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# Item 14.3: Recommendation Regarding Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group (RPG) Project

*Kristi Hobbs*
Vice President, System Planning and Weatherization

Board of Directors Meeting
December 8-9, 2025

- **Purpose**
  Provide an overview of the $110.62 million Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Tier 1 Reliability Project. Per ERCOT Protocol Section 3.11.4.7 Tier 1 projects require Board endorsement

- **Voting Items / Request**
  ERCOT staff requests and recommends that the Board of Directors (Board) endorse the Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line RPG Project (Option 1) based on North American Electric Reliability Corporation (NERC) and Electric Reliability Council of Texas, Inc (ERCOT) reliability planning criteria

**Key Takeaways**

- Ensuring ERCOT's leadership for grid reliability and resilience, the Project has completed RPG review and received an independent assessment from ERCOT staff and unanimous endorsement by the Technical Advisory Committee (TAC)
- ERCOT studied several options and recommends Option 1 as it addresses all project needs with no reliability violations and improves long-term load-serving capability

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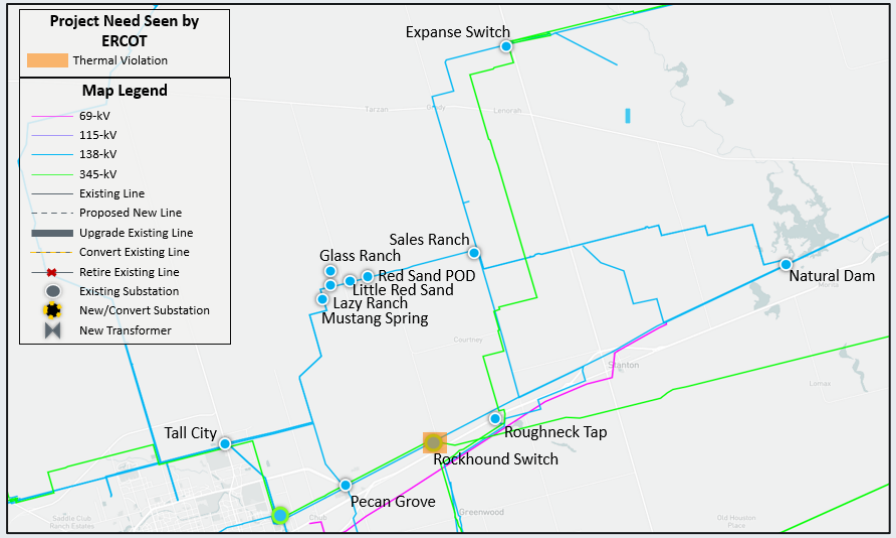
Item 14.3

# Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line RPG Project

- Oncor submitted the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Project for Regional Planning Group (RPG) review in June 2024
- The purpose of the project is to address the reliability issues in Martin and Midland Counties in the Far West Weather Zone
- ERCOT performed an independent review of the project and identified thermal overloads in Midland County
- ERCOT's endorsement of the project is based on the reliability need to relieve thermal overloads on two (2) 345/138-kV autotransformers in Midland County to meet NERC and ERCOT reliability planning criteria
- ERCOT presented the project and TAC voted unanimously to endorse the project on November 19, 2025

**Key Takeaway:** The Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project has completed RPG review and received unanimous endorsement by TAC.

## Thermal Overloads Seen by ERCOT



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# Basis for ERCOT Board Endorsement

ERCOT's independent review identified a reliability need for the Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project to satisfy:

## NERC TPL-001-5.1 Table 1 Reliability Criteria for category:

- P6-2: The contingency is the loss of a transformer with System adjustments followed by a transmission circuit outage

## ERCOT Planning Guide Section Reliability Performance Criteria contingency:

- 4.1.1.2(1)(d): The contingency is a loss of a single transformer followed by a single transmission element or common tower outage

**Key Takeaway:** The Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project is needed to meet reliability under NERC and ERCOT Planning Guide criteria.

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# Overall Project Summary

- One (1) new 345/138-kV substation
- Approximately 13 miles of new 345-kV double-circuit transmission lines
- Rebuild of approximately 9 miles of 138-kV single-circuit transmission lines
- Two (2) new 345/138-kV transformers
- Eight (8) new 345-kV circuit breakers
- Twelve (12) new 138-kV circuit breakers

**Key Takeaway:** The Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project (Option 1) will require a Certificate of Convenience and Necessity (CCN) for the new 345-kV double-circuit transmission lines

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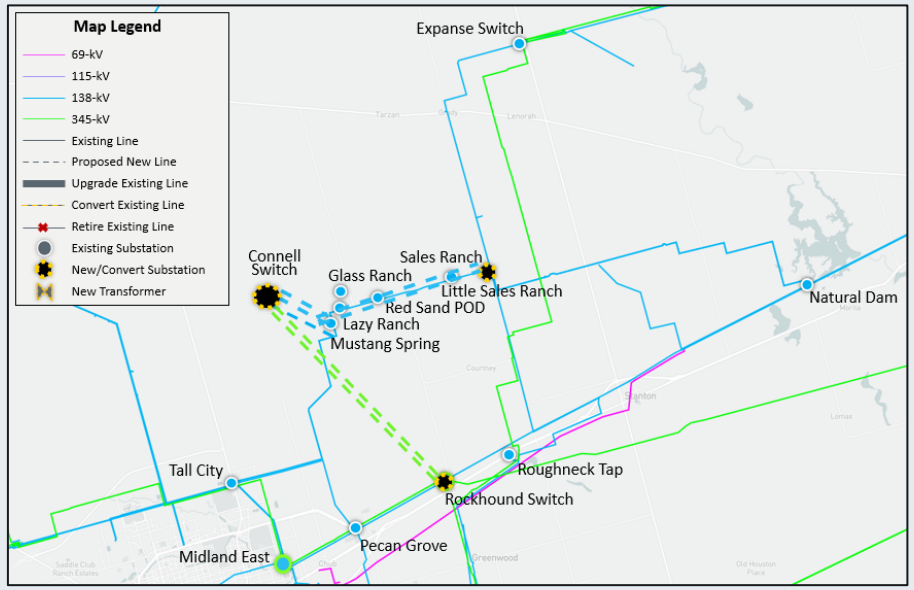
# Request for Board Vote

ERCOT staff requests and recommends that the Board:

- Endorse the need for the Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project (Option 1) based on NERC and ERCOT reliability planning criteria
- The ERCOT Independent Review (EIR) is included as ***Attachment A*** to the Board Decision Template

**Key Takeaway:** ERCOT studied several options and recommends Option 1 to address the reliability violations and improve long-term load-serving capability.

## ERCOT Recommendation



**Date:** December 1, 2025
**To:** Board of Directors
**From:** Kristi Hobbs, Vice President, System Planning and Weatherization (ERCOT)
**Subject:** Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group (RPG) Project

# Issue for the ERCOT Board of Directors

**ERCOT Board of Directors Meeting Date: December 8-9, 2025**

**Item No.:** 14.3

**Issue:**
Whether the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) should accept the recommendation of ERCOT staff to endorse the need for the Tier 1 Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group (RPG) Project in order to meet the reliability requirements for the ERCOT System and address thermal overloads due to load growth in the Far West Weather Zone, which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unanimously to endorse.

