TNMP – Pecos County Transmission Improvement Project ERCOT Independent Review Status Update

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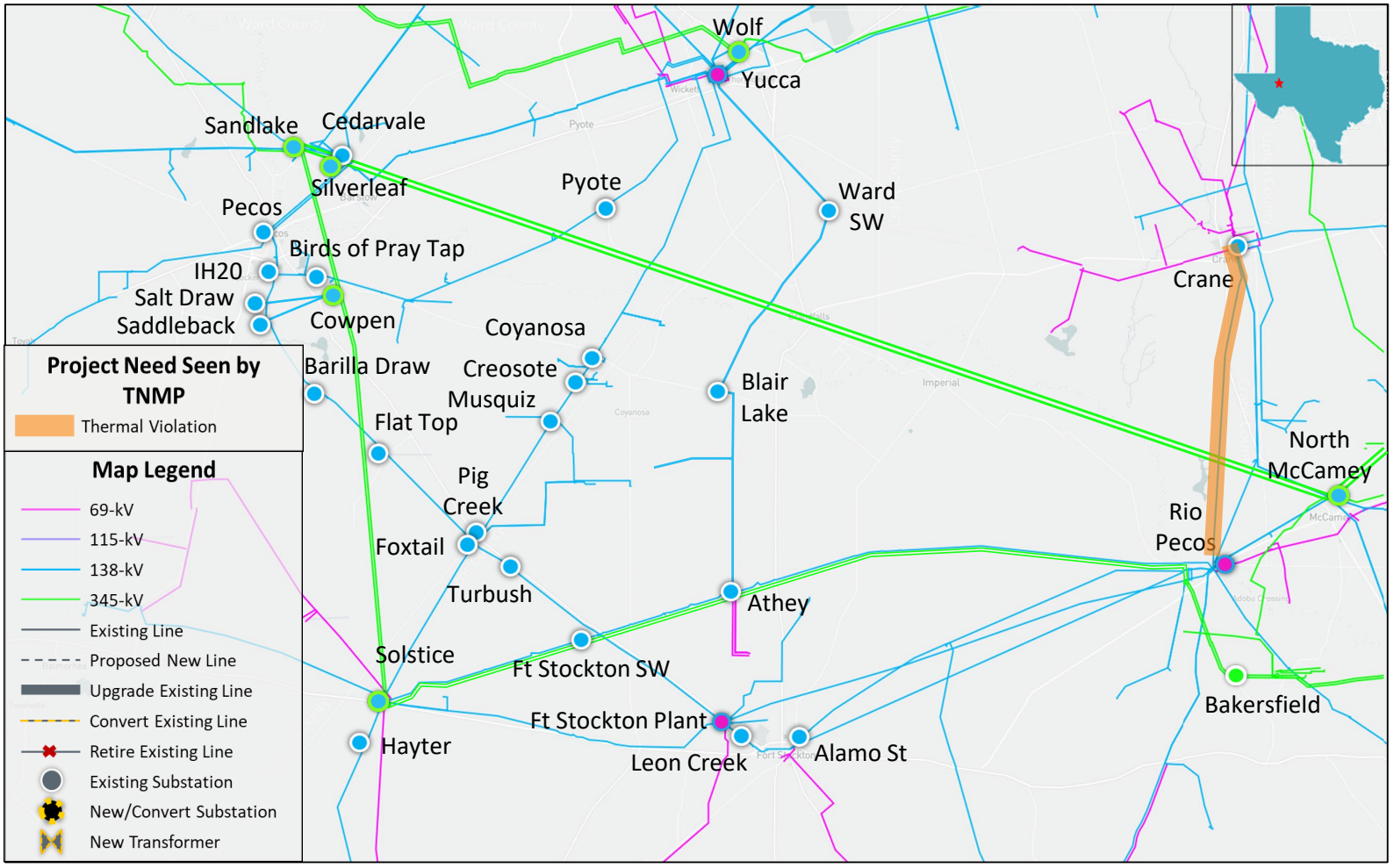
RPG meeting
December 13, 2023

Recap

- TNMP submitted the Pecos County Transmission Improvement Project for Regional Planning Group (RPG) review in August 2023
  - This Tier 1 project is estimated to cost $108.0 million and will require Certificate of Convenience and Necessity (CCN) filings
  - Estimated in-service date is May 2026
  - Addresses both thermal overloads and voltage violations under maintenance outage conditions due to new load additions in the Pecos County in the Far West Weather Zone (WZ)
  - TNMP has expressed need for “critical status designation”
- TNMP provided an overview presentation and ERCOT presented the study scope at the October RPG Meeting
  - https://www.ercot.com/calendar/10182023-RPG-Meeting
- ERCOT provided status update at the November RPG Meeting
  - https://www.ercot.com/calendar/11142023-RPG-Meeting

