



Item 5.1: Recommendation Regarding 25RPG004 Oncor Southern DFW Load Interconnection and General Grid Strengthening Regional Planning Group (RPG) Project

*Kristi Hobbs
Vice President, System Planning and
Weatherization*

Board of Directors Meeting

April 20-21, 2026

Purpose

Provide an overview of the \$2.866 billion Oncor Southern DFW Load Interconnection and General Grid Strengthening Tier 1 Reliability Project (Option 3). Per ERCOT Protocol Section 3.11.4.7 Tier 1 projects require Board endorsement.

Voting Items

ERCOT staff requests and recommends that the Board of Directors (Board) endorse the Oncor Southern DFW Load Interconnection and General Grid Strengthening RPG Project (Option 3) 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 unopposed endorsement with two abstentions by the Technical Advisory Committee (TAC).
- ERCOT studied several options and recommends Option 3 as it addresses all project needs, meets ERCOT and NERC Reliability Standard, improves long-term load-serving capability for future load growth in the area, and improves operational flexibility.

Oncor Southern DFW Load Interconnection and General Grid Strengthening RPG Project

Oncor submitted the Southern DFW Load Interconnection and General Grid Strengthening Project for Regional Planning Group (RPG) review in February 2025.

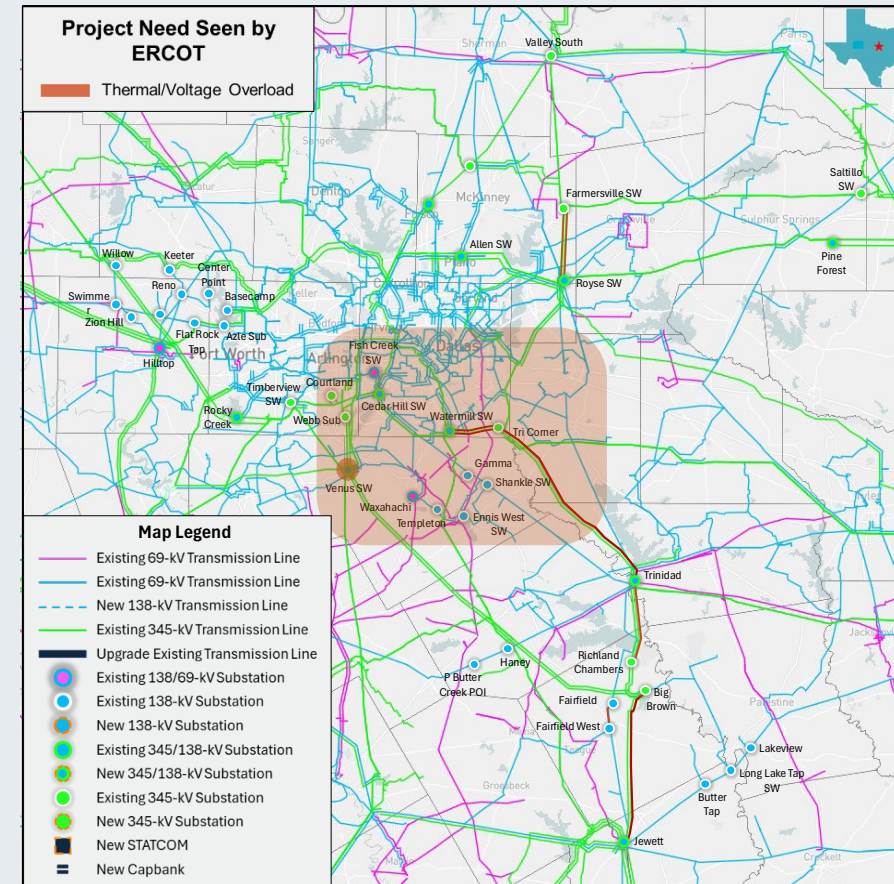
The purpose of the project is to address the reliability issues due to proposed load additions in the Southern DFW area in the North Central and East Weather Zones.

ERCOT performed an independent review of the project and identified thermal overloads, voltage violations and unsolved power flows in Dallas and Ellis counties.

ERCOT’s endorsement of the project is based on the reliability need to relieve **thermal overloads** on ~146 miles of 345-kV, ~121 miles of 138-kV, ~5 miles of 69-kV transmission lines and one (1) 345/138-kV transformer, 44 **voltage violations** and 3 **unsolved power flows** in Dallas and Ellis counties to meet NERC and ERCOT reliability planning criteria.

Key Takeaway: The Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) addressed approximately 4.0 GW of new load in the study area.

Thermal Overloads and Voltage Violations Seen by ERCOT



Oncor Southern DFW Load Interconnection and General Grid Strengthening RPG Project (cont.)

Oncor's initial cost estimate was updated through the Cost Estimate and Feasibility Assessment.

The cost estimate for Option 3 (\$2.886 billion) includes:

- Updated Oncor's initial cost estimate (\$1.248 billion);
- Approximately \$856.28 million in the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area Reliability Project (25RPG038);
- Approximately \$763.58 million for the upgrades identified as part of the Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042);
- Approximately \$18 million for the upgrades identified by Brazos Electric Cooperative (BEC); and
- The estimated capital cost with energized construction work.

ERCOT presented the project and TAC voted unopposed with two abstentions to endorse the project on March 25, 2026.

Key Takeaway: The Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) has completed RPG review and received unopposed endorsement with two abstentions by TAC.

Basis for ERCOT Board Endorsement

ERCOT's independent review identified a reliability need for the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) to satisfy:

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

- P0, P1, P3 and P6-2 contingencies

ERCOT Planning Guide Section Reliability Performance Criteria contingency:

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

Key Takeaway: The Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) is needed to reliably meet NERC and ERCOT Planning Guide criteria.

Overall Project Summary

Construct six new substations

- Two new 345/138-kV switches
- Two new 345-kV switches
- Two new 138-kV substations

Install nine reactive devices

- Three ± 250 MVA 345-kV STATCOMs
- Three 345-kV capacitor banks
- Three 138-kV capacitor banks

Rebuild six existing substations

- Five 345-kV switches
- One 345/138-kV switches

Construct twelve new 345-kV and 138-kV lines

- Approximately 218.0 circuit miles of new 345-kV lines
- Approximately 8.0 circuit miles of new 138-kV lines

Upgrade of existing 345-kV and 138-kV lines

- Approximately 394.8 circuit miles of existing 345-kV lines
- Approximately 73.8 circuit miles of existing 138-kV lines

A Certificate of Convenience and Necessity (CCN) is needed for the construction of the new Desoto Switch to Sam Switch 345-kV double-circuit transmission line, the new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line, and the four new Midlothian Tap to Ironwood Switch 138-kV transmission lines due to approximately 111.0 miles of new right of way (ROW).

Key Takeaway: The Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) will require a CCN due to approximately 111.0 miles of new ROW.

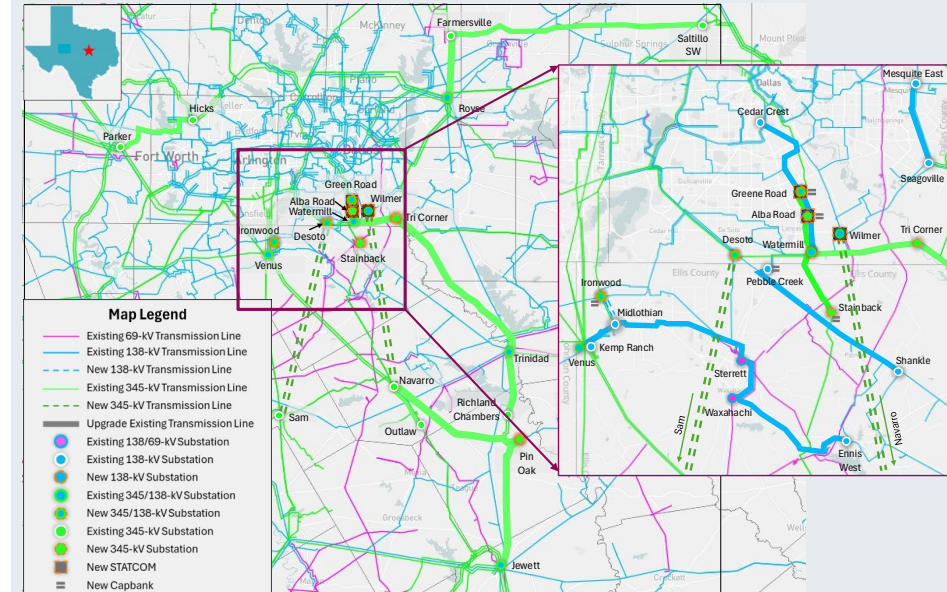
Request for Board Vote

ERCOT staff requests and recommends that the Board endorse the need for the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3) 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 3 as it addresses all project needs, meets ERCOT and NERC Reliability Standard, improves long-term load-serving capability for future load growth in the area, and improves operational flexibility.

ERCOT Recommendation





Date: March 24, 2026
To: Board of Directors
From: Kristi Hobbs, Vice President, System Planning and Weatherization
Subject: 25RPG004 Oncor Southern DFW Load Interconnection and General Grid Strengthening Planning Group Project

Issue for the ERCOT Board of Directors

ERCOT Board of Directors Meeting Date: April 20-21, 2026

Item No.: 5.1

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 Southern DFW Load Interconnection and General Grid Strengthening Regional Planning Group (RPG) Project in order to meet the reliability requirements for the ERCOT System and address thermal overloads, voltage violations and unsolved power flows due to proposed load additions in the Southern DFW area in the North Central and East Weather Zones, which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unopposed with two abstentions to endorse.

Background/History:

Oncor proposed the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project in February 2025, a \$1.219 billion, Tier 1 project with the expected in-service date of December 2028, to meet reliability planning criteria due to proposed load additions in the Southern DFW area in the North Central and East Weather Zones. 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 Oncor Southern DFW Load Interconnection and General Grid Strengthening Project and identified thermal overloads, voltage violations and unsolved power flows in Dallas and Ellis counties. The ERCOT project recommendation (Option 3), a \$2.886 billion, Tier 1 project with the expected in-service dates between May 2026 to April 2033 addresses the need for a project under North American Electric Reliability Corporation (NERC) and ERCOT Planning Criteria to address thermal overloads on approximately 146 miles of 345-kV, 121 miles of 138-kV, 5 miles of 69-kV transmission lines and one 345/138-kV transformer, 44 voltage

violations and 3 unsolved power flows in Dallas and Ellis counties with the following ERCOT System improvements:

- Construct a new Greene Road 345/138-kV Switch by installing fourteen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two new 345/138-kV autotransformers with a normal rating of 700 MVA and an emergency rating of 750 MVA;
 - Re-terminate the existing Watermill Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission line into the new Greene Road 345-kV Switch, which creates the new Watermill Switch to Greene Road Switch and the new Greene Road Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission lines;
 - Re-terminate the existing Wilson Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line into the new Greene Road 138-kV Switch, which creates the new Wilson Switch to Greene Road Switch and the new Greene Road Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line;
- Rebuild the new Greene Road Switch to Watermill Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 3.6 miles/circuit;
- Rebuild the new Wilson Switch to Greene Road Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, for approximately 2.0 miles/circuit;
- Rebuild the new Greene Road Switch to Cedar Crest Switch 138-kV single-circuit transmission line on double-circuit structures with one circuit in place, with normal and emergency ratings of at least 764 MVA, for approximately 10.9 miles/circuit;
- Construct a new Alba Road 345-kV Switch by installing eleven 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the new Watermill Switch to Greene Road Switch 345-kV double-circuit transmission line into the new Alba Road 345-kV Switch, which creates the new Watermill Switch to Alba Road Switch and the new Alba Road Switch to Greene Road Switch 345-kV double-circuit transmission lines;
- Construct a new Stainback 345-kV Switch by installing fourteen 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the existing Watermill Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission line into the new Stainback 345-

kV Switch, which creates the new Watermill Switch to Stainback Switch and the new Stainback Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission lines;

- Rebuild the new Watermill Switch to Stainback Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 3.0 miles/circuit;
- Rebuild the existing Watermill Switch to Wilson Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, for approximately 0.8 miles/circuit;
- Construct a new Ironwood 345/138-kV Switch by installing seventeen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two 345/138-kV autotransformers with normal and emergency ratings of 700 MVA and 750 MVA, respectively;
 - Re-terminate the existing Liggett Switch to Endeavor Switch 345-kV Line at the new Ironwood 345-kV Switch, which creates the new Liggett Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Disconnect the existing Endeavor Switch to Venus Switch (south bus) and Midlothian ANP #2 to Venus Switch (south bus) 345-kV Lines from Venus Switch (south bus) and connect the Midlothian ANP to Endeavor 345-kV Switch. This will create Midlothian ANP #1 to Venus Switch (north bus) and Midlothian ANP #2 to Endeavor Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Timberview Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Everman Switch to Venus Switch (north bus) and the new Timberview Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cedar Hill Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Sherry Switch to Venus Switch (north bus) and the new Cedar Hill Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Sam Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Fort Smith Switch to Venus Switch (north bus) and the new Sam Switch to Ironwood Switch 345-kV double-circuit transmission line;

