TNMP Climax-Bells Area Transmission Improvement project

ERCOT RPG Meeting

06/22/2026

Project Overview

- TNMP's Climax-Bells Area RPG submission is a Tier 1 project in Grayson/Collin counties
- Supports residential/commercial load growth, resolves thermal violations, voltage collapse and enhances local regional system reliability
- It involves upgrades to approximately 100 miles transmission facilities primarily comprising of conversion from 69kV to 138kV and rebuild of existing 69kV or 138kV facilities owned by TNMP and Oncor
  - Primary facilities involved are the Climax – Bells and Oncor's Stone Creek – Bonham – Toco line segments
- Project's cost estimate is $225.4 M
  - No CCN anticipated at this time
- Targeted in-service date (ISD) of December 2029

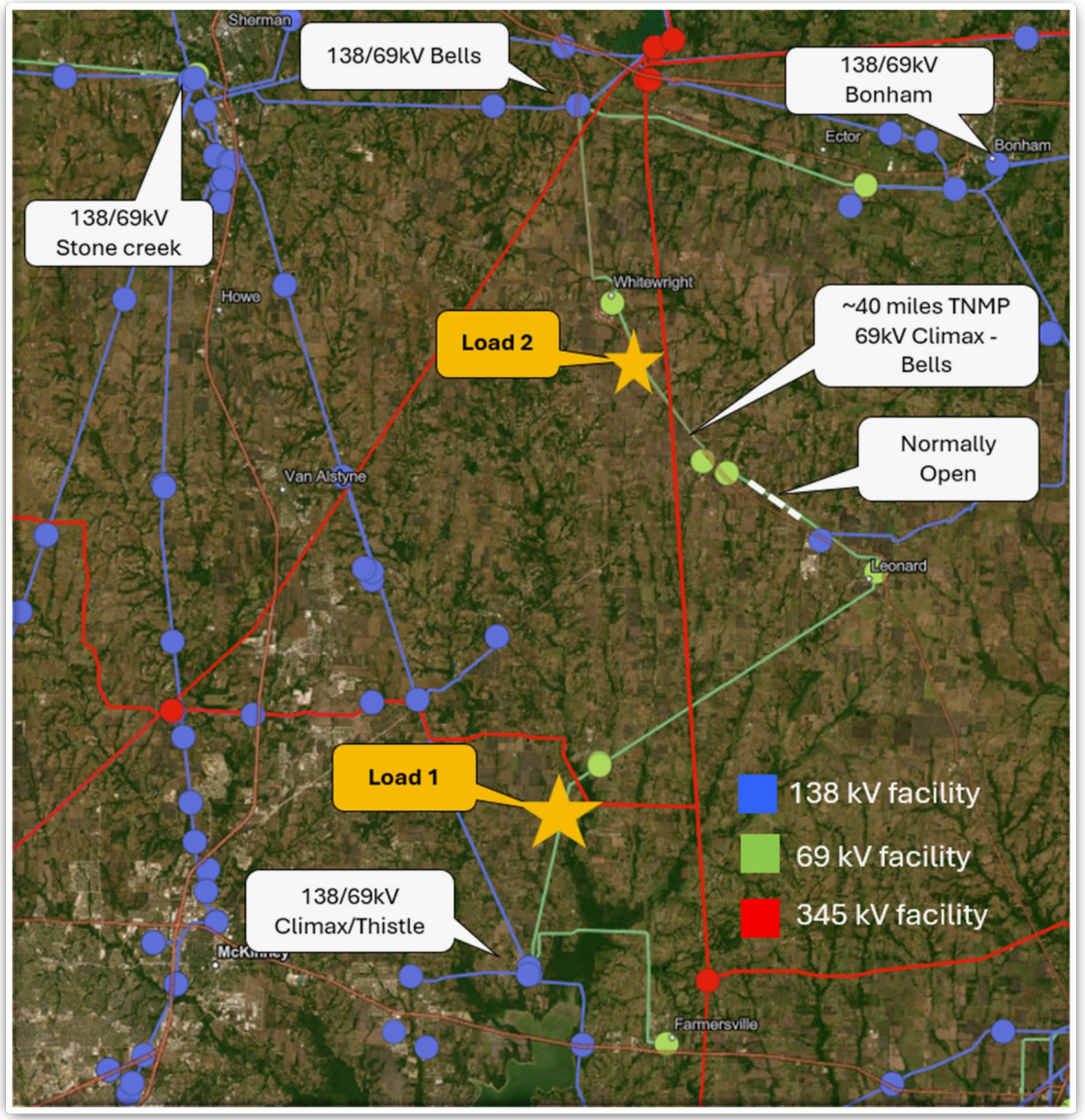
TNMP Recommended Option #3

Project Overview

- TNMP's Preferred Option Description
  - Re-terminate the Climax terminal of the TNMP's existing 69kV line from Climax – Blueridge Tap into 138kV Thistle substation, creating a new 138kV transmission line from Thistle – Blueridge Tap.
  - Upgrade TNMP's 7.3-mile 69kV line segment from Thistle – Blueridge Tap – Blueridge substation to operate at 138kV with conductor rated at 1600 Amps
  - Upgrade TNMP's 32.5-mile 69kV line segment from Blueridge – Leonard – Trenton – Frontier – Whitewright – Bells substation to operate at 138kV with conductor rated at 1600 Amps
