit 3	BAT	05/15/2026	201.4	Bexar