- Re-terminate the existing Navarro Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Navarro Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
- Re-terminate the existing Cottonwood Creek 345/138-kV Autotransformer #2 at the north bus of Venus 345-kV Switch by installing one 345-kV, 5,000 A breaker;
- Loop the existing Kemp Ranch Switch to Sardis Switch/Soap Creek Switch 138-kV double-circuit transmission line into the new Ironwood 138-kV Switch by disconnecting the double-circuit line at structure #1/2 (Midlothian Tap) and constructing four circuits from Midlothian Tap to the new Ironwood 138-kV Switch on separate structures, with normal and emergency ratings of at least 764 MVA, for approximately 2.0 miles each circuit;
- Rebuild the two Kemp Ranch Switch to Midlothian Tap 138-kV single-circuit transmission line sections using two separate structures, with normal and emergency ratings of at least 764 MVA, for approximately 0.5 miles/circuit;
- Rebuild the existing Sterrett Switch to Midlothian TXI 138-kV single-circuit transmission line sections, with normal and emergency ratings of at least 764 MVA, for approximately 11.8 miles/circuit;
- Rebuild the existing Ennis West Switch to Sterrett Switch 138-kV single-circuit transmission line, with normal and emergency ratings of at least 614 MVA, for approximately 21.0 miles/circuit;
- Rebuild the existing Big Brown 345-kV Switch by installing twelve 345-kV, 5,000 A breakers in a breaker-and-a-half bus arrangement. Upon completion, Big Brown Switch will be renamed as Pin Oak Switch:
 - Re-terminate the existing Big Brown Switch to Jewett Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Jewett Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Navarro Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Navarro Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Richland Chamber Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Richland Chambers Switch 345-kV double-circuit transmission line;

- Rebuild the new Jewett Switch to Pin Oak Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 32.8 miles/circuit;
- Rebuild the existing Richland Chambers Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 18.7 miles/circuit;
- Rebuild the existing Parker Switch to Hicks Switch 345-kV transmission line, with normal and emergency ratings of at least 1,912 MVA and with a conductor rating of at least 2,987 MVA, for approximately 23.0 miles/circuit;
- Rebuild the existing Pebble Creek Switch to Shankle Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, for approximately 15.5 miles/circuit;
- Rebuild the existing Mesquite East Switch to Seagoville Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, for approximately 7.4 miles/circuit;
- Rebuild the existing Farmersville Switch to Royse Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 15.3 miles/circuit;
- Install one +250/-250 MVar Grid-forming STATCOM at each of the following:
 - Alba Road 345-kV Switch;
 - Greene Road 345-kV Switch;
 - Wilmer 345kV Switch;
- Install 240 MVar 345-kV capacitor banks (3-80 MVar each):
 - One at Greene Road 345-kV Switch;
 - Two at Alba Road 345-kV Switch;
 - Two at Stainback 345-kV Switch;
- Install 110.4 MVar 138-kV capacitor banks (3-36.8 MVar each) at:
 - One at Greene Road 138-kV Switch;
 - Two at Ironwood 138-kV Switch;
 - Two at Pebble Creek 138-kV Switch;
- For terminal equipment:
 - The existing 345 kV terminal equipment, ensure they meet or exceed a rating of 3,000 A (1,792 MVA);
 - The new 345-kV terminal equipment, ensure they meet or exceed a rating of 5,000 A if the station is 5,000 A capable. Otherwise ensure the new 345-kV terminal equipment meets or exceeds a rating of 3,200 A;

- The 138-kV terminal equipment, ensure they meet or exceed a rating of 3,000 A;
- Construct a new Goat Pad Switch 138-kV Substation:
 - Install a new Goat Pad Switch to Padera 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 287 MVA, for approximately 2.6 miles/circuit;
 - Install a new Goat Pad Switch to Midlothian 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 287 MVA, for approximately 3.0 miles/circuit;
 - Install a new Goat Pad Switch to Goatheard 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 524 MVA, for approximately 0.1 miles/circuit;
- Construct a new Goatheard Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Saint Paul Switch 138-kV single-circuit transmission line into the new Goatheard 138-kV Switch, which creates the new Goatheard Switch to Cedar Hill Switch and the new Goatheard Switch to Saint Paul Switch 138-kV single-circuit transmission line, and rebuild on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 237 MVA, for approximately 0.7 miles/circuit;
- Upgrade the existing Navarro Switch to the new Pin Oak (Big Brown) Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 27.6 miles/circuit;
- Upgrade the existing Navarro Switch to Outlaw Switch 345-kV double-circuit transmission line on double-circuit structures with both one circuit in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 5.6 miles/circuit;
- Upgrade the existing Desoto 345/138-kV Switch:
 - Install five 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Install nine 138-kV circuit breakers in a breaker-and-a-half configuration with ratings of 3,200 A;
- Construct a new Desoto Switch to Sam Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 56.0 miles/circuit;

- Install four 345-kV circuit breakers at the existing Desoto Switch 345-kV substation with ratings of at least 5,000 A;
- Install four 345-kV circuit breakers at the existing Sam Switch 345-kV substation with ratings of at least 5,000 A;
- Construct a new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 53.0 miles/circuit:
 - Install three 345-kV circuit breakers at the existing Wilmer Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Navarro Switch 345-kV substation with ratings of at least 5,000 A;
- Rebuild the existing Tri Corner 345-kV Switch:
 - Install twelve 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Ensure all terminal equipment meets or exceeds 5,000A;
- Upgrade the existing Watermill Switch to Tri Corner Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 11.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A;
- Upgrade the existing Tri Corner Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 40.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Farmerville Switch to Saltillo Switch 345-kV single-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 59.9 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 3,200A.

ERCOT's independent review verified the reliability need for the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project to satisfy ERCOT Planning Guide Section 4.1.1.2(1)(d), Reliability Performance Criteria, contingency for the loss of a single generator followed by a single transmission element or common tower outage, and 4.1.1.2(1)(e), Reliability Performance Criteria, contingency for the loss of a single transformer followed by a single transmission element or common tower outage.



RPG considered project overviews during meetings in April 2025 and March 2026. Between April 2025 and March 2026, ERCOT staff presented scope and status updates at RPG meetings in April, July, August 2025, January and March 2026. 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 March 25, 2026, TAC endorsed the project, unopposed with two abstentions, 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 Oscillations (SSO) of existing facilities in Dallas and Ellis counties in the North Central and East Weather Zones, conducted pursuant to Protocol Section 3.22.1.3, Transmission Project Assessment, yielded no adverse SSO 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 Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3).

The report describing the ERCOT Independent Review of the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (Option 3), 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 a proposed load additions in the Southern DFW area in the North Central and East Weather Zones.
2. ERCOT staff found the recommended set of improvements to be the most efficient solution for meeting the planning reliability criteria, addressing thermal overloads, voltage violations and unsolved power flows.
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 Oncor Southern DFW Load Interconnection and General Grid Strengthening Regional Planning Group (RPG) Project (Option 3), as recommended by ERCOT, on March 25, 2026.

Conclusion/Recommendation:



ERCOT staff recommends that the Board endorse the need for the Tier 1 Oncor Southern DFW Load Interconnection and General Grid Strengthening RPG Project (Option 3), which ERCOT staff has independently reviewed, and which TAC has voted unopposed with two abstentions 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 Oncor Southern DFW Load Interconnection and General Grid Strengthening Regional Planning Group Project (Option 3), which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unopposed with two abstentions 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 Oncor Southern DFW Load Interconnection and General Grid Strengthening Regional Planning Group Project (Option 3), which ERCOT staff has independently reviewed, and which TAC has voted unopposed with two abstentions 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 _____, 2026.

Brandon Gleason
Assistant Corporate Secretary



ERCOT Independent Review of the Oncor Southern DFW Load Interconnection and General Grid Strengthening Project (25RPG004)

Document Revisions

Date	Version	Description	Author(s)
3/19/2026	1.0	Final	Tanzila Ahmed, Md Moinul Islam
		Reviewed by	Robert Golen, Sun Wook Kang, Prabhu Gnanam

Executive Summary

Oncor Electric Delivery Company LLC (Oncor) submitted the Southern Dallas Fort Worth (DFW) Load Interconnection and General Grid Strengthening Project to the Electric Reliability Council of Texas' (ERCOT) Regional Planning Group (RPG) in February 2025. Oncor proposed this project to address North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-5.1 and ERCOT Planning Guide reliability criteria thermal overloads and voltage violations, seen in the Southern DFW area, located in Dallas and Ellis counties in the North Central Weather Zone.

Oncor's proposed project was estimated to cost approximately \$1.219 billion, was classified as a Tier 1 project under ERCOT Protocol Section 3.11.4.3 and would require a Certificate of Convenience and Necessity (CCN) application.

ERCOT performed an independent review, identified reliability needs (thermal overloads, voltage violations and unserved power flow issues) and evaluated three transmission project options to resolve identified issues in the project area.

ERCOT Independent Review (EIR) evaluated three transmission project options. Based on the study results described in Sections 5 and 6 of this report, ERCOT recommends the following upgrades (Option 3) to address the reliability issues mentioned above. Summary of Option 3 upgrades are as follows:

- Construct six new substations:
 - Two new 345/138-kV switch stations;
 - Two new 345-kV switch stations;
 - Two new 138-kV substations;
- Rebuild six existing substations:
 - Five 345-kV switch stations;
 - One 345/138-kV switch station;
- Twelve new 345-kV and 138-kV transmission lines:
 - Approximately 8.0 circuit miles of new 138-kV transmission lines;
 - Approximately 218.0 circuit miles of new 345-kV transmission lines;
- Upgrade of existing 345-kV and 138-kV transmission lines:
 - Approximately 394.8 circuit miles of existing 345-kV transmission lines;
 - Approximately 73.8 circuit miles of existing 138-kV transmission lines;
- Nine reactive devices:
 - Three ± 250 MVA 345-kV Static Synchronous Compensator (STATCOMs);
 - Three 345-kV capacitor banks; and
 - Three 138-kV capacitor banks.

A detailed component list of Option 3 is provided in Appendix A of this document. In addition to the Oncor's proposed project, Option 3 includes the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area upgrade project (25RPG038). Oncor and Lone Star Transmission, LLC (Lone Star) submitted the Navarro and Ellis Area Reliability Project to the ERCOT RPG in November 2025. Oncor and Lone Star proposed this project to address NERC Reliability Standard TPL-001-5.1 and ERCOT Planning Guide reliability thermal overloads and voltage violations seen in Dallas, Ellis, Freestone and Hill counties in the North Central Weather Zone. A subset of upgrades identified in Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042) are also included in the recommended Option 3. Project submittals for these projects are provided in Appendix B of this document. This report will serve as the combined EIR for all those upgrades.

The cost estimate for Option 3 is approximately \$2.886 billion. The cost estimate includes approximately \$856.28 million in the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area Reliability Project (25RPG038), and approximately \$763.58 million for the upgrades identified as part of the Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042). The cost estimate includes the estimated capital cost with energized construction work.

The expected in-service dates (ISDs) of this project for Oncor's upgrades are between May 2026 to April 2033, December 2028 for Brazos Electric Cooperatives' upgrades, and June 2030 and April 2033 for Lone Star's upgrades. One or multiple CCN applications would be required for the construction of the new Desoto Switch to Sam Switch 345-kV double-circuit transmission line, the new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line, and the four new Midlothian Tap to Ironwood Switch 138-kV transmission lines due to approximately 111.0 miles of new right of way (ROW). However, Oncor has advised that the projected ISD may change based on material acquisition, outage coordination, construction, or other project related requirements.

Table of Contents

Executive Summary	ii
1 Introduction	1
2 Study Assumptions and Methodology	2
2.1 Study Assumptions for Reliability Analysis	2
2.1.1 Steady State Study Base Case	2
2.1.2 Transmission Topology	2
2.1.3 Generation	4
2.1.4 Loads	5
2.2 Long-Term Load-Serving Capability Assessment	5
2.3 Maintenance Outage Scenario	6
2.4 Study Assumptions for Congestion Analysis	6
2.5 Study Assumptions for Dynamic Stability Analysis	6
2.6 Methodology	6
2.6.1 Contingencies and Criteria	6
2.6.2 Contingencies and Criteria for Dynamic Stability Analysis	7
2.6.3 Study Tool	8
3 Project Need	8
4 Description of Project Options	12
5 Option Evaluations	19
5.1 Results of Reliability Analysis	19
5.2 Maintenance Outage Evaluation	20
5.3 Long-Term Load Serving Capability Analysis	20
5.4 Cost Estimate and Feasibility Assessment	20
6 Comparison of All Three Options	21
7 Additional Analysis and Assessment	21
7.1 Generation Addition Sensitivity Analysis	22
7.2 Load Scaling Sensitivity Analysis	22

- 7.3 Sub-synchronous Oscillations (SSO) Assessment 23
- 7.4 Congestion Analysis 23
- 7.5 Dynamic Stability Analysis..... 23
- 8 Conclusion 23
- Appendix 30
 - A: Option 3 Upgrade Components 30
 - B: Attachments 35

1 Introduction

In February 2025, Oncor Electric Delivery Company LLC (Oncor) submitted the Southern Dallas Fort Worth (DFW) Load Interconnection and General Grid Strengthening Project to the Electric Reliability Council of Texas' (ERCOT) Regional Planning Group (RPG) to address North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-5.1 and ERCOT Planning Guide reliability criteria thermal overloads and voltage violations under various contingency conditions due to approximately 4,046 MW of new load in the Southern DFW area. This project is located in Dallas, and Ellis counties in the North Central (NC) Weather Zone.

Oncor's proposed project was classified as a Tier 1 project under ERCOT Protocol Section 3.11.4.3, with an estimated cost of approximately \$1.219 billion. A Certificate of Convenience and Necessity (CCN) application would be required, and the expected in-service date (ISD) for this project is December 2028.