  - Construct a new TNMP 138 kV Starling station on Leonard – Trenton line (approximately 3 miles from Leonard) initially configured with three 138kV, 3000 A circuit breakers in a three-breaker ring bus arrangement.
  - Construct a new 138 kV TNMP Kestrel station on TNMP's Whitewright to Bells line (approximately 3.55 miles from Bells) initially configured with three 138kV, 3000 A circuit breakers in a three-breaker ring bus arrangement.
  - Construct a 0.37-mile 138kV line from the new TNMP Starling station to Rayburn's Leonard station with conductor rated at 1600 Amps
  - Operate the 138kV line segment from Trenton – New TNMP Starling station as normally closed.
  - Eliminate the 138/69kV autotransformers at Oncor's Stone Creek, Bonham and Toco switching stations.
  - Establish Oncor's Bells 138 kV Switch with three 138 kV, 3200 A circuit breakers in a ring bus arrangement.
  - Rebuild Oncor's Bonham 138 kV Switch by installing eight 138 kV, 3200 A circuit breakers in a breaker-and-a-half bus arrangement.
  - Establish Oncor's Windom 138 kV Switch with three 138 kV, 3200 A circuit breakers in a ring bus arrangement.
  - Rebuild Oncor's 26.1-mile 69kV line from Stone Creek Switch – Bells Switch– Ector – Bonham Switch using double-circuit capable structures with one circuit in place and a conductor rated at 2569 Amps operated at 138kV.
  - Upgrade Oncor's 34.2-mile 69kV line from Bonham Switch – Windom REA – Honey Grove – Brookston - Toco Switch to operate at 138kV with a rating of 2569 Amps.