**Background/History:**
Oncor proposed the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project in June 2024, a $110.62 million, Tier 1 project with the expected in-service date of December 2026, to meet reliability planning criteria due to load growth in the Far West Weather Zone. Protocol Section 3.11.4.7, Processing of Tier 1 Projects, requires ERCOT to independently review submitted projects. ERCOT performed an independent review of the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project and identified thermal overloads in Midland County. The ERCOT project recommendation (Option 1), a $110.62 million, Tier 1 project with the expected in-service date of December 2026 addresses the need for a project under North American Electric Reliability Corporation (NERC) and ERCOT Planning Criteria to address thermal overloads on two (2) 345/138-kV autotransformers in Midland County with the following ERCOT System improvements:

- Construct a new Connell 345/138-kV switching station approximately 1.0 mile west of existing Oncor Glass Ranch Switch, with two new 600 MVA (nameplate)

345/138-kV transformers, in a 6-breaker 345-kV breaker-and-a-half bus arrangement and a 10-breaker 138-kV breaker-and-a-half bus arrangement, with all 345-kV equipment will be rating at least 2988 MVA and 138-kV at least 765 MVA;

- Construct two new Connell to Rockhound 345-kV lines, with conductors rated to at least 2988 MVA, in a new (estimated 13.0 mile) right of way (ROW), installed on new, common double-circuit towers;
- Install two new 345-kV circuit breakers at Oncor's existing Rockhound 345-kV Switch, rated at least 2988 MVA;
- Install two new 138-kV circuit breakers at Oncor's existing Sale Ranch 138-kV Switch, rated at least 765 MVA;
- Disconnect Oncor's existing Tall City to Sale Ranch 138-kV line at structure 1/9;
- Rebuild 9.0-mile portion of Oncor's existing single circuit 19.2-mile Sale Ranch to Glass Ranch to Tall City 138-kV line from Sale Ranch to existing 1/9 Structure and replace 9.0-mile portion with two new conductors, rated to at least 614 MVA, installed on new, common double-circuit towers;
- Construct two new Connell Switch to 1/9 structure 138-kV lines, with conductors rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed on new, common double-circuit towers configured to create a Connell Switch to Sale Ranch 138-kV double-circuit line;
- Construct a new single Connell Switch to 1/9 structure 138-kV line, with conductor rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed in one position on new double-circuit towers leaving one position vacant and configured to create a new Connell Switch to Tall City 138-kV line; and
- Reconfigure Oncor's existing Red Sand 138-kV POD to be connected to the south circuit on the new Connell to Sale Ranch 138-kV double circuit line.

ERCOT's independent review verified the reliability need for the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project to satisfy ERCOT Planning Guide Section 4.1.1.2(1)(d), Reliability Performance Criteria, contingencies are for the loss of a single transformer followed by a single transmission element or common tower outage, respectively.

RPG considered project overviews during meetings in August 2024 and November 2025. Between August 2024 and November 2025, ERCOT staff presented scope and status updates at RPG meetings in August, September, July, August, October and November. Pursuant to paragraph (2) of Protocol Section 3.11.4.9, Regional Planning Group Acceptance and ERCOT Endorsement, ERCOT presented the Tier 1 project to the Technical Advisory Committee (TAC) for review and comment, and on November 19, 2025, TAC unanimously endorsed the project as recommended by ERCOT. Pursuant to

paragraph (1)(a) of Protocol Section 3.11.4.3, Categorization of Proposed Transmission Projects, projects with an estimated capital cost of $100 million or greater are Tier 1 projects, for which Protocol Section 3.11.4.7(2) requires endorsement by the Board. Pursuant to Section 3.11.4.9, ERCOT's endorsement of a Tier 1 project is obtained upon affirmative vote of the Board.

ERCOT's assessment of the Sub-Synchronous Resonance (SSR) of existing facilities in Midland and Martin Counties in the Far West Weather Zone, conducted pursuant to Protocol Section 3.22.1.3, Transmission Project Assessment, yielded no adverse SSR impacts to the existing and planned generation resources at the time of the study. Results of the congestion analysis ERCOT conducted pursuant to Planning Guide Section 3.1.3, Project Evaluation, indicated no significant new congestion in the area with the addition of the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project (Option 1).

The report describing the ERCOT Independent Review of the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project (Option 1), including ERCOT staff's recommendation, is included as Attachment A.

**Key Factors Influencing Issue:**

1. ERCOT System improvements are needed to meet reliability planning criteria due to load growth in the Far West Weather Zone.
2. ERCOT staff found the recommended set of improvements to be the most efficient solution for meeting the planning reliability criteria, addressing thermal overloads and facilitating future transmission expansion for future load in the area.
3. Protocol Section 3.11.4.7 requires Board endorsement of a Tier 1 project, which is a project with an estimated capital cost of $100 million or greater pursuant to Protocol Section 3.11.4.3(1)(a).
4. TAC voted unanimously to endorse the Tier 1 Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group (RPG) Project (Option 1), as recommended by ERCOT, on November 19, 2025.

**Conclusion/Recommendation:**

ERCOT staff recommends that the Board endorse the need for the Tier 1 Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line RPG Project (Option 1), which ERCOT staff has independently reviewed, and which TAC has voted unanimously to endorse based on North American Electric Reliability Corporation (NERC) and ERCOT reliability planning criteria.

## ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.

## BOARD OF DIRECTORS RESOLUTION

WHEREAS, pursuant to Section 3.11.4.3(1)(a) of the Electric Reliability Council of Texas, Inc. (ERCOT) Protocols, projects with an estimated capital cost of $100 million or greater are Tier 1 projects, for which Section 3.11.4.7 requires endorsement by the ERCOT Board of Directors (Board); and

WHEREAS, after due consideration of the alternatives, the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) deems it desirable and in the best interest of ERCOT to accept ERCOT staff's recommendation to endorse the need for the Tier 1 Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group Project (Option 1), which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unanimously to endorse based on North American Electric Reliability Corporation (NERC) and ERCOT reliability planning criteria;

THEREFORE, BE IT RESOLVED, that ERCOT is hereby authorized and approved to endorse the need for the Tier 1 Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Regional Planning Group Project (Option 1), which ERCOT staff has independently reviewed, and which TAC has voted unanimously to endorse based on NERC and ERCOT reliability planning criteria.

## CORPORATE SECRETARY'S CERTIFICATE

I, Brandon Gleason, Assistant Corporate Secretary of ERCOT, do hereby certify that, at its _____ meeting, the Board passed a motion approving the above Resolution by _____.

IN WITNESS WHEREOF, I have hereunto set my hand this ___ day of _____, 2025.

_____

Brandon Gleason

Assistant Corporate Secretary

# ERCOT Independent Review of the Oncor Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project

# Document Revisions

| Date | Version | Description | Author(s) |
|---|---|---|---|
| 11/19/2025 | 1.0 | Final | Ben Richardson |
| | | Reviewed by | Robert Golen, Prabhu Gnanam |

# Executive Summary

Oncor submitted the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Project in June 2024. Oncor proposed this project to address North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-5.1 and ERCOT Planning Guide criteria thermal overloads and voltage violations in Martin and Midland Counties due to new loads confirmed by Transmission Service Provider (TSP) Attestation Letters.

The Oncor proposed project was estimated to cost approximately $110.62 million and was classified as a Tier 1 project per ERCOT Protocol Section 3.11.4.3. The proposed project will require a Certificate of Convenience and Necessity (CCN) application.

ERCOT performed an Independent Review, identified reliability issues (thermal overloads identified in Oncor's project submission) and evaluated three different transmission project options.

The ERCOT Independent Review (EIR) evaluated three different transmission project options. Based on the study results described in Sections 5 and 6 of this report, ERCOT recommends the following option (Option 1) to address the reliability issues mentioned. Option 1 consists of the following:

- Construct a new Connell 345/138-kV switching station approximately 1.0 mile west of existing Oncor Glass Ranch Switch, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 6-breaker 345-kV breaker-and-a-half bus arrangement and a 10-breaker 138-kV breaker-and-a-half bus arrangement, with all 345-kV equipment will be rating at least 2988 MVA and 138-kV at least 765 MVA;
- Construct two new Connell to Rockhound 345-kV lines, with conductors rated to at least 2988 MVA, in a new (estimated 13.0 mile) right of way (ROW), installed on new, common double-circuit towers;
- Install two new 345-kV circuit breakers at Oncor's existing Rockhound 345-kV Switch, rated at least 2988 MVA;
- Install two new 138-kV circuit breakers at Oncor's existing Sale Ranch 138-kV Switch, rated at least 765 MVA;
- Disconnect Oncor's existing Tall City to Sale Ranch 138-kV line at structure 1/9;
- Rebuild 9.0-mile portion of Oncor's existing single circuit 19.2-mile Sale Ranch to Glass Ranch to Tall City 138-kV line from Sale Ranch to existing 1/9 Structure and replace 9.0-mile portion with two new conductors, rated to at least 614 MVA, installed on new, common double-circuit towers;
- Construct two new Connell Switch to 1/9 structure 138-kV lines, with conductors rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed on new, common double-circuit towers configured to create a Connell Switch to Sale Ranch 138-kV double-circuit line;
- Construct a new single Connell Switch to 1/9 structure 138-kV line, with conductor rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed in one position on new double-

circuit towers leaving one position vacant and configured to create a new Connell Switch to Tall City 138-kV line; and

- Reconfigure Oncor's existing Red Sand 138-kV POD to be connected to the south circuit on the new Connell to Sale Ranch 138-kV double circuit line.