In November 2025, Oncor and Lone Star Transmission, LLC (Lone Star) submitted the Navarro and Ellis Area Reliability Project to the ERCOT RPG to address NERC Reliability Standard TPL-001-5.1 and ERCOT Planning Guide reliability thermal overloads and voltage violations seen in Dallas, Ellis, Freestone, and Hill counties in the North Central Weather Zone.

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

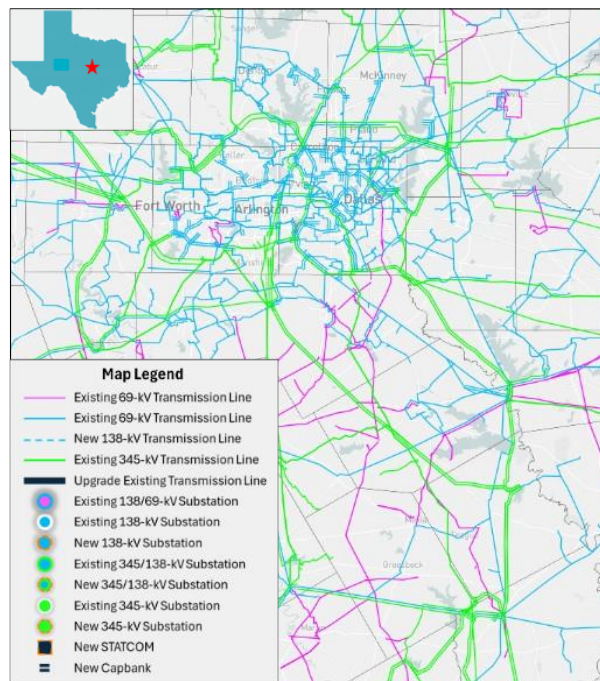


Figure 1.1: Map of Transmission System in The Southern DFW Area

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 Southern DFW Load Interconnection and General Grid Strengthening Project if an upgrade is deemed necessary. This section describes the study assumptions and criteria used to conduct this independent study.

2.1 Study Assumptions for Reliability Analysis

This project is in the North Central Weather Zone in Dallas and Ellis counties. Tarrant, Navarro, Parker, Leon, Freestone, Henderson, Rockwall, and Collin counties were also included in the study because of their electrical proximity to the proposed project.

2.1.1 Steady State Study Base Case

The Final 2024 Regional Transmission Plan (RTP) cases, published on the Market Information System (MIS) on December 20, 2024, were used as reference cases in this study. The 2029 Summer Peak Load case was selected for the long-term outlook. The steady-state study base case was constructed by updating transmission, generation, and load data of the following 2029 Summer Peak Load case for noted below:

- Case: 2024RTP_2029_SUM_12202024¹.

2.1.2 Transmission Topology

Transmission projects within the study area with ISDs by December 2028 were added to the study base case. The ERCOT Transmission Project Information and Tracking (TPIT)² report posted in June 2025 was used as reference to identify the applicable project added to the study base case, as listed in Table 2.1.

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

RPG/TPIT No	Project Name	Tier	Project ISD	County(s)
24RPG016	Rand Area Loop Project	Tier 2	4/1/2027	Kaufman
24RPG017	Venus Switch to Sam Switch 345-kV Line Project	Tier 1	5/1/2026	Ellis, Hill
24RPG025	Gunter 345/138-kV Switch Project	Tier 3	12/1/2025	Ellis, Hill

Transmission projects, listed in Table 2.2, identified as placeholder projects in the 2024 RTP in the study area that have not been approved by RPG, were removed from the study base case.

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

Project ID	Project Name	County
2024-E2	Shamburger (3103) to Elkton (3105) 345-kV Double Circuit Line Addition	Smith
2024-E3	Big Brown SES West (3381) to Jewett (3391) 345-kV Line Upgrade and Substation Rebuilds	Henderson, Freestone

¹ 2024 RTP Postings: <https://mis.ercot.com/secure/data-products/grid/regional-planning>

² June 2025 TPIT Report: <https://www.ercot.com/gridinfo/planning>

Project ID	Project Name	County
2024-E12	Trinidad SES (3124) to Richland Chambers (3134) 345-kV Line Upgrade	Freestone, Leon
2024-E18	Big Brown SES West (3381) to Jewett (3391) 345-kV Line Upgrade	Freestone, Leon
2024-E3	Big Brown SES West (3381) to Jewett (3391) 345-kV Line Upgrade and Substation Rebuilds	Henderson, Freestone
2024-N11	Alla Hubbard (1757) to Epco POI (12468) 138-kV Line Upgrade	Collin, Grayson
2024-NC01	Glen Heights (217) to Sterett Road (2237) 138-kV Line Upgrade	Ellis
2024-NC04	Railport (442) Area 138-kV Rebuild	Ellis, Johnson
2024-NC06	Miller (824) to Newman (849) 138-kV Line Upgrade	Dallas
2024-NC07	Walnut (823) to Naaman (825) 138-kV Line Upgrade	Dallas
2024-NC08	Centerville (810) to Miller (824) 138-kV Line Upgrade	Dallas
2024-NC09	Walnut (823) to Newman (849) 138-kV Line Upgrade	Dallas
2024-NC10	Glen Heights (217) to Desoto Switch 8 (2424) 138-kV Line Upgrade	Ellis, Dallas
2024-NC13	Pebble Creek (2229) to Trumbull (221) to Gamma (12344) to Shankle Switch (12329) 138-kV Line Upgrades	Ellis
2024-NC14	Green Road (3069) to Ten Mile (2126) to Watermill (2429) to Reindeer (3065) 138-kV Line Upgrades	Dallas
2024-NC15	Waxahachie (2321) to Waxahachie North (2320) 138-kV Line Upgrade and Waxahachie (2335) to Waxahachie OCF (2343) 69-kV Line Upgrades	Ellis
2024-NC18	Ennis West Switch (2241) to Templeton (12320) to Waxahachie (2321) 138-kV Line Upgrades	Ellis, Waxahachie
2024-NC19	Climax TNP (37280) to Bridge Point RC (37245) 69-kV Line Upgrade	Collin
2024-NC21	Carrollton Northwest (2363) to South TNP (37100) to TI TNP (37080) 138-kV Line Upgrades	Dallas, Denton
2024-NC22	Waxahachie Pump 2 (2315) to Waxahachie North (2320) 138-kV Line Upgrade	Ellis
2024-NC25	LTV Sub (2259) to Grand Prairie (2262) 138-kV Line Upgrade	Dallas
2024-NC27	Navarro (3478) to Haney (213) to Payne Battle Creek POI (888876) to Hubbard (3515) 138-kV Line Upgrades	Navarro, Hill
2024-NC28	Olympus Switch (3723) to Montfort Switch (3454) to Chatfield (200) 138-kV Line Upgrade	Henderson, Navarro
2024-NC29	Allen Switch (2514) to Pine Forest POI (888854) 345-kV Line Upgrade	Collin, Hopkins
2024-NC31	Royse Area 345-kV Line Upgrades and Substation Rebuilds	Collin, Hopkins, Rockwall, Fannin, Lamar
2024-NC34	Trinidad SES (3127) to Nipak Tap (3260) to Mankin Switch (3265) 138-kV Line Upgrade	Henderson, Navarro
2024-NC35	Firewheel (821) to Wylie Switch (833) 138-kV Line Upgrade	Dallas, Collin
2024-NC38	Seagoville Area Upgrades	Dallas
2024-NC41	Ben Davis (968) to GOBLN_8 (2497) 138-kV Line Upgrade	Dallas
2024-NC44	Cedar Creek 138-kV Area Line Upgrades	Henderson
2024-NC51	Waxahachie-Sterrett Area Upgrades	Ellis
2024-NC59	Lavon Switch 345/138-kV Switch Substation Expansion and Lavon Switch (2475) to Allen Switch (2511) 138-kV Line Addition	Collin, Rockwall
2024-NC63	Watermill Area 345-kV Line Additions and Reactive Support	Dallas, Navarro, Hill, Leon
2024-NC64	Calmont Switch (1955) to Benbrook Switch (1874) 138-kV Line Upgrade	Tarrant
2024-NC66	Tri Corner (2432) to Forney Switch (2437) 345-kV Line Upgrade	Dallas, Kaufman
2024-NC67	Elkton (3105) to Tri Corner (2432) 345-kV Line Additions and Upgrades	Dallas, Kaufman, Smith, Van Zandt
2024-NC68	Batchler Road (2217) to Watermill (2427) 345-kV Line Upgrades	Dallas

Project ID	Project Name	County
2024-NC70	Miller Road (2632) 345/138-kV Substation Addition and 345-kV Lines Re-Termination	Dallas, Ellis
2024-NC71	Mitchell Bend Switch (1895) to Carmichael Bend Switch (2285) to Benbrook Switch (1873) 345-kV Line Upgrades	Tarrant, Hood, Grayson
2024-NC74	Midlothian TXI (2307) to Waxahachie Northwest (2309) 138-kV Line Upgrades	Ellis
2024-NC75	Primrose Fort Worth (2196) to Rocky Creek (1881) to Primrose Fort Worth (2197) 138-kV Line Upgrades	Tarrant
2024-NC76	Gunter 345/138-kV Switch Addition and Gunter (2236) to Collin (2370) 138-kV Line Addition	Cooke, Denton, Collin, Grayson
2024-NC77	Skyview 345/138-kV Switch Addition and Area Upgrade	Dallas, Tarrant
2024-NC79	Upgrade Benbrook Switch 345/138-kV (1869/18741) and (1870/18751) Transformers	Tarrant
2024-NC80	Desoto Switch 345/138-kV Transformer Addition (2431/2424) and Desoto Switch (2424) to Loop9 (2848) 138-kV Line Addition	Dallas
2024-NC82	Rocky Creek 345/138-kV Transformer Addition (1880/1881)	Tarrant
2024-NC83	Hempill (2164) to Mistletoe Heights (2173) 138-kV Line Upgrade	Tarrant
2024-NC84	Wedgewood Switch (2184) to Bryant Irvin (2182) 138-kV Line Upgrade	Tarrant
2024-NC85	Miller Road (2635) to Kemp Ranch Switch (2303) 138-kV double-circuit transmission line Upgrade	Ellis
2024-NC86	Greene Road (3063/3069) New 138-kV and 345-kV Line Additions and Substation Rebuilds	Dallas

Base case updates based on Oncor's feedback were also applied to the study base case.

2.1.3 Generation

Based on the March 2025 Generator Interconnection Status (GIS)³ report posted on the ERCOT website on April 1, 2025, generators in the study area that met Planning Guide Section 6.9(1) conditions with commercial operations date (COD) prior to December 2028 were added to the study base case. These generation additions are listed in Table 2.3. All new generation dispatches were kept consistent with the 2024 RTP methodology.

Table 2.3: List of Generation Added to the Study Base Case Based on the March 2025 GIS Report

GINR	Project Name	Fuel	Project COD	Max Capacity (~MW)	County
21INR0359	Hickerson Solar	SOL	3/1/2026	316.3	Bosque
22INR0437	TORMES SOLAR	SOL	3/31/2027	382.1	Navarro
24INR0126	High Noon Storage	OTH	12/1/2027	94.0	Hill
24INR0188	Tehuacana Creek Solar SLF	SOL	3/10/2027	505.5	Navarro
24INR0189	Tehuacana Creek BESS SLF	OTH	3/10/2027	419.0	Navarro
24INR0355	Anatole Renewable Energy Storage	OTH	1/11/2026	207.8	Henderson
24INR0364	Pitts Dudik II	SOL	1/29/2026	30.2	Hill
24INR0498	Fort Watt Storage	OTH	4/20/2027	205.4	Tarrant
24INR0631	Radian Storage SLF	OTH	4/22/2025	160.3	Brown
25INR0018	Yellow Cat Wind	WIN	9/30/2026	301.2	Navarro
25INR0046	Blue Skies BESS	OTH	12/31/2027	306.3	Hill

³ March 2025 GIS Report: <https://www.ercot.com/mp/data-products/data-product-details?id=PG7-200-ER>

GINR	Project Name	Fuel	Project COD	Max Capacity (~MW)	County
25INR0231	Apache Hill BESS	OTH	11/15/2026	200.9	Hood
25INR0391	Purple Sage BESS 1	OTH	5/30/2027	156.0	Collin
25INR0392	Purple Sage BESS 2	OTH	5/30/2027	156.0	Collin
26INR0543	Three Canes Solar SLF	SOL	12/31/2026	333.0	Navarro

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 2.4 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/Forced Outage Status

Bus No	Unit Name	Max Capacity (~MW)	Weather Zone
110124	DOWGEN_DOW_G66	95.6	Coast
151361	CHISMGRD_BES1	101.7	North Central
150071	SPNC_SPNCE_4	57.0	North Central
150072	SPNC_SPNCE_5	61.0	North Central

Generation in East and North Central Weather Zones that did not meet Planning Guide Section 6.9(1) were opened (turned off) to balance power. These units are listed in the Table 2.5.

Table 2.5: List of Generation Opened in the Study Base Case

Bus No	Generation Hub Name	Max Capacity (~MW)	Weather Zone
1695	Monticello	1375.0	East
3103	Shamburger	1375.0	East
3308	Big Brown	1375.0	East
68091	Navarro	1375.0	North Central

2.1.4 Loads

Modified RTP Large Loads including Officer Letter Loads (OLLs) relevant to the project, provided by Oncor, to address approximately 4.0 GW of load in the study area.