Recap: Study Area Map with Project Need as Seen by TNMP



The reliability need includes the planned maintenance outage condition

Recap: Study Assumption

- Final 2022 Regional Transmission Planning (RTP) 2027 summer peak case for West and Far West (WFW) WZ was used as the start case
- Transmission & Generation updates
- Load updates
  - Loads in the Far West WZ will be reviewed and updated to reflect the load level in the 2023 RTP

	Load (MW)
Far West Total	14,349
Far West Flexible Load	3,959

Recap: Preliminary Results of Reliability Assessment – Need Analysis

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

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

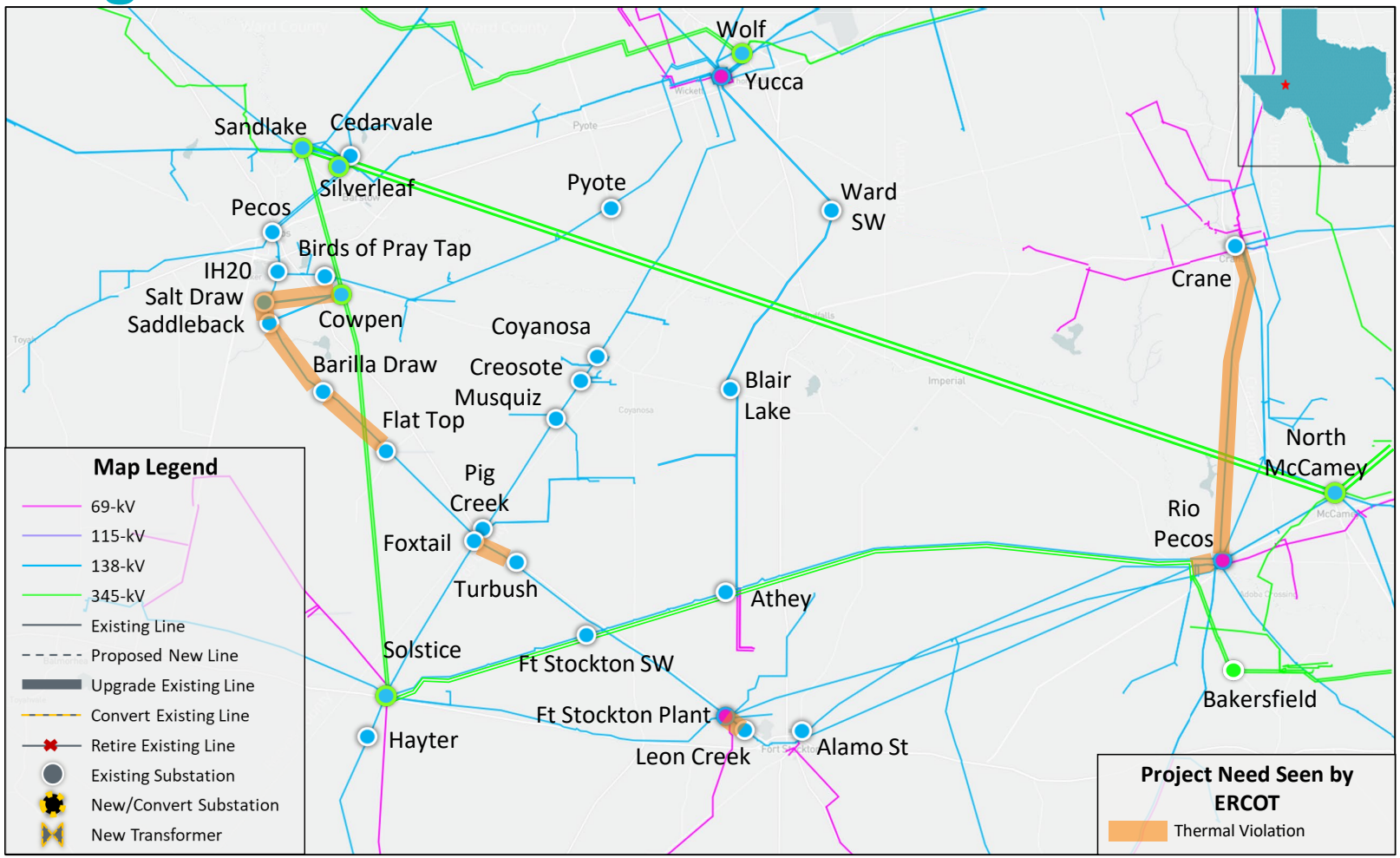
* G-1: Permian Basin all five units, and Riggins Solar
** X-1: Cowpen, North McCamey, and Solstice 345/138-kV transformers