The cost estimate for Option 1 is approximately $110.62 million and is classified as a Tier 1 project per ERCOT Protocol Section 3.11.4.3(a). One or more CCN applications will be required for the new 345-kV double-circuit transmission line from Connell to Rockhound due to an approximately 13.0-mile of new ROW. The expected in-service date (ISD) of the project is December 2026.

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# 1 Introduction

In June 2024, Oncor submitted the Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project for Regional Planning Group (RPG) to address North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-5.1 and ERCOT Planning Guide criteria thermal overloads and voltage violations in Martin and Midland Counties due to new loads confirmed by Transmission Service Provider (TSP) Attestation Letters. The proposed project is in the Far West Weather Zone in Martin and Midland Counties.

The Oncor proposed project was estimated to cost approximately $110.62 million and was classified as a Tier 1 project per ERCOT Protocol Section 3.11.4.3. The proposed project will require a Certificate of Convenience and Necessity (CCN) application for an approximately 13.0-mile right of way (ROW). The expected in-service date (ISD) of the project is December 2026.

ERCOT conducted an Independent Review for this RPG project to identify any reliability needs in the area and evaluate various transmission upgrade options. This report describes the study assumptions, methodology, and the results of the ERCOT Independent Review (EIR) for the project.

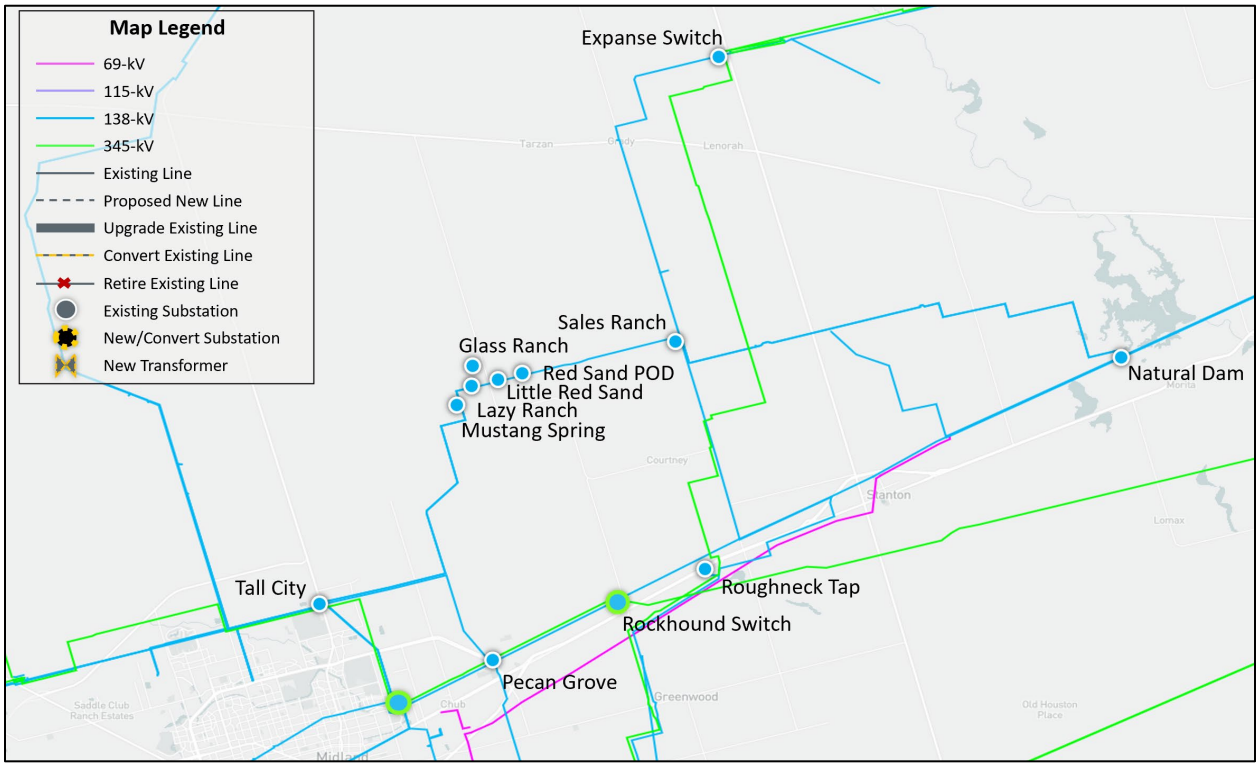


**Figure 1.1: Map of Transmission System in Study Area**

# 2 Study Assumptions and Methodology

ERCOT performed studies under various system conditions to identify potential reliability issues and corresponding transmission upgrades that will be necessary to support the proposed Connell 345/138-kV Switch and Connell to Rockhound 345-kV Double-Circuit Line Project. This section describes the study assumptions and criteria used to conduct this independent study.

## 2.1 Study Assumptions for Reliability Analysis

The project is in the Far West Weather Zone in Martin and Midland Counties.

### 2.1.1 Steady-State Study Base Case

A Final 2023 Regional Transmission Plan (RTP) case, published on the Market Information System (MIS) on December 20, 2023, was used as the reference case for this study and the 2026 study year was selected to create the base case. The steady-state study base case was constructed by updating transmission, generation, and loads of the following 2026 Summer peak load case[1]:

- Summer Peak Case: 2023RTP_2026_SUM_12222023.

### 2.1.2 Transmission Topology

Transmission projects within the study area with ISDs by June 1, 2026, were added to the study base case. The ERCOT Transmission Project Information and Tracking (TPIT)[2] report posted in June 2024 was used as a reference. The added TPIT projects are listed in Table 2.1.

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

| TPIT | Project Name | Tier | Project ISD | County |
|---|---|---|---|---|
| 72007 | Ranger Camp 345/138/69 kV Switch | Tier 1 | In-service | Mitchell |
| 78374 | Rockhound 345/138 kV Switch | Tier 3 | In-service | Midland Martin |
| 73368 | Grey Well Draw – Buffalo 138 kV Second Circuit | Tier 3 | In-service | Midland Martin |
| 76705 | Prairieland 345/138 kV Switch and 138 kV Line | Tier 2 | In-service | Glasscock |
| 80913 | Sloan 138 kV Switch | Tier 4 | 5/1/2025 | Midland |
| 71960 | Upgrade Grady – Expanse 138 kV Line | Tier 4 | 12/1/2024 | Martin |
| 81223 | Range Rider 138 kV Switch | Tier 1 | 12/1/2025 | Mitchell |
| 72009 | Cattleman 345/138 kV Switch | Tier 1 | 12/1/2025 | Mitchell |
| 87861 | Range Rider – Ranger Camp 138 kV Double-Circuit Line | Tier 1 | 12/1/2025 | Mitchell |
| 81274 | Ranger Camp – Cattleman 345 kV Double-Circuit Line | Tier 1 | 12/1/2025 | Mitchell |
| 81270 | Construct the new Prong Moss 345 kV switch | Tier 1 | 12/1/2025 | Howard |
| 81232 | Cattleman – Bitter Creek/Champion Creek 345 kV Reroute | Tier 1 | 12/1/2026 | Mitchell |
| 81410 | Reiter Switch Synchronous Condenser | Tier 1 | 1/1/2027 | Ector |

[1] 2023 Regional Transmission Plan Postings: https://mis.ercot.com/secure/data-products/grid/regional-planning?id=pg3-3200-m
[2] TPIT Report: https://www.ercot.com/gridinfo/sysplan/index.html

| TPIT | Project Name | Tier | Project ISD | County |
|---|---|---|---|---|
| 81415 | Tonkawa Switch Synchronous Condenser | Tier 1 | 1/1/2027 | Scurry |
| 80870 | Bakersfield Dynamic Reactive Substation Upgrade | Tier 1 | 5/1/2027 | Pecos |
| 81299 | Ranger Camp – Prong Moss 345 kV Line Rebuild | Tier 1 | 5/1/2027 | Mitchell Howard |
| 81227 | Cattleman – Gascondades 345 kV Reroute | Tier 1 | 6/1/2027 | Mitchell |
| 87633 | WETT Buck Canyon Synchronous Condenser | Tier 1 | 7/1/2027 | Borden |
| 87635 | WETT Pitchfork Synchronous Condenser | Tier 1 | 9/1/2027 | Dickens |
| 87629 | WETT Binturong Synchronous Condenser | Tier 1 | 11/1/2027 | Glasscock |
| 72011 | Tonkawa – Ranger Camp 345 kV Line Rebuild | Tier 1 | 12/1/2027 | Mitchell Scurry |
| 81296 | Prong Moss – Rockhound 345 kV Line Rebuild | Tier 1 | 12/1/2027 | Mitchell Howard |
| 81175 | Salt Flat Road 138 kV Switch and Salt Flat Road - Barr Ranch - Reiter 138 kV Second Circuit | Tier 3 | 12/1/2025 | Ector, Midland |
| 81305 | Expanse - Vealmoor 138 kV Line Rebuild (Tredway 138-kV Switch and Expanse to Tredway 138-kV 2nd Circuit) | Tier 1 | 12/1/2025 | Borden, Howard, Martin |

The transmission projects, listed in Table 2.2, identified in the 2023 RTP as placeholder projects in the study area and were not approved by RPG were removed from the study base case.