Approximately 50 MW of additional loads were also applied to the study base case based on feedback from Brazos Electric Cooperative (BEC).

The minimum reserve requirements were kept consistent with the 2024 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 North Central Weather Zone were decreased to balance power.

2.3 Maintenance Outage Scenario

ERCOT performed a maintenance outage evaluation based on historic off-peak system load. Conforming loads in the North Central and East Weather Zones were scaled down to 82% and 76%, respectively, of the summer peak load to create the off-peak case. Loads designated as non-scalable remained at the same level as the 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 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 2025 RTP's 2030 economic base case was to conduct the congestion analysis. The 2030 study year was selected based on the proposed ISD of the project.

2.5 Study Assumptions for Dynamic Stability Analysis

ERCOT conducted a dynamic stability analysis for ERCOT preferred option to determine if there are any adverse dynamic stability impacts. The study utilized the 2024 DWG 2026 Summer Peak dynamic case provided by Oncor, and the following were incorporated and evaluated in the analysis:

- Large Loads included in Oncor's RPG proposal within the study area;
- Critical contingencies provided by Oncor and additional contingencies near Large Load locations in the study area; and
- ERCOT's preferred option.

2.6 Methodology

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

2.6.1 Contingencies and Criteria

The reliability assessments were performed based on NERC Reliability Standard TPL-001-5.1, ERCOT Nodal Protocol, and ERCOT Planning Criteria⁴.

Contingencies⁵ 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 ERCOT Planning Criteria: <http://www.ercot.com/mktrules/guides/planning/current>

⁵ 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 only);
- P3: G-1+N-1 (G-1: generation outages) {Forney Combined Cycle Train, Mountain Creek SES, Comanche Peak, Midlothian, and Martain Lake generation}; and
- P6-2: X-1+N-1 (X-1: 345/138-kV transformers only) {Desoto Switch, Greene Road Switch, Sargent Road Switch, Seagoville Switch, Trinidad SES, Venus Kemp Ranch Switch, Watermill Switch, West Levee Switch, and Wilmer Switch 345/138-kV transformers}.

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
 - Rate A (normal rating) for pre-contingency conditions; and
 - 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.

2.6.2 Contingencies and Criteria for Dynamic Stability Analysis

ERCOT performed limited dynamic stability study of ERCOT preferred option in accordance with ERCOT Planning Guide Section 4 (Transmission Planning Criteria) and NERC Reliability Standard TPL-001-5.1. The study evaluated twenty-two 138-kV and 345-kV P1, P2, P3, P6 and P7 critical contingencies provided by Oncor and twenty-three P1 contingencies nearby large load locations in the study area.

Monitored quantities included all 138-kV and 345-kV bus voltages and frequencies in the study area as well as active and reactive power for at least one unit in all generation in the study area.

For dynamic stability analysis, the following criteria were enforced:

- For planning event P1: No generating unit shall pull out of synchronism. A generator being disconnected from the system by fault clearing action or by a Remedial Action Scheme (RAS) is not considered pulling out of synchronism;
- For planning events P2 through P7: When a generator pulls out of synchronism in the simulations, the resulting apparent impedance swings shall not result in the tripping of any transmission system elements other than the generating unit and its directly connected facilities;
- For any operating condition in categories P1 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, voltage shall recover to 0.90 p.u. within five seconds after clearing the fault;
- For any operating condition in categories P2 through P7 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, voltage shall recover to 0.90 p.u. within ten seconds after clearing the fault; and

- For any operating condition in categories P1 through P7, power oscillation within the range of 0.2 Hz to 2 Hz decays with a minimum 3% damping ratio.

2.6.3 Study Tool

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

- PowerWorld Simulator version 24 for Security Constrained Optimal Power Flow and steady-state contingency analysis;
- UPLAN version 12.3.0.30786 to perform congestion analysis; and
- PSS/e version 35.6 for dynamic stability analysis.

3 Project Need

Steady-state reliability analysis was performed in accordance with NERC Reliability Standard TPL-001-5.1 and ERCOT Planning Criteria described in Section 2.6 of this document. This analysis indicated thermal overloads, voltage violations and unsolved power flow issues under NERC P0(N-0), P1(N-1), P7(N-1), P3(G-1+N-1), and P6-2(X-1+N-1). These issues are summarized in Table 3.1 and visually illustrated in Figure 3.1. Detailed thermal overloads and voltage violations are listed in Table 3.2 and Table 3.3, respectively.

Table 3.1: Violations Observed Under NERC Reliability Standard 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	1	None
P1, P2-1, P7: N-1	6	14	None
P3: G-1+N-1	8	10	None
P6-2: X-1+N-1	30	23	3

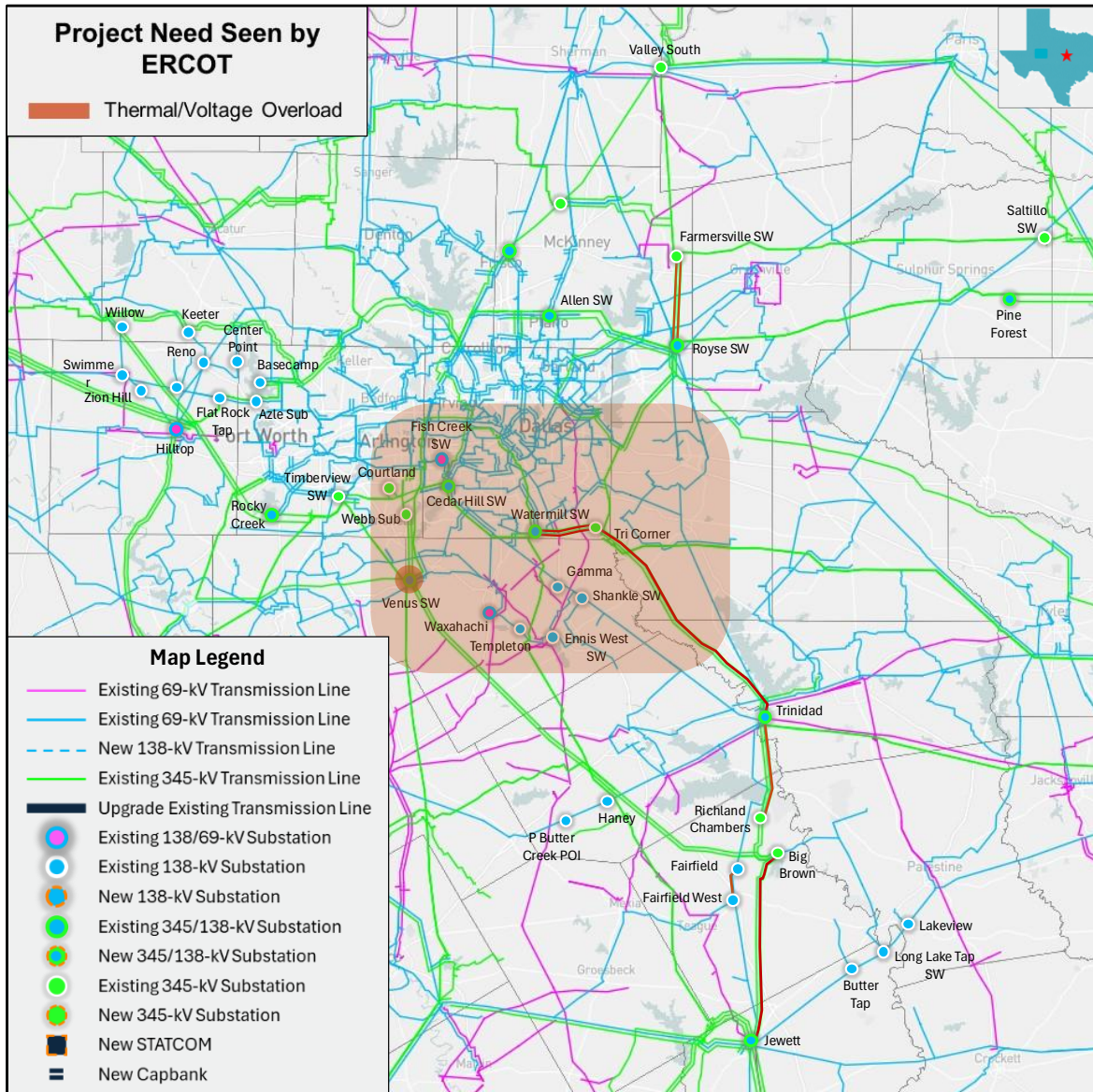


Figure 3.1: Study Area Map Showing Project Need Seen by ERCOT

Table 3.2: Thermal Overloads Observed in the Study Area

NERC Contingency Category	Overloaded Element	Voltage Level (kV)	Length (~miles)	Max Loading %
P0: N-0	BRDG_RC (37245) -> TNCLIMAX__0 (37280) CKT 1	69	4.46	103.43
P1: N-1	BUNTIN2_8 (2985) -> SMPST2T_8 (2986) CKT 1	138	3.70	215.91
P1: N-1	CCRST_8 (2486) -> BUNTIN2_8 (2985) CKT 1	138	2.70	214.18
P1: N-1	WATMLL_8 (2429) -> WILSON_8 (3074) CKT 1	138	1.30	172.88
P1: N-1	SMPST2T_8 (2986) -> WITTRD1_8 (3067) CKT 1	138	3.00	145.20
P1: N-1	WATMLL_8 (2429) -> WILSON_8 (3074) CKT 2	138	1.30	134.26
P1: N-1	WITTRD1_8 (3067) -> TENMILE_8 (2126) CKT 1	138	2.87	127.70
P1: N-1	CCRST_1T8 (2495) -> CCRST_8 (2486) CKT 1	138	0.10	127.57

NERC Contingency Category	Overloaded Element	Voltage Level (kV)	Length (~miles)	Max Loading %
P1: N-1	TENMILE_8 (2126) -> WILSON_8 (3074) CKT 1	138	0.70	124.02
P1: N-1	CHILSW_S8 (2421) -> DVIL1_8 (2999) CKT 1	138	3.46	109.29
P1: N-1	FARMLSW_5 (1685) -> ROYSE_N5 (2461) CKT 1	345	15.40	100.82
P1: N-1	GAMMA_8 (12344) -> TRUMBULL8 (221) CKT 1	138	6.00	100.49
P1: N-1	SHANKLSW_8 (12329) -> GAMMA_8 (12344) CKT 1	138	6.36	100.42
P1: N-1	Venus Kemp Ranch Auto	345/138	-	100.20
P1: N-1	FARMLSW_5 (1685) -> ROYSE_S5 (2478) CKT 1	345	15.40	100.02
P3: G-1+N-1	FAIRWPOD_8 (3503) -> FAIRFIELD (196) CKT 1	138	5.20	140.51
P3: G-1+N-1	FSHCRK1_8 (2491) -> CHILSW_N8 (2422) CKT 1	138	6.30	114.25
P3: G-1+N-1	RICHLND1_5 (3134) -> TRINDAD2_5 (3124) CKT 1	345	18.70	106.03
P3: G-1+N-1	JEWETT_S5 (3390) -> BIGBRNE_5 (3380) CKT 1	345	32.80	105.68
P3: G-1+N-1	PARKROW1_8 (2257) -> POLY_AM1_8 (2260) CKT 1	138	1.50	105.63
P3: G-1+N-1	MDLTHTX1_8 (2307) -> NEWBRCH_8 (12307) CKT 1	138	0.30	102.84
P3: G-1+N-1	SHRY_A8 (1919) -> PARKROW1_8 (2257) CKT 1	138	1.42	102.63
P3: G-1+N-1	TRINDAD1_5 (3123) -> TRICRN1_5 (2432) CKT 1	345	40.50	101.76
P3: G-1+N-1	WATMLL_8 (2429) -> WILSON_8 (3074) CKT 1	138	1.30	101.20
P3: G-1+N-1	LTV1_8 (2259) -> GRANDPR1_8 (2262) CKT 1	138	2.40	100.94
P6-2: X-1+N-1	SARDIS8 (203) -> WAX_NW_8 (2309) CKT 1	138	1.88	179.50
P6-2: X-1+N-1	WAX_NW_8 (2309) -> MDLTH_S_8 (2308) CKT 1	138	5.10	163.55
P6-2: X-1+N-1	RAILPORT (442) -> VENUS (1908) CKT 1	138	5.69	153.36
P6-2: X-1+N-1	MDLTHTX12_8 (2310) -> SOAPCRK_8 (2289) CKT 1	138	0.00	151.70
P6-2: X-1+N-1	PADERA_8 (2286) -> MDLTHTX12_8 (2310) CKT 1	138	5.54	151.69
P6-2: X-1+N-1	STERRETTL_8 (12317) -> SARDIS8 (203) CKT 1	138	2.00	149.67
P6-2: X-1+N-1	MDLTH_S_8 (2308) -> NEWBRCH_8 (12307) CKT 1	138	1.90	147.28
P6-2: X-1+N-1	NEWBRCH_8 (12307) -> MDLTHTX1_8 (2307) CKT 1	138	0.30	146.40
P6-2: X-1+N-1	CHILTPL_8 (3053) -> CHCLRKR1_8 (3054) CKT 1	138	3.40	141.44
P6-2: X-1+N-1	DESSW1_8 (2424) -> GLNHEIGHTS (217) CKT 1	138	2.10	140.36
P6-2: X-1+N-1	CHCLRKR1_8 (3054) -> MDLTHBOX_8 (2314) CKT 1	138	5.00	135.80
P6-2: X-1+N-1	GLNHEIGHTS (217) -> STERRETT1_8 (2317) CKT 1	138	0.00	128.40
P6-2: X-1+N-1	MDLTHBOX_8 (2314) -> MDLTH_N_8 (2313) CKT 1	138	1.80	126.06
P6-2: X-1+N-1	P_BTTLECRK_POI (888876) -> HANEY (213) CKT 1	138	7.80	125.50
P6-2: X-1+N-1	SOAPCRK_8 (2289) -> KEMPRNCH_8 (2303) CKT 1	138	0.00	123.46
P6-2: X-1+N-1	HANEY (213) -> NAVARRO1_8 (3478) CKT 1	138	9.83	122.61
P6-2: X-1+N-1	TRICRN1_5 (2432) -> WATMLL_W5 (2427) CKT 1	345	11.50	104.57
P6-2: X-1+N-1	TRICRN1_5 (2432) -> WATMLL_W5 (2427) CKT 2	345	11.50	104.57
P6-2: X-1+N-1	ENNS_W_8 (2241) -> TMPLTON_8 (12320) CKT 1	138	7.10	103.82
P6-2: X-1+N-1	GRIFFTH_P8 (1905) -> RAILPORT (442) CKT 1	138	3.50	103.09
P6-2: X-1+N-1	DVIL1_8 (2999) -> LVBRD1T_8 (2994) CKT 1	138	1.84	101.12
P6-2: X-1+N-1	SARDIS9 (202) -> SARDIS8 (203) CKT 1	69	1.00	100.82
P6-2: X-1+N-1	TMPLTON_8 (12320) -> WAX_8 (2321) CKT 1	138	6.22	100.20