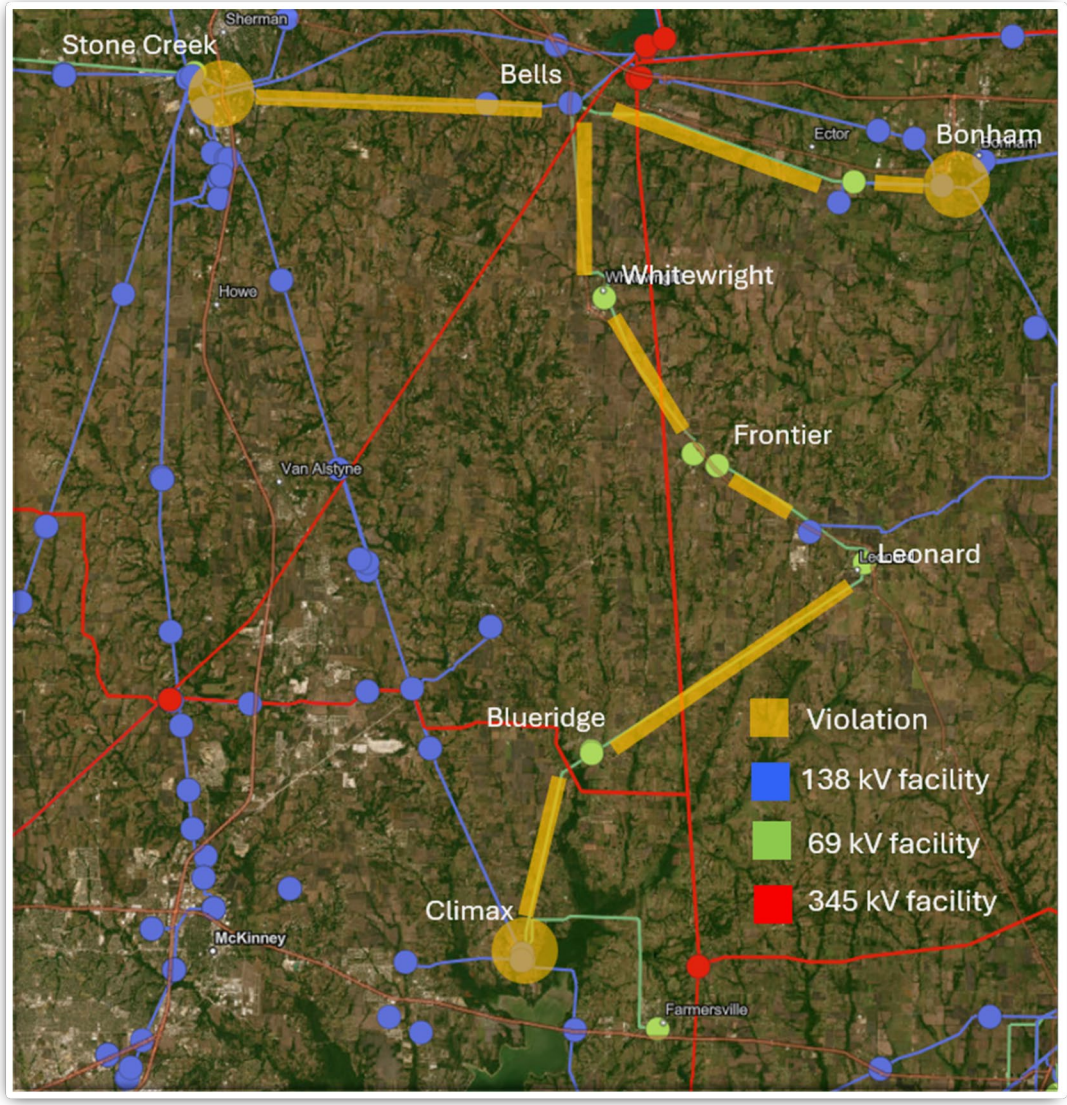
Background

- TNMP currently owns and operates ~40 miles of 69kV transmission lines from Climax to Bells
  - 69kV system in the region is fed via two (2) 138kV sources, one at Climax on the south side and the other at Stone Creek Switch/Bonham Switch feeding into Bells station on the north side.
  - Effectively a radial segment from either end since the Trenton – Leonard section is normally open along this 40-mile 69kV segment
  - 138kV source on the Climax end and at Stone Creek and Bonham on the Bells end
- A combination of residential and commercial load growth have led to the identification of potential reliability concerns in the region
- New load growth along the 69kV segment expected to reach 30 MW for Load 1 and 35 MW for Load 2 by 2030 timeframe
- TNMP, in coordination with Rayburn Electric Cooperative (REC) & Oncor, has identified potential solutions to address the reliability concerns