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

| RTP Project ID | Project Name | County |
|---|---|---|
| 2021-FW4 | Rio Pecos – Rankin – Texon Tap – Atlantic Best Tap – Kemper Tap – Big Lake 69-kV to 138-kV Line Conversion | Pecos, Upton, Reagan |
| 2021-FW19 | Morgan Creek SES - Longshore Switch 345-kV Line Upgrade | Mitchell, Howard |
| 2021-FW20 | Lamesa – Key Sub – Gail Sub – Willow Valley Switch 138-kV Line Upgrade | Dawson, Borden |
| 2023-FW4 | Buzzard Draw Switch – Koch Tap – Vealmoor 138-kV Line Upgrade | Howard |
| 2023-FW9 | East Stiles 138-kV Cap Bank Addition | Reagon |
| 2023-FW13 | Bulldog – Elbow – Eiland – Einstein – Carterville 138-kV Line Upgrade | Howard, Midland |
| 2022-WFW1 | Twin Buttes – Hargrove – Pumpjack – Jerry – Russek Street – Big Lake 138-kV line Upgrade | Tom Green, Irion, Reagan |

### 2.1.3 Generation

Based on the September 2024 Generator Interconnection Status (GIS)[3] report posted on the ERCOT website in October 2024, there were no generators that met Planning Guide Section 6.9(1) conditions with Commercial Operations Date (COD) prior to June 1, 2026.

The status of each unit that was projected to be either indefinitely mothballed or retired at the time of the study was reviewed. The units listed in Table 2.3 were opened (turned off) in the study base case to reflect their mothballed/retired status.

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

**Table 2.3: List of Generation Opened to Reflect Mothballed/Retired/Forced Outage Status**

| Bus No | Unit Name | Max Capacity (~MW) | Weather Zone |
|---|---|---|---|
| 150711 | STEA_STEAM_1 | 17.5 | NORTH_CE |
| 130121 | SGM_SIGNALMT | 7.5 | FAR_WEST |

Generation listed in Table 2.4 were closed (turned on) in the study base case to reflect the change in their Generation Resource as this resource is returning to year-round service.

**Table 2.4: List of Generation Closed to Reflect Returning to Service Status**

| Bus No | Unit Name | Max Capacity (~MW) | Weather Zone |
|---|---|---|---|
| 151361 | CHSMGRD_BES1 | 101.7 | NORTH_CE |

### 2.1.4 Loads

Loads in the ERCOT system were consistent with 2023 RTP. This project is driven by confirmed by TSP Attestation Letters. Load was adjusted outside the West and Far West Weather Zones to maintain the minimum reserve requirements consistent with the 2023 RTP methodology.

## 2.2 Long-Term Load-Serving Capability Assessment

ERCOT performed a long-term load-serving capability assessment to compare the performance of the study options.

Incremental load serving capability was evaluated to assess the long-term load-serving capability. The loads in the study area were increased (customer designated as non-scalable remained at the same level as in the study base case), and conforming loads outside of West and Far West Weather Zones were decreased to balance power.

## 2.3 Maintenance Outage Scenario

ERCOT performed a planned maintenance outage evaluation based on historic off-peak system load. Conforming loads in the West Weather Zone was scaled down to 88.4% of the summer peak load to create the off-peak case. Loads designated as non-scalable remained at the same level as in the study base case. Next, ERCOT Planning Guide Section 4.1.1.8 Maintenance Outage Reliability Criteria was evaluated to identify and address violations.

## 2.4 Study Assumptions for Economic Study

An economic study was performed to further evaluate the study options and to identify any new congestion in the study area with the addition of the respective transmission upgrade options.

The 2023 RTP 2028 economic case was updated based on the February 2025 GIS[4] report for generation updates and the February 2025 TPIT[5] report for transmission updates to conduct the economic study. The 2028 study year was selected as it's the future year case currently available.

New transmission project additions are listed in Table A.1 in Appendix A of this document.

New generation additions listed in Table A.2 in Appendix A of this document were added to the economic base case and all generation listed in Table 2.3 were opened (turned off) in the study base case to reflect their mothballed/retired status. Furthermore, generation listed in Table 2.4 was removed from seasonal settings in the study base case as this resource is returned to year-round service.

## 2.5 Methodology

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

### 2.5.1 Contingencies and Criteria

The reliability assessments were performed based on NERC Reliability Standard TPL-001-5.1, ERCOT Protocols, and ERCOT 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);
- P2-2, P2-3, P4, and P5 (345-kV only);
- P3: G-1+N-1 (G-1: generation outage) {Cedar Bayou G2, Exxon G4, Baytown Energy G1 and Diamon Shamrock Battleground G3}; and
- P6-2: X-1+N-1 (X-1: 345/138-kV transformer only) {Cedar Bayou A3, Greens Bayou A1, Bellaire A4, PH Robinson A4 and Jordan A1}.

All 60-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 limits
  - Rate A (normal rating) for pre-contingency conditions; and
  - Rate B (emergency rating) for post-contingency conditions.
- Voltage limits
  - Voltages exceeding pre-contingency and post-contingency limits; and
  - Voltage deviations exceeding 8% on non-radial load buses.

[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

### 2.5.2 Study Tools

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 12.3.0.30786 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 of this document. This analysis indicated thermal overloads in Midland County under NERC P6-2(X-1+N-1). These issues are summarized in Table 3.1 and visually illustrated in Figure 3.1. Detailed thermal overloads are listed in Table 3.2.

**Table 3.1: Reliability Issues Seen Under NERC TPL-001-5.1 and ERCOT Planning Criteria in the Study Area**

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

**Table 3.2: Thermal Overloads Observed in the Study Area**

| NERC Contingency Category | Overloaded Element | Voltage Level (kV) | Length (~miles) | Max Loading (%) |
|---|---|---|---|---|
| P6-2 | Rockhound 345/138-kV Auto #1 | 345/138 | 0 | 132 |
| P6-2 | Rockhound 345/138-kV Auto #2 | 345/138 | 0 | 132 |