Table 3.3: Voltage Violations Observed in the Study Area

NERC Contingency Category	Overloaded Element	Voltage Level (kV)	Base Loading (p.u.)	Min Loading (p.u.)
P1: N-1	WILSON_8 (3074)	138	0.90	0.88
P1: N-1	TENMIL2_8 (2238)	138	0.90	0.88
P1: N-1	TENMILE_8 (2126)	138	0.90	0.88
P1: N-1	WITTRD2_8 (3068)	138	0.90	0.89
P1: N-1	VIOLET_8 (2230)	138	0.90	0.89
P1: N-1	RED_OAK1_8 (2328)	138	0.90	0.89
P3: G-1+N-1	PEBBLCRK_8 (2229)	138	0.90	0.89
P3: G-1+N-1	CEDARDLE_8 (12427)	138	0.90	0.90
P3: G-1+N-1	BRYNST2_8 (2908)	138	0.90	0.90
P3: G-1+N-1	THMSAVE1_8 (13696)	138	0.90	0.90
P3: G-1+N-1	THOMAVE1_T8 (2840)	138	0.90	0.90
P3: G-1+N-1	ENETOH2_8 (12904)	138	0.90	0.90
P3: G-1+N-1	ENET2_8 (2904)	138	0.90	0.90
P3: G-1+N-1	WITTRD1_8 (3067)	138	0.90	0.90
P6.2: X-1+N-1	PLUTO2_8 (12304)	138	0.90	0.75
P6.2: X-1+N-1	PLUTO1_8 (12303)	138	0.90	0.75
P6.2: X-1+N-1	KEMPRNCH_8 (2303)	138	0.90	0.75
P6.2: X-1+N-1	HOBTLZL_8 (2299)	138	0.90	0.75
P6.2: X-1+N-1	COTTONWD_8 (2304)	138	0.90	0.76
P6.2: X-1+N-1	SOAPCRK_8 (2289)	138	0.90	0.76
P6.2: X-1+N-1	ELLISSLR_8 (152283)	138	0.90	0.76
P6.2: X-1+N-1	GERDAU_8 (152285)	138	0.90	0.76
P6.2: X-1+N-1	MDLTHTX12_8 (2310)	138	0.90	0.77
P6.2: X-1+N-1	CHCLRKR1_8 (3054)	138	0.90	0.77
P6.2: X-1+N-1	MDLTHBOX_8 (2314)	138	0.90	0.78
P6.2: X-1+N-1	ASHGRVE_8 (12313)	138	0.90	0.78
P6.2: X-1+N-1	MDLTH_N_8 (2313)	138	0.90	0.78
P6.2: X-1+N-1	MDLTH_N_T8 (2311)	138	0.90	0.78
P6.2: X-1+N-1	PADERA_8 (2286)	138	0.90	0.78
P6.2: X-1+N-1	VENUS (1908)	138	0.90	0.80
P6.2: X-1+N-1	AIRPRD1_8 (2306)	138	0.90	0.81
P6.2: X-1+N-1	AIRPRD_T8 (2305)	138	0.90	0.81
P6.2: X-1+N-1	MDLTHTX11_8 (2307)	138	0.90	0.81
P6.2: X-1+N-1	NEWBRCH_8 (12307)	138	0.90	0.81
P6.2: X-1+N-1	RAILPORT (442)	138	0.92	0.82
P6.2: X-1+N-1	MDLTH_S_8 (2308)	138	0.90	0.82
P6.2: X-1+N-1	STERRETTL_8 (12317)	138	0.90	0.84
P6.2: X-1+N-1	SARDIS8 (203)	138	0.92	0.84
P6.2: X-1+N-1	LONGBRANCH (280)	138	0.92	0.84
P6.2: X-1+N-1	WAX_NW_8 (2309)	138	0.90	0.85

NERC Contingency Category	Overloaded Element	Voltage Level (kV)	Base Loading (p.u.)	Min Loading (p.u.)
P6.2: X-1+N-1	CEDARHILL (220)	138	0.92	0.85
P6.2: X-1+N-1	SAINTPAUL (223)	138	0.92	0.86
P6.2: X-1+N-1	LOOP9_8 (2848)	138	0.90	0.90
P6.2: X-1+N-1	VENUS3_8 (441)	138	0.92	0.90

The three (3) unsolved power flows were observed under various N-1 outage conditions:

- REDACTED _____
- REDACTED _____
- REDACTED _____

4 Description of Project Options

ERCOT evaluated three system improvement options to address the thermal overload, voltage violation(s) and the unsolved power flow issues that were observed in the study base case in the project study area.

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

- Construct a new Greene Road 345/138-kV Switch by installing fourteen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two new 345/138-kV autotransformers with a normal rating of 700 MVA and an emergency rating of 750 MVA;
 - Re-terminate the existing Watermill Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission line into the new Greene Road 345-kV Switch, which creates the new Watermill Switch to Greene Road Switch and the new Greene Road Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission lines;
 - Re-terminate the existing Wilson Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line into the new Greene Road 138-kV Switch, which creates the new Wilson Switch to Greene Road Switch and the new Greene Road Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line;
- Rebuild the new Greene Road Switch to Watermill Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 3.6 miles/circuit;
- Rebuild the new Wilson Switch to Greene Road Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, approximately 2.0 miles/circuit;

- Rebuild the new Greene Road Switch to Cedar Crest Switch 138-kV single-circuit transmission line on double-circuit structures with one circuit in place, with normal and emergency ratings of at least 764 MVA, approximately 10.9 miles/circuit;
- Construct a new Alba Road 345-kV Switch by installing eleven 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the new Watermill Switch to Greene Road Switch 345-kV double-circuit transmission line into the new Alba Road 345-kV Switch, which creates the new Watermill Switch to Alba Road Switch and the new Alba Road Switch to Greene Road Switch 345-kV double-circuit transmission lines;
- Construct a new Stainback 345-kV Switch by installing fourteen 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the existing Watermill Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission line into the new Stainback 345-kV Switch, which creates the new Watermill Switch to Stainback Switch and the new Stainback Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission lines;
- Rebuild the new Watermill Switch to Stainback Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 3.0 miles/circuit;
- Rebuild the existing Watermill Switch to Wilson Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, approximately 0.8 miles/circuit;
- Construct a new Ironwood 345/138-kV Switch by installing seventeen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two 345/138-kV autotransformers with normal and emergency ratings of 700 MVA and 750 MVA, respectively;
 - Re-terminate the existing Liggett Switch to Endeavor Switch 345-kV Line at the new Ironwood 345-kV Switch, which creates the new Liggett Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Disconnect the existing Endeavor Switch to Venus Switch (south bus) and Midlothian ANP #2 to Venus Switch (south bus) 345-kV Lines from Venus Switch (south bus) and connect the Midlothian ANP to Endeavor 345-kV Switch. This will create Midlothian ANP #1 to Venus Switch (north bus) and Midlothian ANP #2 to Endeavor Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Timberview Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Everman Switch to Venus Switch (north bus) and the new Timberview Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cedar Hill Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Sherry Switch to Venus Switch (north

- bus) and the new Cedar Hill Switch to Ironwood Switch 345-kV double-circuit transmission line;
- Re-terminate the existing Sam Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Fort Smith Switch to Venus Switch (north bus) and the new Sam Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Navarro Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Navarro Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cottonwood Creek 345/138-kV Autotransformer #2 at the north bus of Venus 345-kV Switch by installing one 345-kV, 5,000 A breaker;
 - Loop the existing Kemp Ranch Switch to Sardis Switch/Soap Creek Switch 138-kV double-circuit transmission line into the new Ironwood 138-kV Switch by disconnecting the double-circuit line at structure #1/2 (Midlothian Tap) and constructing four circuits from Midlothian Tap to the new Ironwood 138-kV Switch on separate structures, with normal and emergency ratings of at least 764 MVA, which will require a new ROW, approximately 2.0 miles/circuit;
- Rebuild the two Kemp Ranch Switch to Midlothian Tap 138-kV single-circuit transmission line sections using two separate structures, with normal and emergency ratings of at least 764 MVA, approximately 0.5 miles/circuit;
 - Rebuild the existing Sterrett Switch to Midlothian TXI 138-kV single-circuit transmission line sections, with normal and emergency ratings of at least 764 MVA, approximately 11.8 miles/circuit;
 - Rebuild the existing Ennis West Switch to Sterrett Switch 138-kV single-circuit transmission line, with normal and emergency ratings of at least 614 MVA, approximately 21.0 miles/circuit;
 - Rebuild the existing Big Brown 345-kV Switch by installing twelve 345-kV, 5,000 A breakers in a breaker-and-a-half bus arrangement. Upon completion, Big Brown Switch will be renamed as Pin Oak Switch:
 - Re-terminate the existing Big Brown Switch to Jewett Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Jewett Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Navarro Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Navarro Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Richland Chamber Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Richland Chambers Switch 345-kV double-circuit transmission line;

- Rebuild the new Jewett Switch to Pin Oak Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 32.8 miles/circuit;
- Rebuild the existing Richland Chambers Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 18.7 miles/circuit;
- Rebuild the existing Parker Switch to Hicks Switch 345-kV transmission line, with normal and emergency ratings of at least 1,912 MVA and with a conductor rating of at least 2,987 MVA, approximately 23.0 miles/circuit;
- Rebuild the existing Pebble Creek Switch to Shankle Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, approximately 15.5 miles/circuit;
- Rebuild the existing Mesquite East Switch to Seagoville Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, approximately 7.4 miles/circuit;
- Rebuild the existing Farmersville Switch to Royse Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 15.3 miles/circuit;
- Install one +250/-250 MVAr Grid-forming STATCOM at each of the following:
 - Alba Road 345-kV Switch;
 - Greene Road 345-kV Switch;
 - Wilmer 345kV Switch;
- Install 240 MVAr 345-kV capacitor banks (3-80 MVAr each):
 - One at Greene Road 345-kV Switch;
 - Two at Alba Road 345-kV Switch;
 - Two at Stainback 345-kV Switch;
- Install 110.4 MVAr 138-kV capacitor banks (3-36.8 MVAr each) at:
 - One at Greene Road 138-kV Switch;
 - Two at Ironwood 138-kV Switch;
 - Two at Pebble Creek 138-kV Switch;
- For terminal equipment:
 - The existing 345 kV terminal equipment, ensure they meet or exceed a rating of 3,000 A (1,792 MVA);
 - The new 345-kV terminal equipment, ensure they meet or exceed a rating of 5,000 A if the station is 5,000 A capable. Otherwise ensure the new 345-kV terminal equipment meets or exceeds a rating of 3,200 A; and
 - The 138-kV terminal equipment, ensure they meet or exceed a rating of 3,000 A.