Project Need

- TNMP utilized the following ERCOT Steady State Working Group (SSWG) cases finalized in 10/24, to perform the reliability assessment:
  - 2028 Summer Peak (SP) Case
  - 2028 Maintenance Outage (MO) Case – prepared by scaling the load in the study region in the 2028MIN load case, based on historical telemetry data to correspond to Fall/Spring conditions
- Load levels for the incremental residential and commercial load growth along the 69kV Climax – Bells segment:
  - 2028 SP – Load 1: 30 MW, Load 2: 35 MW
  - 2028 MO - Load 1: 20.82 MW, Load 2: 24.29 MW
- All generation units meeting Section 6.9 requirements of the EPG were modeled in the study region and dispatched appropriately for both study cases
- All relevant contingencies per Section 4 of the EPG and NERC Categories P1-P7 evaluated for the reliability assessment
- Numerous reliability violations, in terms of thermal overloads and voltage violations, observed in the local region



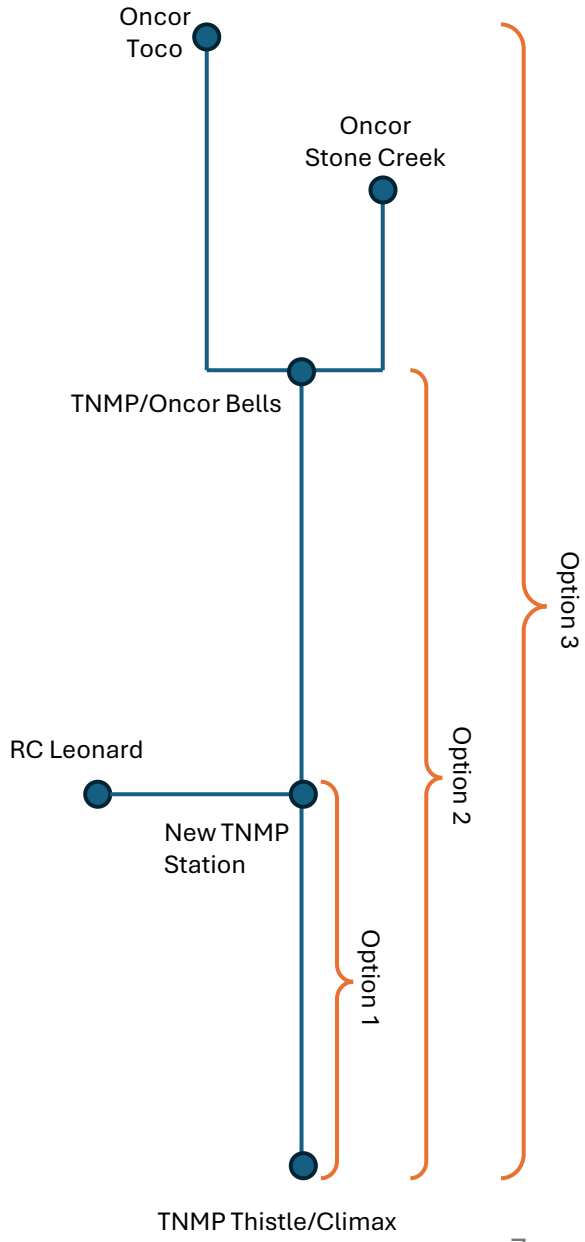
Reliability Violations, Climax – Bells Region

Project Need

- Numerous thermal overloads and voltage violations observed per Section 4 of ERCOT Planning Guide
- Thermal overloads were observed across multiple transmission elements in the Climax–Bells region, including:
  - 69kV line segment from TN Blue Ridge – TN Climax under P0 conditions
  - 69/138kV transformer at TN Climax under P0 conditions
  - 69kV line segment from TN Bells – Kestrel (Kentucky Town Load POI) under P0 conditions
  - 69/138kV transformer at Oncor Bonham station under G-1+N-1 conditions
  - 69/138kV transformer at Oncor Stone Creek station under G-1+N-1 conditions
  - 69kV line segments from Oncor Bonham–Ector–Bells–Stone Creek stations under G-1+N-1 conditions
- Steady-state voltage security concerns were observed under both normal operating (P0) conditions and ERCOT-2, ERCOT-3 and N-1-1 maintenance outage contingency conditions per EPG Section 4.1.1.8.
- Three (3) distinct transmission improvement options evaluated to address the reliability concerns