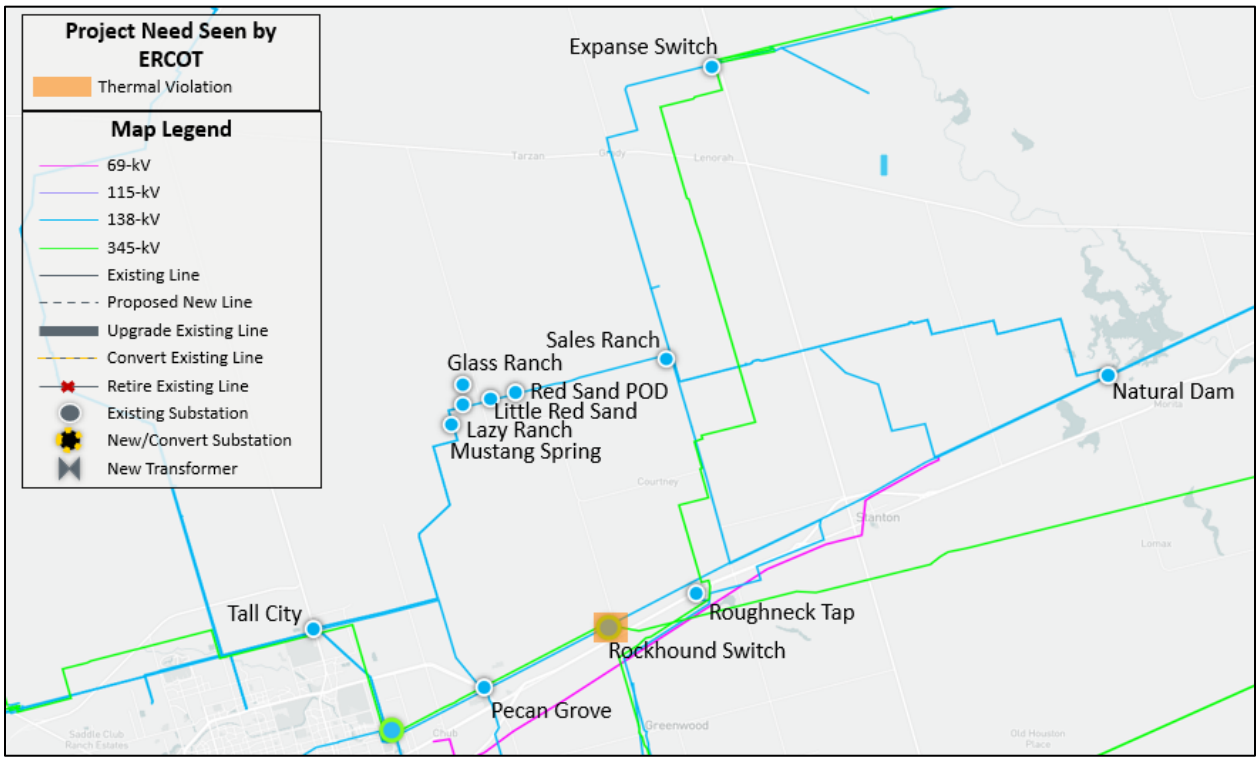


**Figure 3.1: Study Area Map Showing Project Need Seen by ERCOT**

# 4 Description of Project Options

ERCOT evaluated three system improvement options to address the reliability violations observed in the study base case in the study area.

Option 1 (Oncor proposed solution) consists of the following:

- Construct a new Connell 345/138-kV switching station approximately 1.0 mile west of existing Oncor Glass Ranch Switch, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 6-breaker 345-kV breaker-and-a-half bus arrangement and a 10-breaker 138-kV breaker-and-a-half bus arrangement, with all 345-kV equipment will be rating at least 2988 MVA and 138-kV at least 765 MVA;
- Construct two new Connell to Rockhound 345-kV lines, with conductors rated to at least 2988 MVA, in a new (estimated 13.0 mile) ROW, installed on new, common double-circuit towers;
- Install two new 345-kV circuit breakers at Oncor's existing Rockhound 345-kV Switch, rated at least 2988 MVA;
- Install two new 138-kV circuit breakers at Oncor's existing Sale Ranch 138-kV Switch, rated at least 765 MVA;
- Disconnect Oncor's existing Tall City to Sale Ranch 138-kV line at structure 1/9;
- Rebuild 9.0-mile portion of Oncor's existing single circuit 19.2-mile Sale Ranch to Glass Ranch to Tall City 138-kV line from Sale Ranch to existing 1/9 Structure and replace 9.0-mile portion

with two new conductors, rated to at least 614 MVA, installed on new, common double-circuit towers;

- Construct two new Connell Switch to 1/9 structure 138-kV lines, with conductors rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed on new, common double-circuit towers configured to create a Connell Switch to Sale Ranch 138-kV double-circuit line;
- Construct a new single Connell Switch to 1/9 structure 138-kV line, with conductor rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed in one position on new double-circuit towers leaving one position vacant and configured to create a new Connell Switch to Tall City 138-kV line; and
- Reconfigure Oncor's existing Red Sand 138-kV POD to be connected to the south circuit on the new Connell to Sale Ranch 138-kV double circuit line.

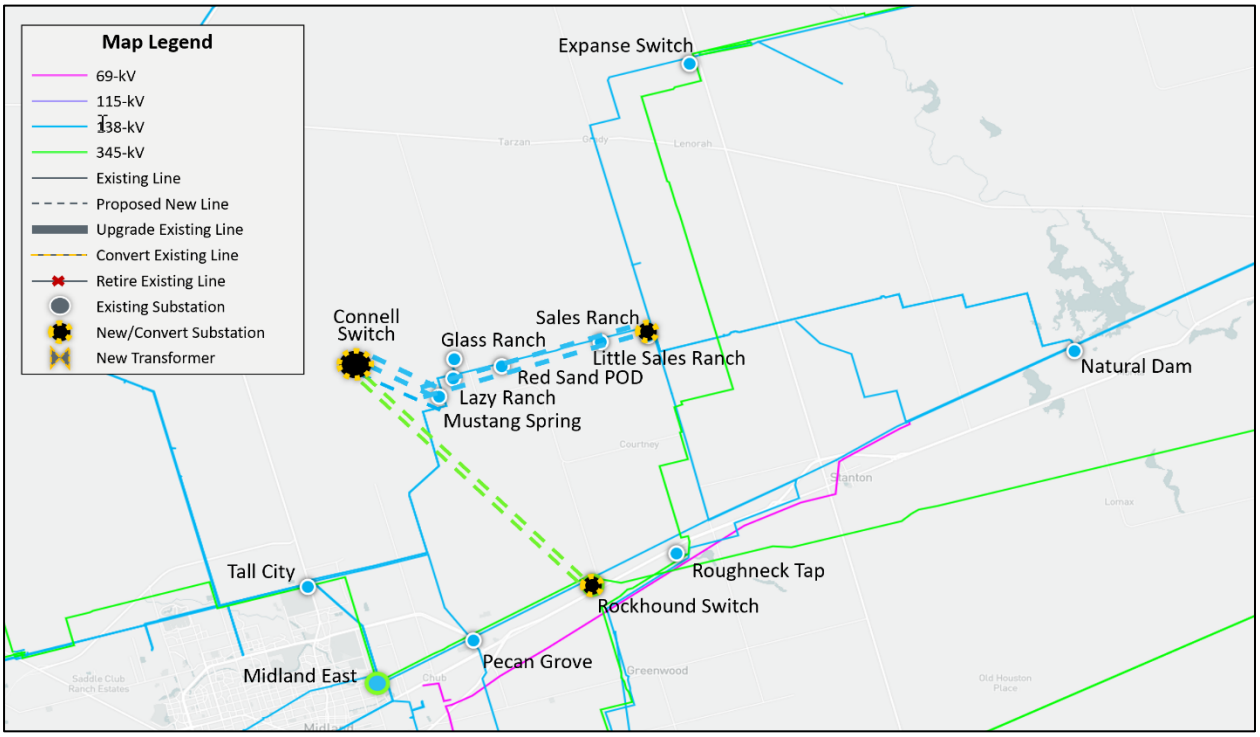


**Figure 4.1: Map of Option 1**

Option 2 consists of the following:

- Add a new 600 MVA (nameplate) 345/138-kV transformer to the existing Rockhound substation.