Preliminary Results of Planned Maintenance Outage Analysis – Need Analysis

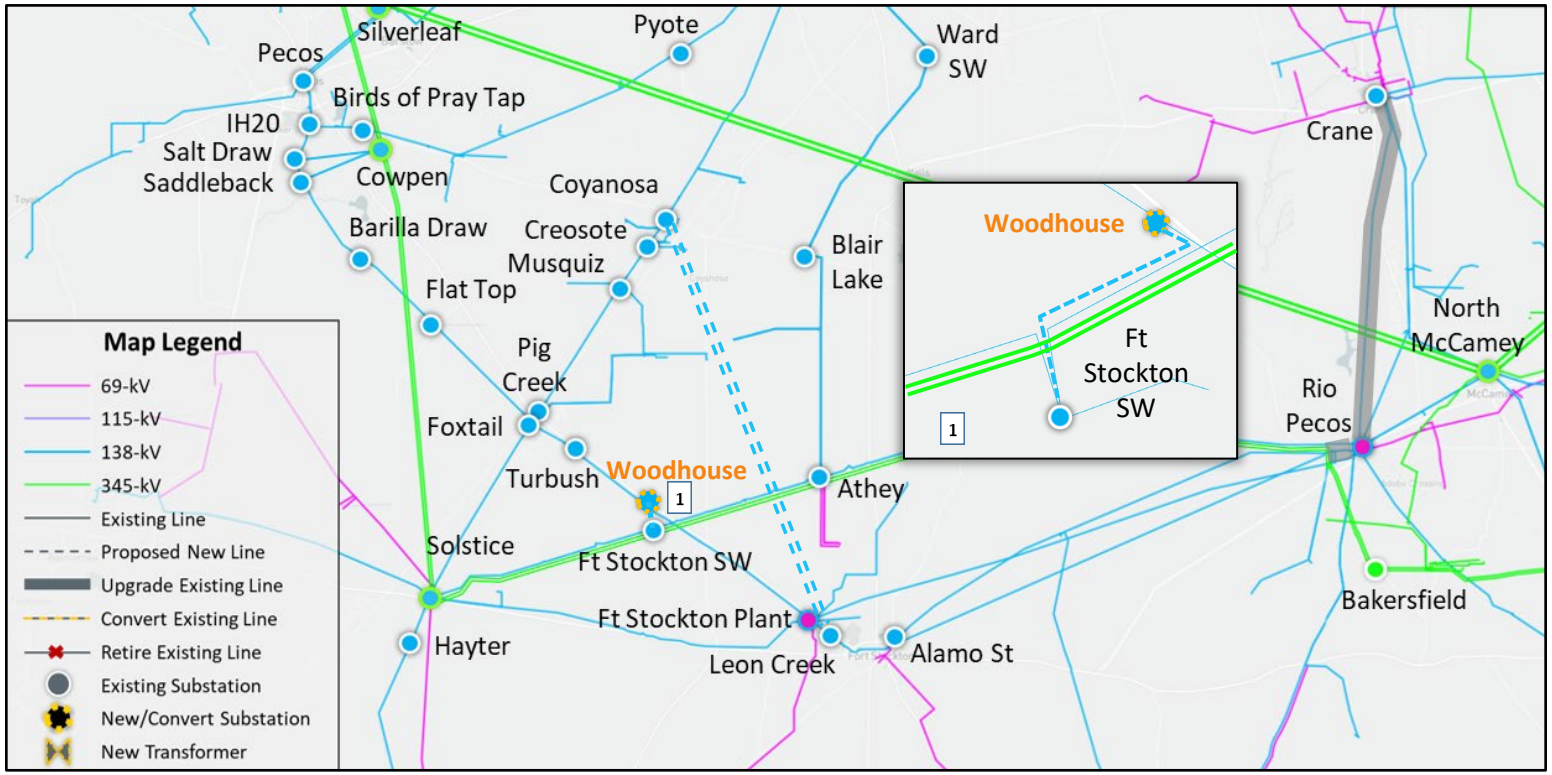
- ERCOT conducted planned maintenance outage analysis on the base case to identify project need
  - Load level in the Far West WZ was scaled down to 96% of the summer peak load in the study base case based on ERCOT load forecast, historical load, and ratio of residential/commercial load from TSP, in order to mimic the non-summer peak load condition
    - Flexible Loads were not scaled down in this process
  - N-2 contingencies were tested as a proxy for N-1-1, and then tested the applicable violating contingencies with system adjustments
  - The transmission elements in the area of Pecos County Improvement Project were monitored in the maintenance outage evaluation
- Results