Project Scope

- TNMP coordinated with neighboring TSPs, Oncor and REC in the study area, to develop the three (3) transmission improvement options
- TNMP evaluated three (3) transmission improvement options to address the reliability concerns observed:
  - **Option 1** – 69kV to 138kV conversion of TN Thistle – Leonard/Trenton and add source from REC Leonard
  - **Option 2** – 69kV to 138kV conversion of TN Thistle – Bells and add source from REC Leonard
  - **Option 3** – 69kV to 138kV conversion of TN Thistle – Bells and add source from REC Leonard along with 69kV to 138kV conversion of Oncor's Stone Creek Switch – Bonham Switch & Bonham Switch – Toco Switch
- Detailed option descriptions provided in the Appendix



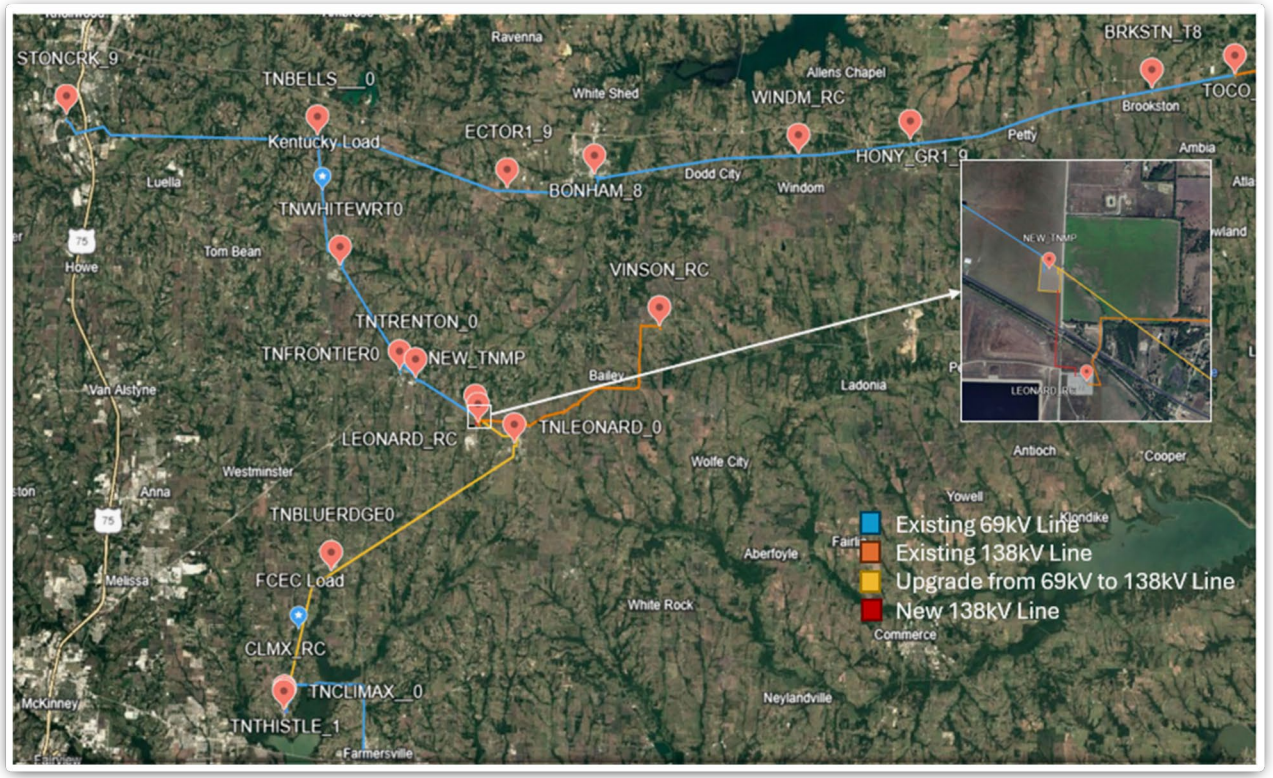
Transmission Option Performance

- Options 1 and 2 involve partial conversion of transmission facilities from 69kV to 138kV and do not address the all the reliability violations observed
- Option 3 is observed to resolve the reliability violations in the area and is the TNMP's preferred option
  - Re-terminate the Climax terminal of the TNMP's existing 69kV line from Climax – Blueridge Tap into 138kV Thistle substation
  - Construct a new TNMP station on Leonard – Trenton line (3 miles from Leonard)
  - Construct a 138kV line (0.37 miles) from new TNMP station to Rayburn's Leonard station with 2-Hr EMGCY rating of 287 MVA
  - Operate the line from Trenton – New TNMP station as normally closed
  - Upgrade TNMP's 40-mi 69kV line segments from Thistle – Blue Ridge – Leonard – Trenton – Frontier – Whitewright – Bells substation to 138kV with conductor rating of 383 MVA