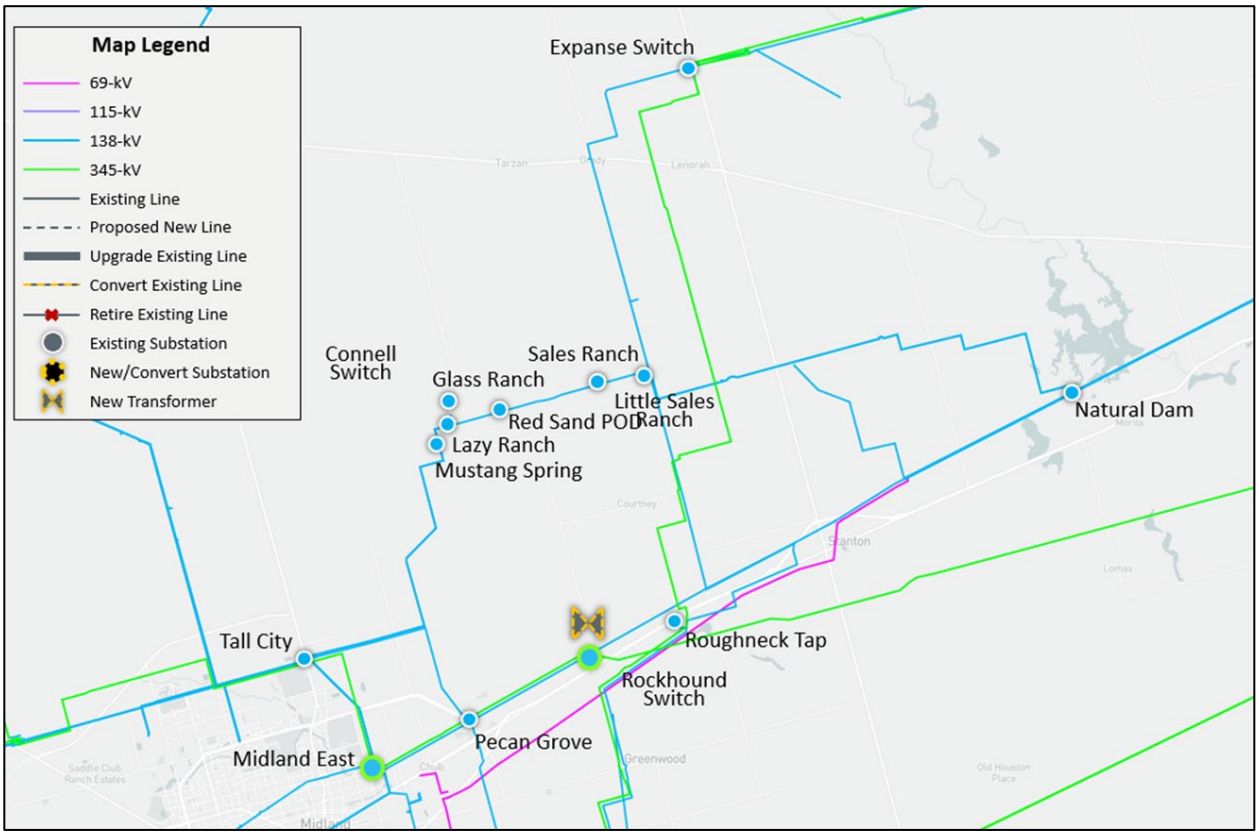


**Figure 4.2: Map of Option 2**

Option 3 consists of the following:

- Install 6 capacitor banks (18.4 MVAr each) to a feasible location near the Expanse 138-kV substation; and
- Install 6 capacitor banks (18.4 MVAr each) to a feasible location near the Lazy Ranch 138-kV substation.

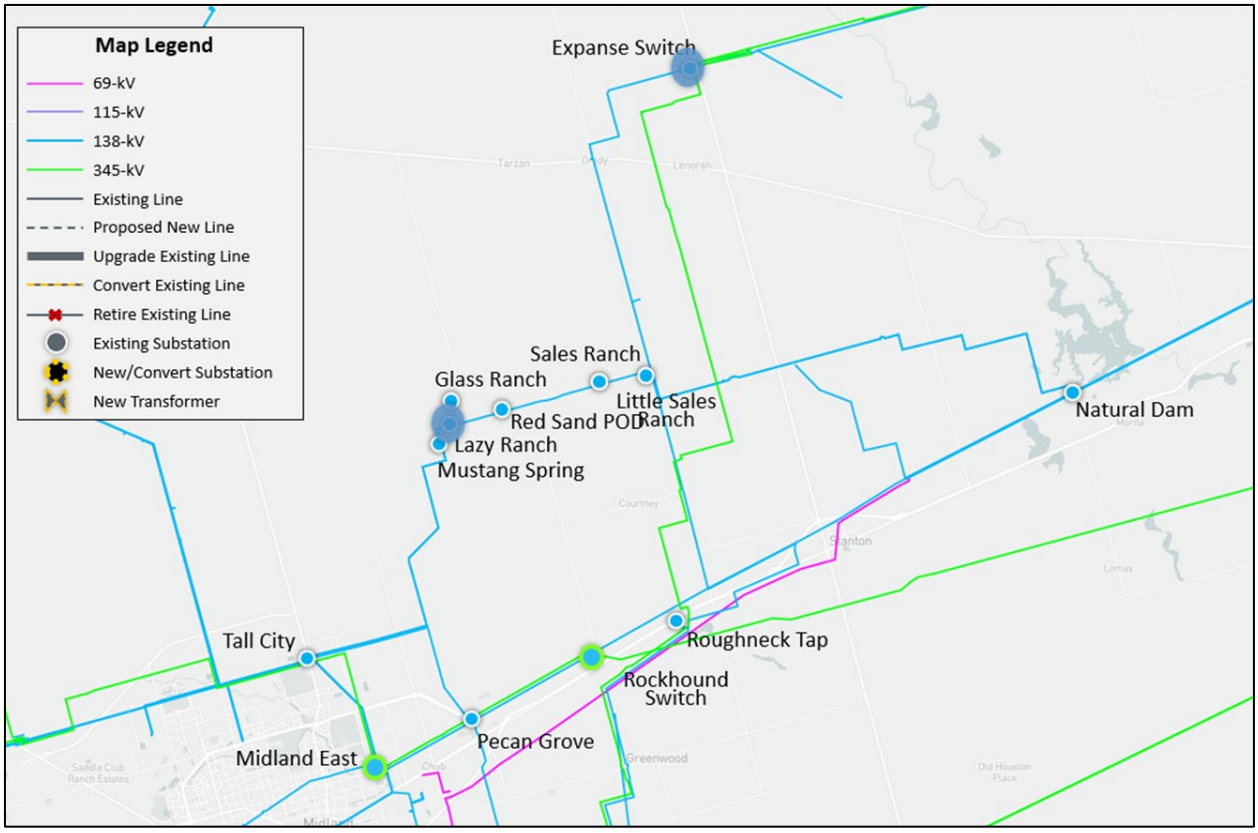


**Figure 4.3: Map of Option 3**

# 5 Option Evaluations

ERCOT performed a reliability analysis, planned maintenance outage evaluation and long-term load-serving capability to evaluate the options and to identify any reliability impacts 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 three options were evaluated based on the contingencies described in Section 2 of this report. Option 3 observed thermal overloads under X-1+N-1 contingency conditions. No reliability criteria violations were identified for Option 1 and Option 2, as shown in Table 5.1.

**Table 5.1: Results of Initial Reliability Assessment of All Three Options**

| Option | N-1 | | | X-1+N-1 | | G-1+N-1 | |
|---|---|---|---|---|---|---|---|
| | Unsolved Power Flow | Thermal Overload | Voltage Violation | Thermal Overload | Voltage Violation | Thermal Overload | Voltage Violation |
| 1 | None | None | None | None | None | None | None |
| 2 | None | None | None | None | None | None | None |
| 3 | None | None | None | 2 | None | None | None |

## 5.2 Short-Listed Options

Based on the results shown in Section 5.1, Option 1 and Option 2 were selected as short-listed options for further evaluations. These two short-listed options are illustrated in Figures 5.1 and 5.2