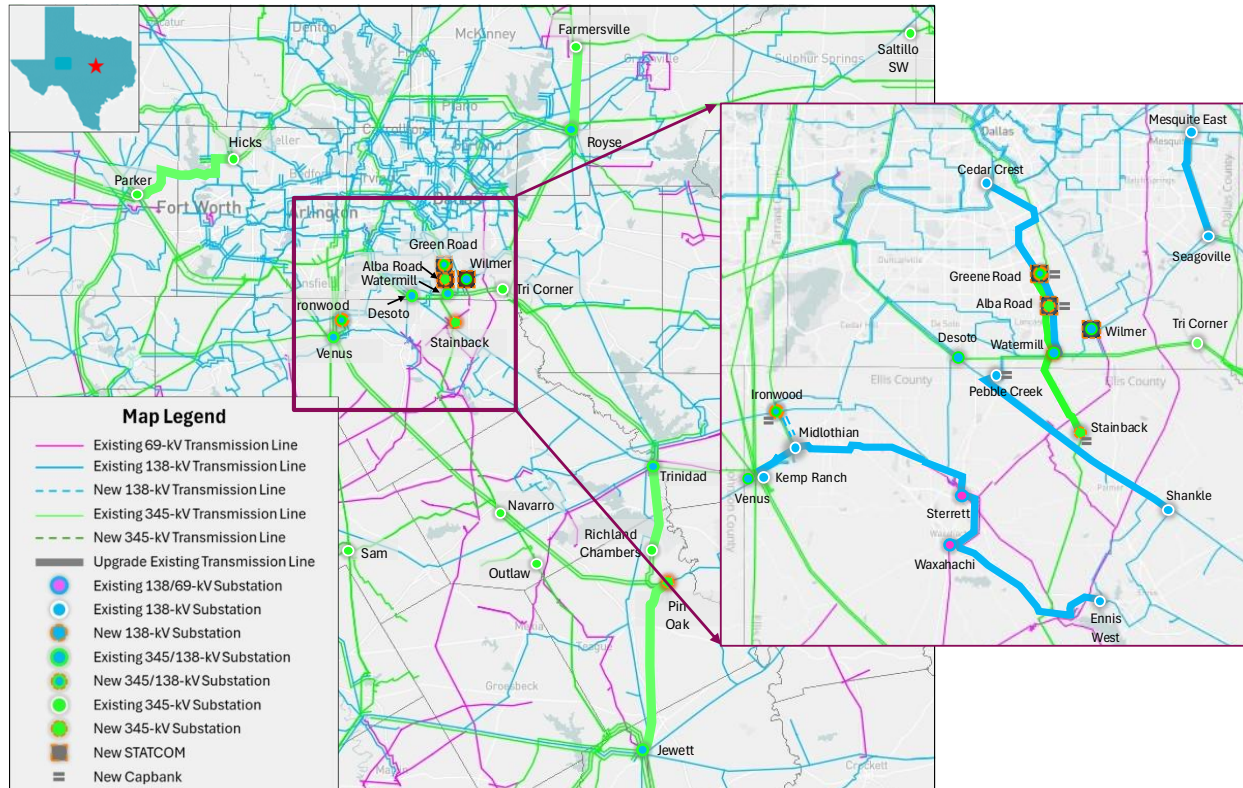


Figure 4.1: Map of Option 1

Option 2 consists of the following:

The following additional upgrades were added to Option 1 to develop Option 2.

- Construct a new Goat Pad Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Soap Creek Switch 138-kV transmission line into the new Goat Pad 138-kV Switch, which creates the new Goat Pad Switch to Cedar Hill Switch and the new Goat Pad Switch to Soap Creek Switch 138-kV transmission lines;
 - Install a new Goat Pad Switch to Goatheard 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 524 MVA, for approximately 0.1 miles/circuit; and
- Construct a new Goatheard Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Saint Paul Switch 138-kV single-circuit transmission line into the new Goatheard 138-kV Switch, which creates the new Goatheard Switch to Cedar Hill Switch and the new Goatheard Switch to Saint Paul Switch 138-kV single-circuit transmission line, and rebuild on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 237 MVA, approximately 0.7 miles/circuit.

Option 3 consists of the following:

The following additional upgrades were added to Option 1 to develop Option 3. Option 3 includes the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area upgrade project (25RPG038) were included in its entirety, and a subset of upgrades identified in the Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042). A detailed component list of Option 3 is provided in Appendix A of this document.

- Construct a new Goat Pad Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Soap Creek Switch 138-kV transmission line into the new Goat Pad 138-kV Switch, which creates the new Goat Pad Switch to Cedar Hill Switch and the new Goat Pad Switch to Soap Creek Switch 138-kV transmission lines;
 - Install a new Goat Pad Switch to Goathead 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 524 MVA, for approximately 0.1 miles/circuit;
- Construct a new Goathead Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Saint Paul Switch 138-kV single-circuit transmission line into the new Goathead 138-kV Switch, which creates the new Goathead Switch to Cedar Hill Switch and the new Goathead Switch to Saint Paul Switch 138-kV single-circuit transmission line, and rebuild on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 237 MVA, approximately 0.7 miles/circuit;
- Upgrade the existing Navarro Switch to the new Pin Oak (Big Brown) Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 27.6 miles/circuit;
- Upgrade the existing Navarro Switch to Outlaw Switch 345-kV double-circuit transmission line on double-circuit structures with both one circuit in place, with normal and emergency ratings of at least 2,987 MVA, approximately 5.6 miles/circuit;
- Rebuild the existing Desoto 345/138-kV Switch:
 - Install five 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Install nine 138-kV circuit breakers in a breaker-and-a-half configuration with ratings of 3,200 A;
- Construct a new Desoto Switch to Sam Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, which will require a new ROW, approximately 56.0 miles/circuit:
 - Install four 345-kV circuit breakers at the existing Desoto Switch 345-kV substation with ratings of at least 5,000 A;

- Install four 345-kV circuit breakers at the existing Sam Switch 345-kV substation with ratings of at least 5,000 A;
- Construct a new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, which will require a new ROW, approximately 53.0 miles/circuit:
 - Install three 345-kV circuit breakers at the existing Wilmer Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Navarro Switch 345-kV substation with ratings of at least 5,000 A;
- Rebuild the existing Tri Corner 345-kV Switch:
 - Install twelve 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Watermill Switch to Tri Corner Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, approximately 11.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A;
- Upgrade the existing Tri Corner Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 40.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Farmerville Switch to Saltillo Switch 345-kV single-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, approximately 59.9 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 3,200A.

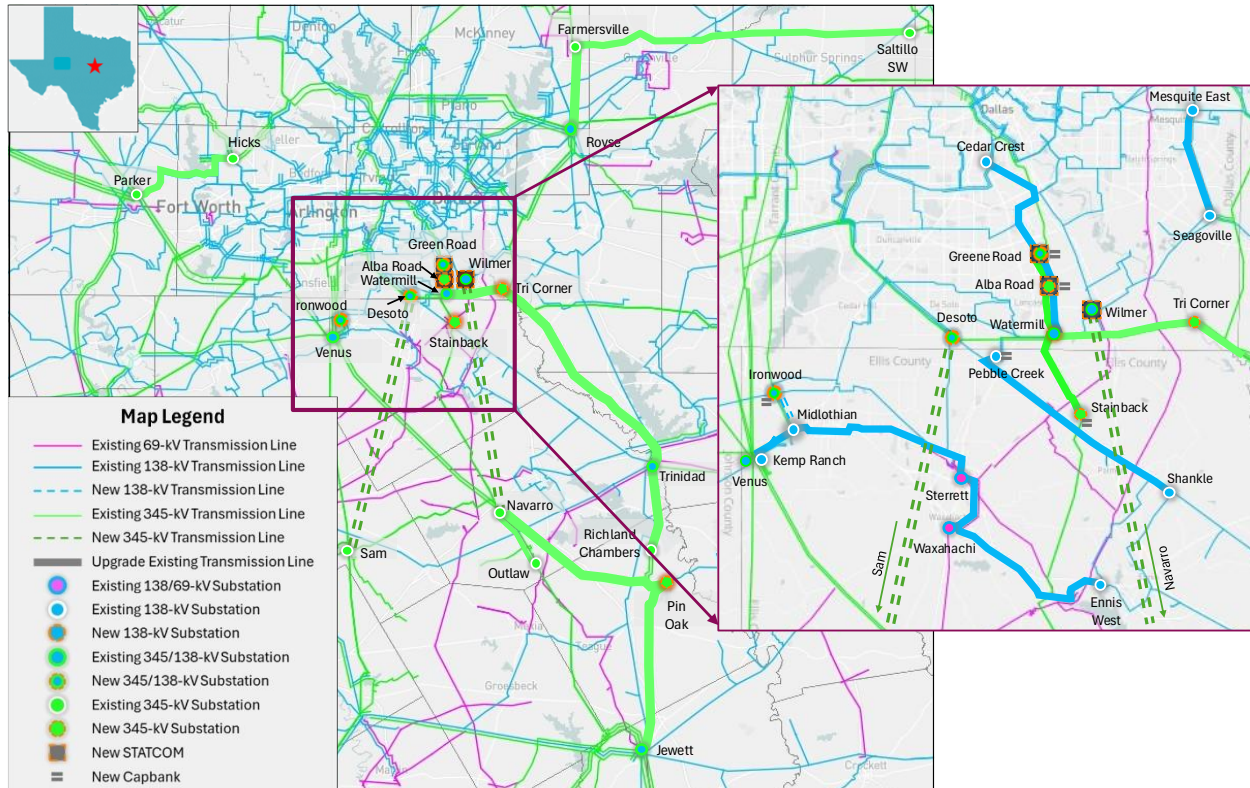


Figure 4.2: Map of Option 3

5 Option Evaluations

ERCOT performed reliability analysis, maintenance outage evaluation, and long-term load-serving capability assessment to evaluate all three 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 three options.

5.1 Results of Reliability Analysis

All three options were evaluated based on the contingencies described in Section 2.6 of this report. As shown in Table 5.1, Option 1 and Option 2 identified reliability criteria violations and Option 3 did not identify any reliability criteria violations.

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

Option	Unsolved Power Flow	N-1		X-1+N-1		G-1+N-1	
		Thermal Overload	Voltage Violation	Thermal Overload	Voltage Violation	Thermal Overload	Voltage Violation
1	None	11	3	2	None	3	None
2	None	2	None	2	None	4	None
3	None	None	None	None	None	None	None

5.2 Maintenance Outage Evaluation

Using the P1, P2.1, and P7 contingencies based on the review of the system topology of the study area, ERCOT conducted an N-2 contingency analysis for all three options 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 5.2, the results of this maintenance outage assessment indicate Option 3 did not result in any reliability criteria violations.

Table 5.2: Results of the Maintenance Outage Assessment for All Three Options

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

5.3 Long-Term Load Serving Capability Analysis

ERCOT conducted a long-term load-serving capability assessment for all three options to compare the relative performance.

The results show that all three options provided additional long-term load-serving capability. However, Option 3 provides additional approximately 600 MW higher incremental load-serving capability than Option 1 and Option 2, these results are shown in Table 5.3.

Table 5.3: Results of Long-Term Load-Serving Capability Assessment of All Three Options

Option	Load-Serving Capability (~MW)
1	2305
2	2335
3	2904

5.4 Cost Estimate and Feasibility Assessment

Transmission Service Providers (TSPs), Oncor, BEC, and Lone Star, performed feasibility assessments and provided cost estimates for all three options. Table 5.4 summarizes the cost estimate, estimated mileage of CCN required, option feasibility, and expected ISD of complication for the three options.

Table 5.4: Cost Estimates and Expected ISD for All Three Options

Option	Cost Estimates (~\$B)	CCN Required (~miles)	Feasible	Expected ISD (Month Year)
1	\$1.248	Yes (2.0)	Feasible	Oncor: May 2026 to April 2029
2	\$1.266	Yes (2.0)	Feasible	Oncor: May 2026 to April 2029 Brazos: April 2028

Option	Cost Estimates (~\$B)	CCN Required (~miles)	Feasible	Expected ISD (Month Year)
3	\$2.886	Yes (111.0)	Feasible	Oncor: May 2026 to April 2033 Brazos: April 2028 Lone Star: June 2030, April 2033

The cost estimate for Option 3 includes approximately \$856.28 million in the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area Reliability Project (25RPG038), and approximately \$763.58 million for the upgrades identified as part of the Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042). The cost estimate includes the estimated capital cost with energized construction work.

6 Comparison of All Three Options

The comparison of Option 1, Option 2, and Option 3, with corresponding cost estimates provided by TSPs are summarized in Table 6.1.

Table 6.1: Comparison of the All Three Options

	Option 1	Option 2	Option 3
Addresses the Project Needs	No	No	Yes
Met ERCOT and NERC Reliability Criteria	No	No	Yes
Improves Long-Term Load-Serving Capability (~MW)	2305	2335	2904
CCN Needed (~miles)	Yes (2.0)	Yes (2.0)	Yes (111.0)
Capital Cost Estimates (~\$B)	\$1.248	\$1.266	\$2.886
Feasible	Yes	Yes	Yes
Expected ISD	Oncor: May 2026 to April 2029	Oncor: May 2026 to April 2029 Brazos: April 2028	Oncor: May 2026 to April 2033 Brazos: April 2028 Lone Star: June 2030, April 2033

ERCOT recommends Option 3 as the preferred option to address the reliability needs in the Study area based on the following considerations:

- Option 3 addresses the project need in the study area and meets ERCOT and NERC Reliability Criteria;
- Option 3 provides the best long-term load-serving capability; and
- Option 3 improves operational flexibility.

7 Additional Analysis and Assessment

The preferred option (Option 3, approximately \$2.886 billion) is categorized as a Tier 1 project, pursuant to ERCOT Protocol 3.11.4.3(1)(a). As required by Planning Guide Section 3.1.3(4), ERCOT performed generation and load sensitivity studies to identify the preferred option performance, as

required under Planning Guide Section 3.1.3(4). Additionally, a Sub-synchronous Oscillations (SSO) Assessment, Congestion Analysis, and Dynamic Stability Analysis were also 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 January 2026 GIS⁶ reports, seventeen (17) units were found within the study area that could have an impact on the identified reliability issues. These units, listed in Table 7.1, were added to the 2024 RTP's 2029 Summer Peak case following the 2024 RTP methodology. ERCOT determined that the addition of these generators does not impact Option 3.