  - Get rid of 138/69kV auto-transformers at Stone Creek, Boham and Toco stations
  - Upgrade Oncor's 26.1-mile 69kV line segment from Stone Creek – Bells – Ector – Bonham and 34.2-mile 69kV line segment from Bonham – Toco substation to 138kV with conductor rating of 614 MVA
- Short circuit and transient stability assessments performed for Option 3 and no concerns identified for the preferred option
- TNMP also conducted a Sub-Synchronous Oscillation (SSO) vulnerability assessment for Option 3 and no material adverse impact on the risk of SSO for existing and/or planned generation resources in study area observed.
- Option 3 recommended as the preferred option

Questions?

Appendix – Option #1

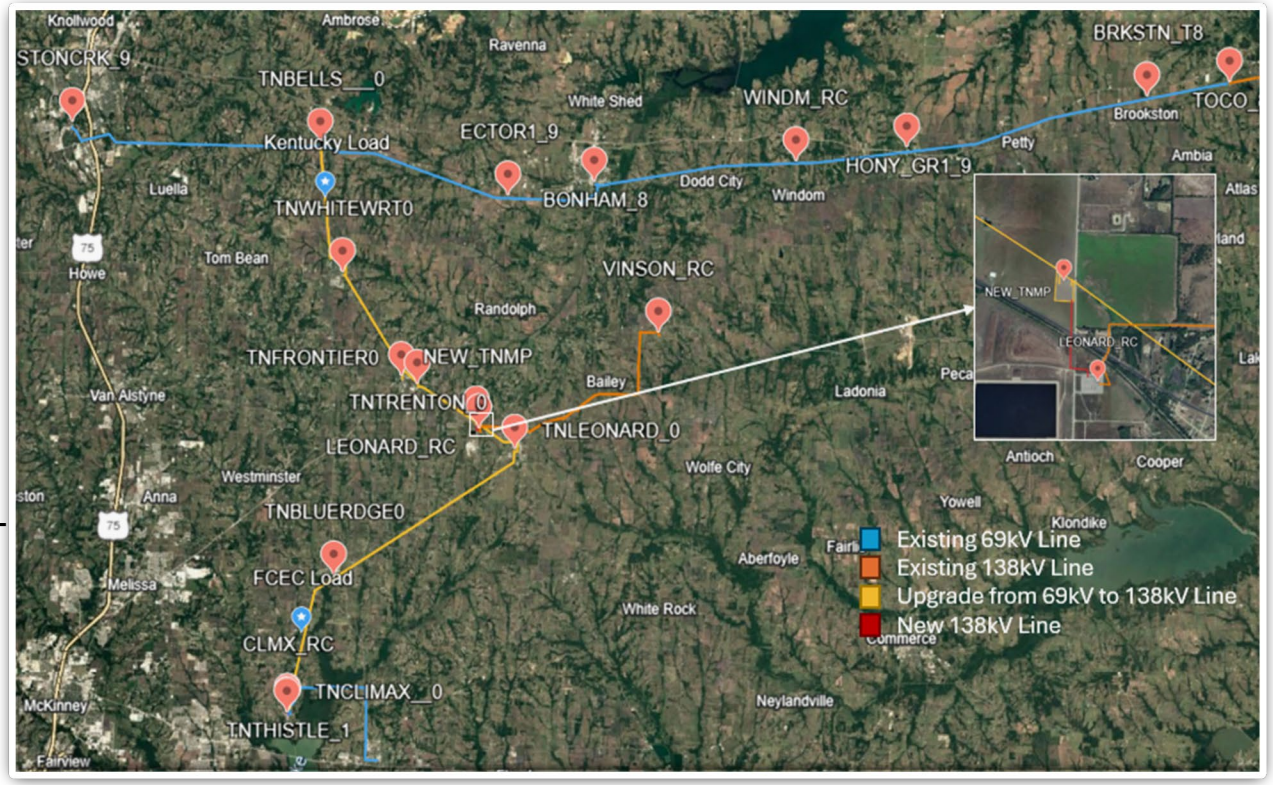
- Transmission Improvement Option #1
  - Re-terminate the TNMP's Climax – Rayburn Blueridge Tap 69kV line into a 138kV Thistle terminal.
  - Construct a new 138/69 kV TNMP Starling station on Leonard – Trenton line (3 miles from Leonard).
  - Upgrade the TNMP's 7.3-mile 69kV line segment from Thistle – Blue Ridge RC – Blue Ridge substation to 138kV with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Upgrade the TNMP's 14-mile 69kV line segment from Blue Ridge – Leonard – new TNMP Starling station to 138kV with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Construct a 0.37-mile 138kV line from the new TNMP Starling station to Rayburn's Leonard station with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Install a new 138/69kV transformer at new TNMP Starling station
  - Operate the 69kV line segment from Trenton – New TNMP Starling station as normally closed.