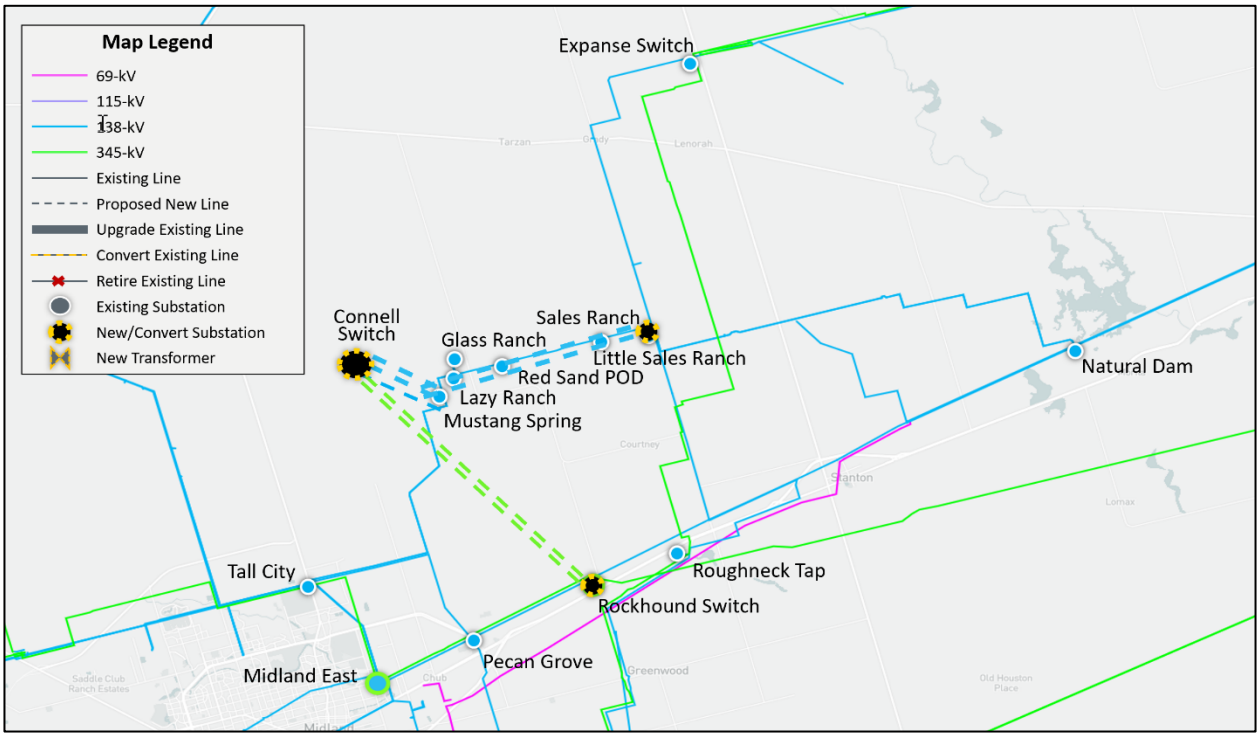


**Figure 5.1: Map of Option 1**

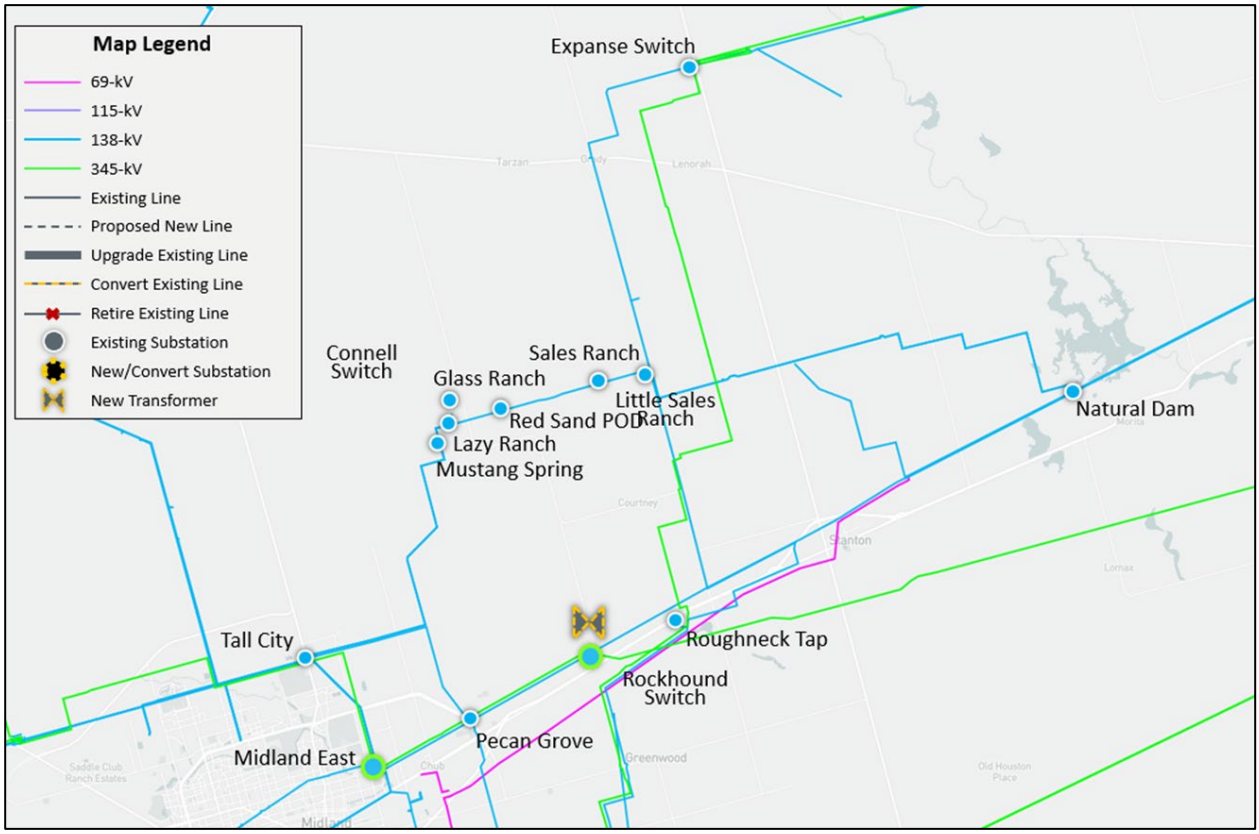


**Figure 5.2: Map of Option 2**

## 5.3 Long-Term Load-Serving Capability Assessment

ERCOT conducted a long-term load-serving capability assessment for the two short-listed options to compare the relative performance.

The results show that both short-listed options provided additional long-term load-serving capability, with Option 1 providing the most incremental capability. These results are shown in Table 5.2

**Table 5.2: Results of Long-Term Load-Serving Capability Assessment of the Two Short-Listed Options**

| Option | Incremental Load-Serving Capability (~MW) |
|---|---|
| 1 | 80 |
| 2 | 43 |

## 5.4 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 to represent system element outage(s) under planned maintenance condition (N-1-1) in the area. Then, each N-2 violation was run as an N-1-1 contingency scenario, with system adjustments between the contingencies. The transmission elements in the study area were monitored in the maintenance outage evaluation.

As shown in Table 5.3, the results of this planned maintenance assessment indicate no reliability violations for Option 1 or Option 2.

**Table 5.3: Results of Planned Maintenance Outage Evaluation of the Two Short-Listed Options**

| Option | Voltage Violations | Thermal Violations | Unsolved Power Flow |
|---|---|---|---|
| 1 | None | None | None |
| 2 | None | None | None |

## 5.5 Cost Estimate and Feasibility Assessment

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

**Table 5.4: Cost Estimates and Feasibility for the Two Short-Listed Options**

| Option | Cost Estimates (~$M) | CCN Required (~miles) | Feasible |
|---|---|---|---|
| 1 | 110.62 | Yes (13.0) | Yes |
| 2 | None | None | No |

# 6 Comparison of Options

Based on the results from Option Evaluations in Section 5, the two short-listed options are summarized in Table 6.1.

**Table 6.1: Comparison of the Two Short-Listed Options**

| | Option 1 | Option 2 |
|---|---|---|
| Meets ERCOT and NERC Reliability Criteria | Yes | Yes |
| Improves Long-Term Load-Serving Capability | Yes | Yes |
| CCN Required (~miles) | Yes (13.0) | No |
| Construction Feasibility[8] | Yes | No |
| Capital Cost Estimates[9] (~$M) | 110.62 | N/A |

ERCOT recommends Option 1 as the preferred option to address the reliability need in the study area based on the following considerations:

- Option 1 addresses the project need in the study area;
- Option 1 meets ERCOT and NERC Reliability criteria; and
- Option 1 improves long-term load-serving capability.

[8] The construction feasibility was based on TSP(s) assessment.
[9] The cost estimates were provided by the TSPs.

# 7 Additional Analysis and Assessment

The recommended option (Option 1, with a cost estimate of approximately $110.62 million) is categorized as a Tier 1 project, pursuant to ERCOT Protocol 3.11.4.3(1)(a). ERCOT performed generation and load sensitivity studies to identify the recommended option performance, as required under Planning Guide Section 3.1.3(4). Additionally, a Sub-synchronous Resonance (SSR) Assessment was performed.

## 7.1 Generation Addition Sensitivity Analysis

ERCOT performed a generation addition sensitivity analysis based on Planning Guide Section 3.1.3(4)(a).

Based on a review of the September 2024 GIS[10] report, no units were found within the study area that could have an impact on the identified reliability issues.

**Table 7.1: List of Units that Could Have Impact on the Identified Reliability Issues**

| GINR | Unit Name | Fuel Type | Max Capacity (~MW) | County |
|---|---|---|---|---|
| | NONE | | | |

## 7.2 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. Before 2024, ERCOT RTP adopted the methodology of developing four sets of summer peak cases with each case representing one study region for each study year. For each summer peak case, the loads outside of the study region may be scaled down from the respective non-coincident summer peak levels to maintain a certain reserve requirement. This methodology may cause potential impact of load scaling on the criteria violations.

The Power Transfer Distribution Factors (PTDFs) of overloaded elements with respect to the load transfer for each Weather Zone (excluding West and Far West) were calculated using PowerWorld Simulator. The PTDFs were 2.5% or less for each of the overloaded elements, i.e., they were not significant enough to have an impact on the overloaded element. ERCOT concluded that the load scaling used to develop the base case in this study did not have a material impact on the project need, which was primarily driven by thermal overloads in Midland County.