Table 7.1: List of Units that Could have an Impact on the Identified Reliability Issues

GINR	Project Name	Fuel	Project COD	Max Capacity (~MW)	County
21INR0368	Eliza Solar	SOL	12/18/2025	151.7	Kaufman
22INR0220	Lamkin Solar	SOL	8/8/2027	101.5	Comanche
22INR0261	Dorado Solar	SOL	2/16/2026	401.4	Callahan
23INR0538	Roadrunner Crossing BESS SLF	OTH	2/13/2026	0.0	Eastland
24INR0136	Eagle Springs Storage	OTH	12/31/2026	33.1	Delta
24INR0137	Eagle Springs Solar	SOL	12/31/2026	77.2	Delta
24INR0181	Bynum Solar Project	SOL	2/6/2026	56.0	Coryell
25INR0101	Drake BESS	OTH	7/14/2026	257.3	Collin
25INR0122	Vial BESS	OTH	9/15/2027	135.2	Hill
25INR0166	Padrino Solar	SOL	7/30/2026	201.4	Hill
25INR0199	Bonham Solar SLF	SOL	4/6/2027	138.4	Limestone
25INR0229	OCI Cobb Creek Solar	SOL	12/31/2027	203.1	Hill
25INR0233	OCI Cobb Creek ESS	OTH	12/31/2027	201.6	Hill
25INR0281	Cosper Solar	SOL	11/12/2027	148.2	Bell
26INR0241	Sol Marina Energy Center	SOL	10/29/2027	175.3	Ellis
26INR0242	Sol Marina Energy Center BESS	OTH	10/29/2027	57.2	Ellis
26INR0380	Pepper Solar Farm	SOL	9/20/2027	120.9	McLennan

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 the 2024 RTP study. Before 2024, ERCOT's 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. Starting 2024, ERCOT's RTP adopted a new methodology of having one summer peak case for each

⁶ January 2026 GIS Report: <https://www.ercot.com/mp/data-products/data-product-details?id=PG7-200-ER>

study year with non-coincident peaks for each of the Weather Zones, which would eliminate the load scaling impact. As such, load scaling sensitivity analysis is no longer needed.

7.3 Sub-synchronous Oscillations (SSO) Assessment

Pursuant to Nodal Protocol Section 3.22.1.3(2), ERCOT conducted a SSO screening for Option 3 and found no adverse SSO impacts to the existing and planned generation resources in the study area.

7.4 Congestion Analysis

ERCOT conducted a congestion analysis to identify any potential impact on system congestion related to the addition of the preferred option, Option 3, using the 2025 RTP's 2030 economic study case.

The results of the congestion analysis indicated no additional congestion in the area due to the addition of the recommended transmission upgrades of Option 3.

7.5 Dynamic Stability Analysis

Dynamic stability analysis examines a power system's behavior before, during, and after a disturbance such as a fault on a transmission line. It involves assessing the system's ability to maintain stability, withstand the disturbance, and return to a steady state condition. The analysis ensures that the system can handle faults without losing synchronism or experiencing unacceptable oscillations, ensuring reliable and continuous operation.

ERCOT conducted the dynamic stability analysis for Option 3 based on the assumption and methodology in Section 2. Based on the study results, no dynamic stability concerns were identified for the evaluated contingencies.

Regardless of these study results, future Large Electronic Loads (LELs) will be expected to comply with the applicable ride-through performance requirements proposed in the pending NOGRR282⁷, if and when it becomes effective and is determined to be applicable.

8 Conclusion

ERCOT evaluated the three transmission upgrade options to resolve thermal overload, voltage violations and unsolved power flow issues in the Southern DFW area. Based on the results of the independent review, ERCOT recommends Option 3 as the preferred solution because it addresses all project needs, meets ERCOT and NERC Reliability Standard, improves long-term load-serving capability for future load growth in the area, and improves operational flexibility.

Option 3 consists of the following upgrades:

- Construct a new Greene Road 345/138-kV Switch by installing fourteen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:

⁷ NOGRR282: <https://www.ercot.com/mktrules/issues/NOGRR282>

- Install two new 345/138-kV autotransformers with a normal rating of 700 MVA and an emergency rating of 750 MVA;
- Re-terminate the existing Watermill Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission line into the new Greene Road 345-kV Switch, which creates the new Watermill Switch to Greene Road Switch and the new Greene Road Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission lines;
- Re-terminate the existing Wilson Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line into the new Greene Road 138-kV Switch, which creates the new Wilson Switch to Greene Road Switch and the new Greene Road Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line;
- Rebuild the new Greene Road Switch to Watermill Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 3.6 miles/circuit;
- Rebuild the new Wilson Switch to Greene Road Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, for approximately 2.0 miles/circuit;
- Rebuild the new Greene Road Switch to Cedar Crest Switch 138-kV single-circuit transmission line on double-circuit structures with one circuit in place, with normal and emergency ratings of at least 764 MVA, for approximately 10.9 miles/circuit;
- Construct a new Alba Road 345-kV Switch by installing eleven 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the new Watermill Switch to Greene Road Switch 345-kV double-circuit transmission line into the new Alba Road 345-kV Switch, which creates the new Watermill Switch to Alba Road Switch and the new Alba Road Switch to Greene Road Switch 345-kV double-circuit transmission lines;
- Construct a new Stainback 345-kV Switch by installing fourteen 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the existing Watermill Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission line into the new Stainback 345-kV Switch, which creates the new Watermill Switch to Stainback Switch and the new Stainback Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission lines;
- Rebuild the new Watermill Switch to Stainback Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 3.0 miles/circuit;
- Rebuild the existing Watermill Switch to Wilson Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, for approximately 0.8 miles/circuit;

- Construct a new Ironwood 345/138-kV Switch by installing seventeen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two 345/138-kV autotransformers with normal and emergency ratings of 700 MVA and 750 MVA, respectively;
 - Re-terminate the existing Liggett Switch to Endeavor Switch 345-kV Line at the new Ironwood 345-kV Switch, which creates the new Liggett Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Disconnect the existing Endeavor Switch to Venus Switch (south bus) and Midlothian ANP #2 to Venus Switch (south bus) 345-kV Lines from Venus Switch (south bus) and connect the Midlothian ANP to Endeavor 345-kV Switch. This will create Midlothian ANP #1 to Venus Switch (north bus) and Midlothian ANP #2 to Endeavor Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Timberview Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Everman Switch to Venus Switch (north bus) and the new Timberview Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cedar Hill Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Sherry Switch to Venus Switch (north bus) and the new Cedar Hill Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Sam Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Fort Smith Switch to Venus Switch (north bus) and the new Sam Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Navarro Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Navarro Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cottonwood Creek 345/138-kV Autotransformer #2 at the north bus of Venus 345-kV Switch by installing one 345-kV, 5,000 A breaker;
 - Loop the existing Kemp Ranch Switch to Sardis Switch/Soap Creek Switch 138-kV double-circuit transmission line into the new Ironwood 138-kV Switch by disconnecting the double-circuit line at structure #1/2 (Midlothian Tap) and constructing four circuits from Midlothian Tap to the new Ironwood 138-kV Switch on separate structures, with normal and emergency ratings of at least 764 MVA, for approximately 2.0 miles each circuit;
- Rebuild the two Kemp Ranch Switch to Midlothian Tap 138-kV single-circuit transmission line sections using two separate structures, with normal and emergency ratings of at least 764 MVA, for approximately 0.5 miles/circuit;

- Rebuild the existing Sterrett Switch to Midlothian TXI 138-kV single-circuit transmission line sections, with normal and emergency ratings of at least 764 MVA, for approximately 11.8 miles/circuit;
- Rebuild the existing Ennis West Switch to Sterrett Switch 138-kV single-circuit transmission line, with normal and emergency ratings of at least 614 MVA, for approximately 21.0 miles/circuit;
- Rebuild the existing Big Brown 345-kV Switch by installing twelve 345-kV, 5,000 A breakers in a breaker-and-a-half bus arrangement. Upon completion, Big Brown Switch will be renamed as Pin Oak Switch:
 - Re-terminate the existing Big Brown Switch to Jewett Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Jewett Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Navarro Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Navarro Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Richland Chamber Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Richland Chambers Switch 345-kV double-circuit transmission line;
- Rebuild the new Jewett Switch to Pin Oak Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 32.8 miles/circuit;
- Rebuild the existing Richland Chambers Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 18.7 miles/circuit;
- Rebuild the existing Parker Switch to Hicks Switch 345-kV transmission line, with normal and emergency ratings of at least 1,912 MVA and with a conductor rating of at least 2,987 MVA, for approximately 23.0 miles/circuit;
- Rebuild the existing Pebble Creek Switch to Shankle Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, for approximately 15.5 miles/circuit;
- Rebuild the existing Mesquite East Switch to Seagoville Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, for approximately 7.4 miles/circuit;
- Rebuild the existing Farmersville Switch to Royse Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, for approximately 15.3 miles/circuit;
- Install one +250/-250 MVAr Grid-forming STATCOM at each of the following:

- Alba Road 345-kV Switch;
- Greene Road 345-kV Switch;
- Wilmer 345kV Switch;
- Install 240 MVAR 345-kV capacitor banks (3-80 MVAR each):
 - One at Greene Road 345-kV Switch;
 - Two at Alba Road 345-kV Switch;
 - Two at Stainback 345-kV Switch;
- Install 110.4 MVAR 138-kV capacitor banks (3-36.8 MVAR each) at:
 - One at Greene Road 138-kV Switch;
 - Two at Ironwood 138-kV Switch;
 - Two at Pebble Creek 138-kV Switch;
- For terminal equipment:
 - The existing 345 kV terminal equipment, ensure they meet or exceed a rating of 3,000 A (1,792 MVA);
 - The new 345-kV terminal equipment, ensure they meet or exceed a rating of 5,000 A if the station is 5,000 A capable. Otherwise ensure the new 345-kV terminal equipment meets or exceeds a rating of 3,200 A;
 - The 138-kV terminal equipment, ensure they meet or exceed a rating of 3,000 A;
- Construct a new Goat Pad Switch 138-kV Substation:
 - Install a new Goat Pad Switch to Padera 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 287 MVA, for approximately 2.6 miles/circuit;
 - Install a new Goat Pad Switch to Midlothian 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 287 MVA, for approximately 3.0 miles/circuit;
 - Install a new Goat Pad Switch to Goatheard 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 524 MVA, for approximately 0.1 miles/circuit;
- Construct a new Goatheard Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Saint Paul Switch 138-kV single-circuit transmission line into the new Goatheard 138-kV Switch, which creates the new Goatheard Switch to Cedar Hill Switch and the new Goatheard Switch to Saint Paul Switch 138-kV single-circuit transmission line, and rebuild on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 237 MVA, for approximately 0.7 miles/circuit;
- Upgrade the existing Navarro Switch to the new Pin Oak (Big Brown) Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 27.6 miles/circuit;

- Upgrade the existing Navarro Switch to Outlaw Switch 345-kV double-circuit transmission line on double-circuit structures with both one circuit in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 5.6 miles/circuit;
- Upgrade the existing Desoto 345/138-kV Switch:
 - Install five 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Install nine 138-kV circuit breakers in a breaker-and-a-half configuration with ratings of 3,200 A;
- Construct a new Desoto Switch to Sam Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 56.0 miles/circuit:
 - Install four 345-kV circuit breakers at the existing Desoto Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Sam Switch 345-kV substation with ratings of at least 5,000 A;
- Construct a new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, for approximately 53.0 miles/circuit:
 - Install three 345-kV circuit breakers at the existing Wilmer Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Navarro Switch 345-kV substation with ratings of at least 5,000 A;
- Rebuild the existing Tri Corner 345-kV Switch:
 - Install twelve 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Watermill Switch to Tri Corner Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 11.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A;
- Upgrade the existing Tri Corner Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 40.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Farmerville Switch to Saltillo Switch 345-kV single-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 59.9 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 3,200A.