Transmission Improvement Option #1

Appendix – Option #2

- Transmission Improvement Option #2
  - Re-terminate the TNMP's Climax – Rayburn Blueridge Tap 69kV line into a 138kV Thistle terminal.
  - Construct a new 138 kV TNMP Starling station on Leonard – Trenton line (3 miles from Leonard).
  - Upgrade the TNMP's 7.3-mile 69kV line segment from Thistle – Blue Ridge RC– Blue Ridge substation to 138kV with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Upgrade the TNMP's 32.5-mile 69kV line segment from Blue Ridge – Leonard – Trenton – Frontier – Whitewright – Bells substation to 138kV with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Construct a 0.37-mile 138kV line from the new TNMP Starling station to Rayburn's Leonard station with conductor rated at 1600 Amps (Normal/Emergency Ratings: 383 MVA).
  - Install a new 138/69kV transformer at Bells substation with 2-Hr EMGCY rating of at least 120 MVA.
  - Operate the 138kV line segment from Trenton – New TNMP Starling station as normally closed.



Transmission Improvement Option #2

Appendix – Option #3

- Transmission Improvement Option #3
  - Re-terminate the TNMP's Climax – Rayburn Blueridge Tap 69kV line into a 138kV Thistle terminal
  - Construct a new 138 kV TNMP Starling station on Leonard – Trenton line (3 miles from Leonard).
  - Upgrade the TNMP's 7.3-mile 69kV line segment from Thistle – Blue Ridge RC– Blue Ridge substation to 138kV with conductor rated at 1600 Amps
  - Upgrade the TNMP's 32.5-mile 69kV line segment from Blue Ridge – Leonard – Trenton – Frontier – Whitewright – Bells substation to 138kV with conductor rated at 1600 Amps
  - Construct a 0.37-mile 138kV line from the new TNMP Starling station to Rayburn's Leonard station with conductor rated at 1600 Amps
  - Operate the line segment from Trenton – New TNMP Starling station as normally closed.
  - Eliminate the 138/69kV autotransformers at Oncor's Stone Creek, Bonham and Toco switching stations.
  - Establish Oncor's Bells 138 kV Switch with three 138 kV, 3200 A circuit breakers in a ring bus arrangement.
  - Rebuild Oncor's Bonham 138 kV Switch by installing eight 138 kV, 3200 A circuit breakers in a breaker-and-a-half bus arrangement.
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Transmission Improvement Option #3