## 7.3 Congestion Analysis

ERCOT conducted a congestion analysis to identify any potential impact on system congestion related to the addition of the recommend option (Option 1) using the 2023 RTP 2028 economic study case.

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

The results of the congestion analysis indicated no significant congestion in the area due to the addition of the recommended transmission upgrades of Option 1.

## 7.4 Sub-synchronous Resonance (SSR) Assessment

Pursuant to Protocol Section 3.22.1.3(2), ERCOT conducted a SSR screening for the recommended option (Option 1) and found no adverse SSR impacts to the existing and planned generation resources in the study area.

# 8 Conclusion

ERCOT evaluated three transmission upgrade options to resolve the thermal overloads identified in the study area. Based on the results of the independent review, ERCOT recommends Option 1 as the preferred solution because it addresses the project need in the study area, meets ERCOT and NERC Reliability criteria and improves long-term load-serving capability.

Option 1 (Oncor proposed solution) consists of the following:

- Construct a new Connell 345/138-kV switching station approximately 1.0 mile west of existing Oncor Glass Ranch Switch, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 6-breaker 345-kV breaker-and-a-half bus arrangement and a 10-breaker 138-kV breaker-and-a-half bus arrangement, with all 345-kV equipment will be rating at least 2988 MVA and 138-kV at least 765 MVA;
- Construct two new Connell to Rockhound 345-kV lines, with conductors rated to at least 2988 MVA, in a new (estimated 13.0 mile) ROW, installed on new, common double-circuit towers;
- Install two new 345-kV circuit breakers at Oncor's existing Rockhound 345-kV Switch, rated at least 2988 MVA;
- Install two new 138-kV circuit breakers at Oncor's existing Sale Ranch 138-kV Switch, rated at least 765 MVA;
- Disconnect Oncor's existing Tall City to Sale Ranch 138-kV line at structure 1/9;
- Rebuild 9.0-mile portion of Oncor's existing single circuit 19.2-mile Sale Ranch to Glass Ranch to Tall City 138-kV line from Sale Ranch to existing 1/9 Structure and replace 9.0-mile portion with two new conductors, rated to at least 614 MVA, installed on new, common double-circuit towers;
- Construct two new Connell Switch to 1/9 structure 138-kV lines, with conductors rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed on new, common double-circuit towers configured to create a Connell Switch to Sale Ranch 138-kV double-circuit line;
- Construct a new single Connell Switch to 1/9 structure 138-kV line, with conductor rated to at least 614 MVA, in a new (estimated 0.1-mile) ROW, installed in one position on new double-circuit towers leaving one position vacant and configured to create a new Connell Switch to Tall City 138-kV line; and

- Reconfigure Oncor's existing Red Sand 138-kV POD to be connected to the south circuit on the new Connell to Sale Ranch 138-kV double circuit line.

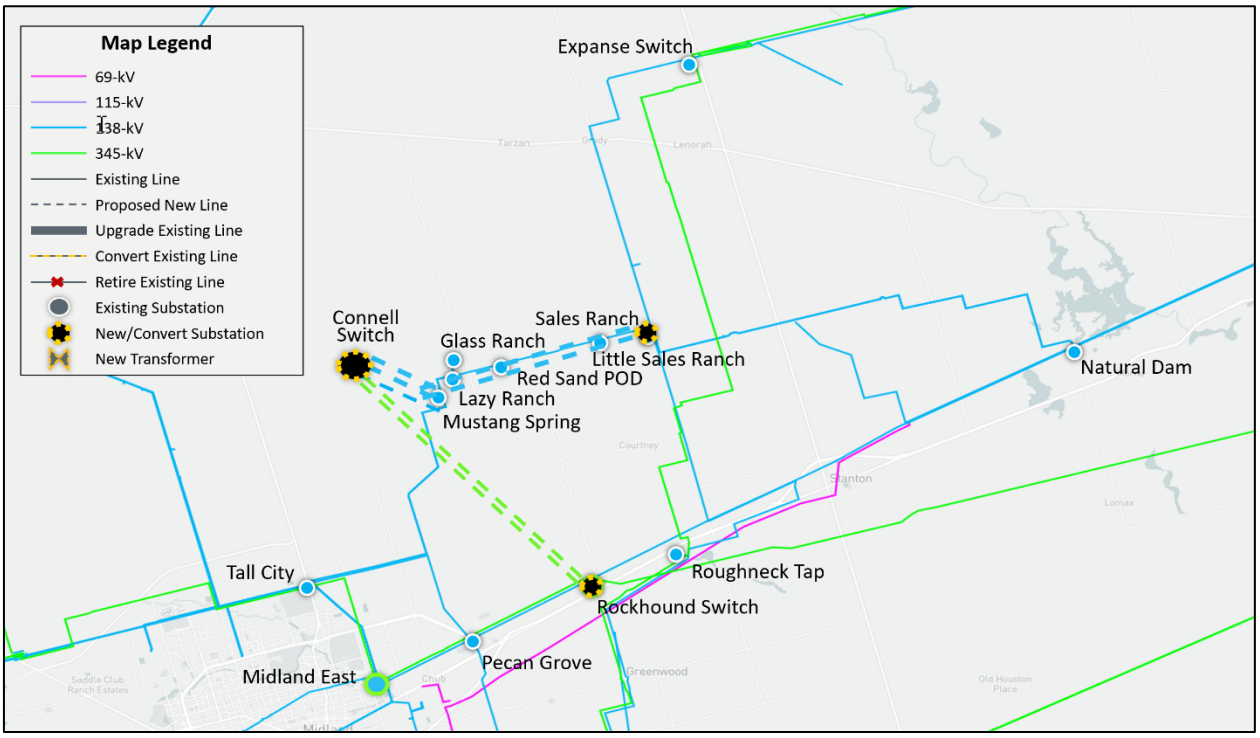


**Figure 8.1: Map of Option 1**

The cost estimate for this project is approximately $110.62 million and is classified as Tier 1 project per ERCOT Protocol Section 3.11.4.3(1)(a). The expected ISD of this project is December 2026.

CCN applications will be required for the new 345-kV double-circuit transmission line from Connell to Rockhound due to an approximately 13.0-mile of new ROW.

# Appendix A

**Table A.1: List of Transmission Projects added to the Economic Base Case**

| TPIT No | Project Name | Tier | Project ISD | County |
|---|---|---|---|---|
| 80404 | Reroute East to Rodgers 69-kV line to create East to Rayburn 69-kV line to accommodate the TXDOT SH6 project | Tier 4 | Jun-26 | Brazos |
| 80424 | Rebuild / Reconductor Dansby to Business Park 69-kV for Rail Spur | Tier 4 | Jun-26 | Brazos |
| 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 |

**Table A.2: List of Generation Added to the Economic Base Case Based on February 2025 GIS Report**

| GINR | Project Name | Fuel | Project COD | Max Capacity (~MW) | County |
|---|---|---|---|---|---|
| 23INR0079 | Chillingham Storage | OTH | 5/1/2025 | 153.9 | Bell |
| 23INR0249 | Limewood Solar | SOL | 12/31/2025 | 204.6 | Bell |
| 23INR0344 | Hermes Solar | SOL | 9/30/2025 | 100.4 | Bell |
| 23INR0469 | Big Elm Storage | OTH | 8/15/2026 | 100.8 | Bell |
| 24INR0166 | Stillhouse Solar | SOL | 9/1/2025 | 210.8 | Bell |
| 24INR0365 | Hermes Storage | OTH | 9/30/2025 | 100.4 | Bell |
| 23INR0079 | Chillingham Storage | OTH | 5/1/2025 | 153.9 | Bell |
| 21INR0517 | Tidwell Prairie Storage 1 | OTH | 07/31/2025 | 204.0 | Robertson |
| 22INR0356 | Jungmann Solar | SOL | 06/30/2025 | 40.2 | Milam |
| 22INR0511 | Gransolar Texas One | SOL | 06/30/2025 | 50.8 | Milam |
| 23INR0235 | Hoyte Solar | SOL | 12/15/2026 | 206.8 | Milam |
| 24INR0031 | Stoneridge Solar | SOL | 09/04/2025 | 201.6 | Milam |
| 26INR0023 | Leon Solar Park | SOL | 07/01/2026 | 210.1 | Leon |

**Table A.3: Project Related Document**

| No | Document Name | Attachment |
|---|---|---|
| 1 | Oncor Connell 345/138-kV Switch and Connell – Rockhound 345-kV Double-Circuit Line Project |  Oncor Connell - Rockhound RPG Proje |