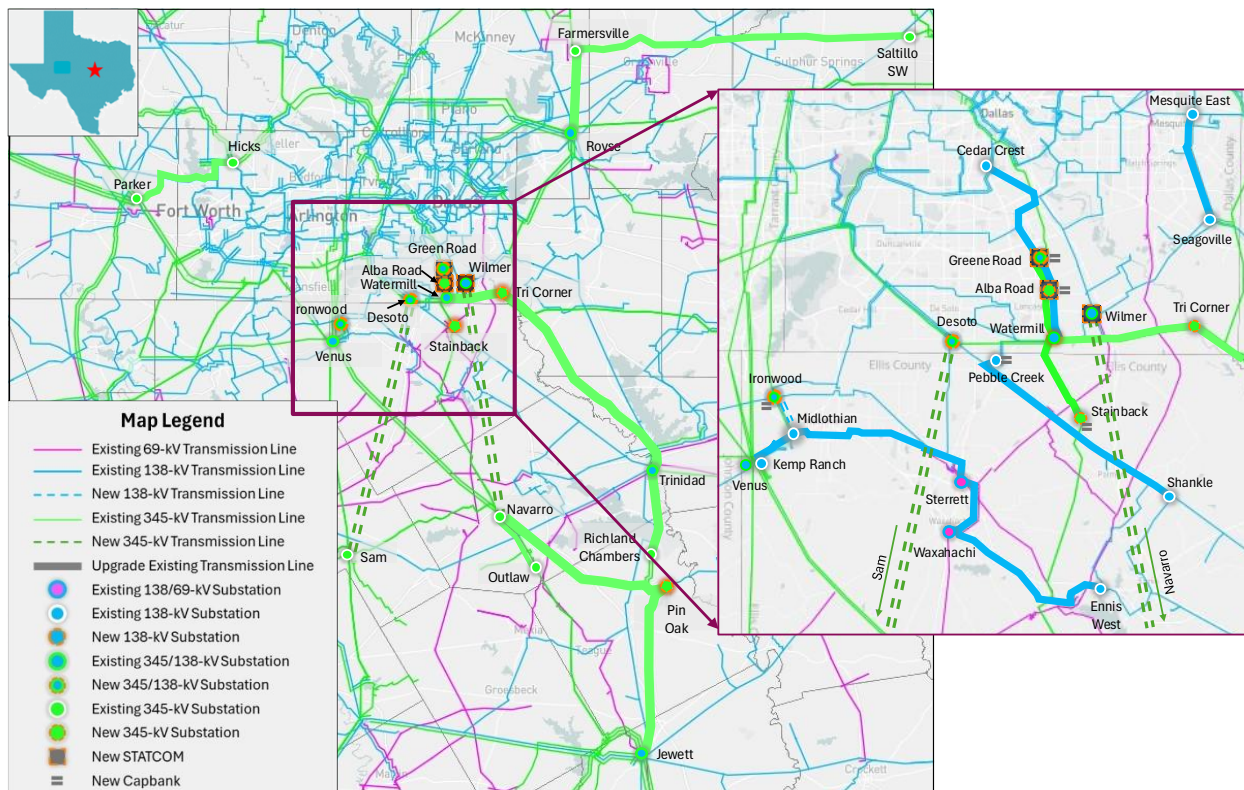


Figure 8.1: Map of Option 3

The upgrades identified in the Oncor and Lone Star Navarro and Ellis Area upgrade project (25RPG038) were included in its entirety, and a subset of upgrades identified in Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042) are included in the recommended Option 3. This report will serve as the combined EIR for all those upgrades.

The cost estimate for this Tier 1 project is approximately \$2.886 billion. The cost estimate includes approximately \$856.28 million in the upgrades identified in the Oncor and Lone Star Navarro and Ellis Area Reliability Project (25RPG038), and approximately \$763.58 million for the upgrades identified as part of Oncor Set 1 and Set 2 North and Central Texas Reliability Projects (25RPG040 and 25RPG042). The cost estimate includes the estimated capital cost with energized construction work.

The expected ISDs of this project for Oncor’s upgrades are between May 2026 to April 2033, December 2028 for Brazos Electric Cooperatives’ upgrades, and June 2030 and April 2033 for Lone Star’s upgrades. One or multiple CCN applications would be required for the construction of the new Desoto Switch to Sam Switch 345-kV double-circuit transmission line, the new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line, and the four new Midlothian Tap to Ironwood Switch 138-kV transmission lines due to approximately 111.0 miles of new right of way (ROW). However, Oncor has advised that the projected ISD may change based on material acquisition, outage coordination, construction, or other project related requirements.

Appendix

A: Option 3 Upgrade Components

Option 3 consists of the following upgrades:

- Construct a new Greene Road 345/138-kV Switch by installing fourteen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two new 345/138-kV autotransformers with a normal rating of 700 MVA and an emergency rating of 750 MVA;
 - Re-terminate the existing Watermill Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission line into the new Greene Road 345-kV Switch, which creates the new Watermill Switch to Greene Road Switch and the new Greene Road Switch to Sargent Road Switch/West Levee Switch 345-kV double-circuit transmission lines;
 - Re-terminate the existing Wilson Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line into the new Greene Road 138-kV Switch, which creates the new Wilson Switch to Greene Road Switch and the new Greene Road Switch to Cedar Hill Switch/Cedar Crest Switch 138-kV double-circuit transmission line;
- Rebuild the new Greene Road Switch to Watermill Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 3.6 miles/circuit;
- Rebuild the new Wilson Switch to Greene Road Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, approximately 2.0 miles/circuit;
- Rebuild the new Greene Road Switch to Cedar Crest Switch 138-kV single-circuit transmission line on double-circuit structures with one circuit in place, with normal and emergency ratings of at least 764 MVA, approximately 10.9 miles/circuit;
- Construct a new Alba Road 345-kV Switch by installing eleven 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the new Watermill Switch to Greene Road Switch 345-kV double-circuit transmission line into the new Alba Road 345-kV Switch, which creates the new Watermill Switch to Alba Road Switch and the new Alba Road Switch to Greene Road Switch 345-kV double-circuit transmission lines;
- Construct a new Stainback 345-kV Switch by installing fourteen 345-kV, 5,000 breakers in a breaker-and-a-half bus arrangement:
 - Re-terminate the existing Watermill Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission line into the new Stainback 345-kV Switch, which creates

the new Watermill Switch to Stainback Switch and the new Stainback Switch to Elrod Switch/Big Onion Switch 345-kV double-circuit transmission lines;

- Rebuild the new Watermill Switch to Stainback Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 3.0 miles/circuit;
- Rebuild the existing Watermill Switch to Wilson Switch 138-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 764 MVA, approximately 0.8 miles/circuit;
- Construct a new Ironwood 345/138-kV Switch by installing seventeen 345-kV, 5,000 A and ten 138-kV, 3,200 A breakers in a breaker-and-a-half bus arrangement:
 - Install two 345/138-kV autotransformers with normal and emergency ratings of 700 MVA and 750 MVA, respectively;
 - Re-terminate the existing Liggett Switch to Endeavor Switch 345-kV Line at the new Ironwood 345-kV Switch, which creates the new Liggett Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Disconnect the existing Endeavor Switch to Venus Switch (south bus) and Midlothian ANP #2 to Venus Switch (south bus) 345-kV Lines from Venus Switch (south bus) and connect the Midlothian ANP to Endeavor 345-kV Switch. This will create Midlothian ANP #1 to Venus Switch (north bus) and Midlothian ANP #2 to Endeavor Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Timberview Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Everman Switch to Venus Switch (north bus) and the new Timberview Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cedar Hill Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Sherry Switch to Venus Switch (north bus) and the new Cedar Hill Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Sam Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Fort Smith Switch to Venus Switch (north bus) and the new Sam Switch to Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Navarro Switch to Venus Switch (south bus) at the new Ironwood 345-kV Switch, which creates the new Navarro Switch to Venus Switch (north bus)/Ironwood Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Cottonwood Creek 345/138-kV Autotransformer #2 at the north bus of Venus 345-kV Switch by installing one 345-kV, 5,000 A breaker;
 - Loop the existing Kemp Ranch Switch to Sardis Switch/Soap Creek Switch 138-kV double-circuit transmission line into the new Ironwood 138-kV Switch by disconnecting

the double-circuit line at structure #1/2 (Midlothian Tap) and constructing four circuits from Midlothian Tap to the new Ironwood 138-kV Switch on separate structures, with normal and emergency ratings of at least 764 MVA, which will require a new ROW, approximately 2.0 miles/circuit;

- Rebuild the two Kemp Ranch Switch to Midlothian Tap 138-kV single-circuit transmission line sections using two separate structures, with normal and emergency ratings of at least 764 MVA, approximately 0.5 miles/circuit;
- Rebuild the existing Sterrett Switch to Midlothian TXI 138-kV single-circuit transmission line sections, with normal and emergency ratings of at least 764 MVA, approximately 11.8 miles/circuit;
- Rebuild the existing Ennis West Switch to Sterrett Switch 138-kV single-circuit transmission line, with normal and emergency ratings of at least 614 MVA, approximately 21.0 miles/circuit;
- Rebuild the existing Big Brown 345-kV Switch by installing twelve 345-kV, 5,000 A breakers in a breaker-and-a-half bus arrangement. Upon completion, Big Brown Switch will be renamed as Pin Oak Switch:
 - Re-terminate the existing Big Brown Switch to Jewett Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Jewett Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Navarro Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Navarro Switch 345-kV double-circuit transmission line;
 - Re-terminate the existing Big Brown Switch to Richland Chamber Switch 345-kV double-circuit transmission line at the new Pin Oak 345-kV Switch, which creates the new Pin Oak Switch to Richland Chambers Switch 345-kV double-circuit transmission line;
- Rebuild the new Jewett Switch to Pin Oak Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 32.8 miles/circuit;
- Rebuild the existing Richland Chambers Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 18.7 miles/circuit;
- Rebuild the existing Parker Switch to Hicks Switch 345-kV transmission line, with normal and emergency ratings of at least 1,912 MVA and with a conductor rating of at least 2,987 MVA, approximately 23.0 miles/circuit;
- Rebuild the existing Pebble Creek Switch to Shankle Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, approximately 15.5 miles/circuit;

- Rebuild the existing Mesquite East Switch to Seagoville Switch 138-kV transmission line, with normal and emergency ratings of at least 764 MVA, approximately 7.4 miles/circuit;
- Rebuild the existing Farmersville Switch to Royse Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,792 MVA and with a conductor rating of at least 2,987 MVA, approximately 15.3 miles/circuit;
- Install one +250/-250 MVAr Grid-forming STATCOM at each of the following:
 - Alba Road 345-kV Switch;
 - Greene Road 345-kV Switch;
 - Wilmer 345kV Switch;
- Install 240 MVAr 345-kV capacitor banks (3-80 MVAr each):
 - One at Greene Road 345-kV Switch;
 - Two at Alba Road 345-kV Switch;
 - Two at Stainback 345-kV Switch;
- Install 110.4 MVAr 138-kV capacitor banks (3-36.8 MVAr each) at:
 - One at Greene Road 138-kV Switch;
 - Two at Ironwood 138-kV Switch;
 - Two at Pebble Creek 138-kV Switch;
- For terminal equipment:
 - The existing 345 kV terminal equipment, ensure they meet or exceed a rating of 3,000 A (1,792 MVA);
 - The new 345-kV terminal equipment, ensure they meet or exceed a rating of 5,000 A if the station is 5,000 A capable. Otherwise ensure the new 345-kV terminal equipment meets or exceeds a rating of 3,200 A;
 - The 138-kV terminal equipment, ensure they meet or exceed a rating of 3,000 A;
- Construct a new Goat Pad Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Soap Creek Switch 138-kV transmission line into the new Goat Pad 138-kV Switch, which creates the new Goat Pad Switch to Cedar Hill Switch and the new Goat Pad Switch to Soap Creek Switch 138-kV transmission lines;
 - Install a new Goat Pad Switch to Goathead 138-kV single-circuit transmission line on double-circuit structures with only one circuit in place, with normal and emergency ratings of at least 524 MVA, for approximately 0.1 miles/circuit;
- Construct a new Goathead Switch 138-kV Substation:
 - Re-terminate the existing Cedar Hill Switch to Saint Paul Switch 138-kV single-circuit transmission line into the new Goathead 138-kV Switch, which creates the new Goathead Switch to Cedar Hill Switch and the new Goathead Switch to Saint Paul Switch 138-kV single-circuit transmission line, and rebuild on double-circuit structures


with only one circuit in place, with normal and emergency ratings of at least 237 MVA, approximately 0.7 miles/circuit;

- Upgrade the existing Navarro Switch to the new Pin Oak (Big Brown) Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, approximately 27.6 miles/circuit;
- Upgrade the existing Navarro Switch to Outlaw Switch 345-kV double-circuit transmission line on double-circuit structures with both one circuit in place, with normal and emergency ratings of at least 2,987 MVA, approximately 5.6 miles/circuit;
- Rebuild the existing Desoto 345/138-kV Switch:
 - Install five 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Install nine 138-kV circuit breakers in a breaker-and-a-half configuration with ratings of 3,200 A;
- Construct a new Desoto Switch to Sam Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, which will require a new ROW, approximately 56.0 miles/circuit:
 - Install four 345-kV circuit breakers at the existing Desoto Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Sam Switch 345-kV substation with ratings of at least 5,000 A;
- Construct a new Wilmer Switch to Navarro Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 2,987 MVA, which will require a new ROW, approximately 53.0 miles/circuit:
 - Install three 345-kV circuit breakers at the existing Wilmer Switch 345-kV substation with ratings of at least 5,000 A;
 - Install four 345-kV circuit breakers at the existing Navarro Switch 345-kV substation with ratings of at least 5,000 A;
- Rebuild the existing Tri Corner 345-kV Switch:
 - Install twelve 345-kV circuit breakers in a breaker-and-a-half configuration with ratings of 5,000 A;
 - Ensure all terminal equipment meets or exceeds 5,000A; and
- Upgrade the existing Watermill Switch to Tri Corner Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, approximately 11.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A;
- Upgrade the existing Tri Corner Switch to Trinidad Switch 345-kV double-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, for approximately 40.5 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 5,000A; and

- Upgrade the existing Farmerville Switch to Saltillo Switch 345-kV single-circuit transmission line on double-circuit structures with both circuits in place, with normal and emergency ratings of at least 1,912 MVA, approximately 59.9 miles/circuit:
 - Ensure all terminal equipment meets or exceeds 3,200A.

B: Attachments

Table B.1: Project Related Document

No	Document Name	Attachment
1	Oncor Southern DFW Load Interconnection and General Grid Strengthening Project	 Southern DFW Load Interconnection and G
2	Oncor and Lone Star Navarro and Ellis Area Reliability Project	 Oncor_and_Lone_Star_Navarro_and_Ellis
3	Oncor Set 1 North and Central Texas Reliability Project	 Set1 Oncor North and Central Texas R
4	Oncor Set 2 North and Central Texas Reliability Project	 Set2 Oncor North and Central Texas R