Voltage Violations	Thermal Overloads	Unsolved Power Flow
25	51.68 miles of 138-kV line	5

Recap: Study Area Map with Project Need as Seen by ERCOT under Planned Maintenance Outage Scenarios



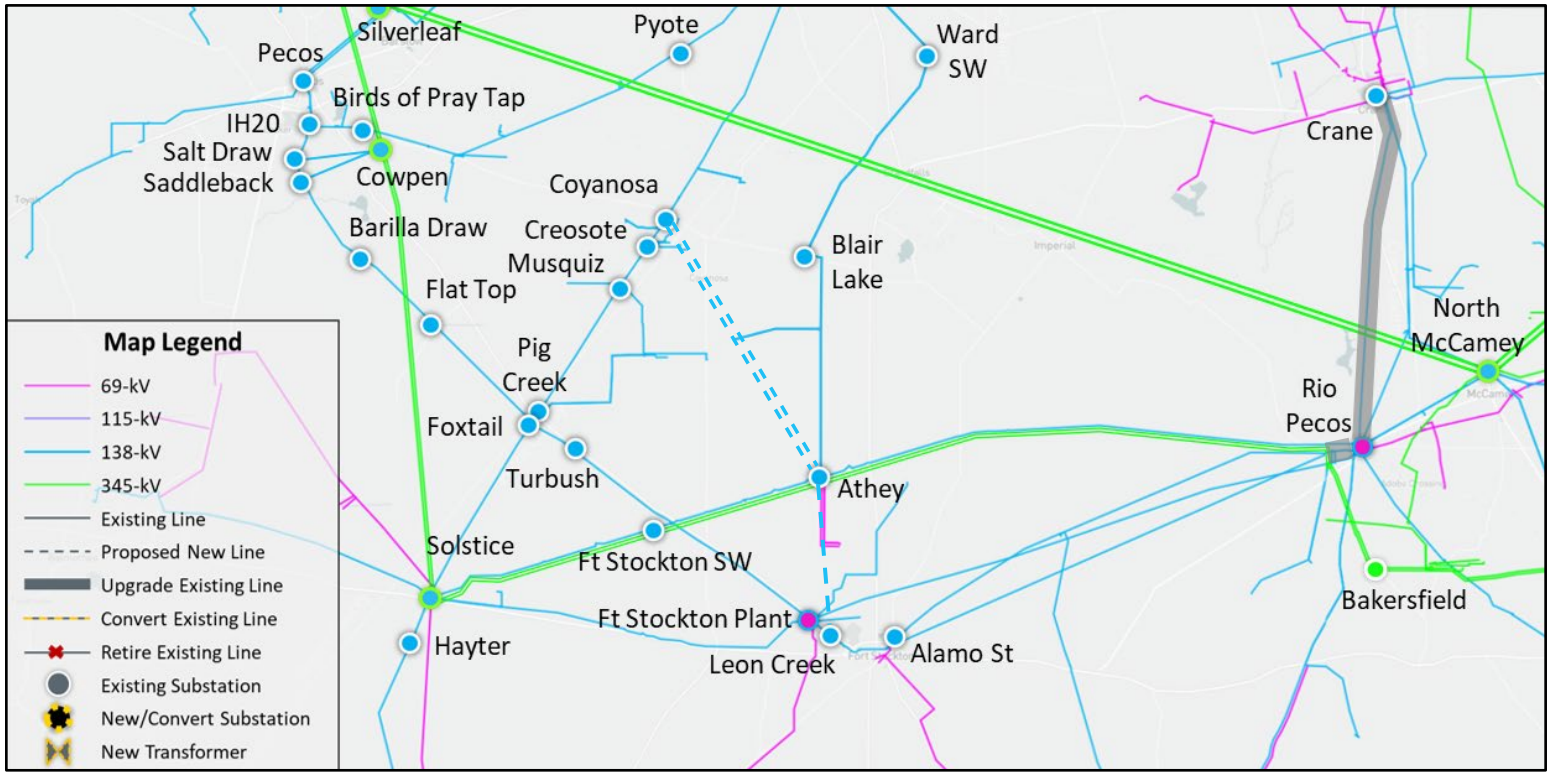
Recap: Option 1 - Proposed Project by TNMP



- Construct a new ~28.5-mile Coyanosa – Leon Creek 138-kV double-circuit lines with rating of 717 MVA or above
- Construct a new Woodhouse 138-kV substation by cutting into Tarbush – Leon Creek 138-kV line near Ft. Stockton SW
- Create a new ~0.1-mile Woodhouse – Ft. Stockton SW 138-kV tie-line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above

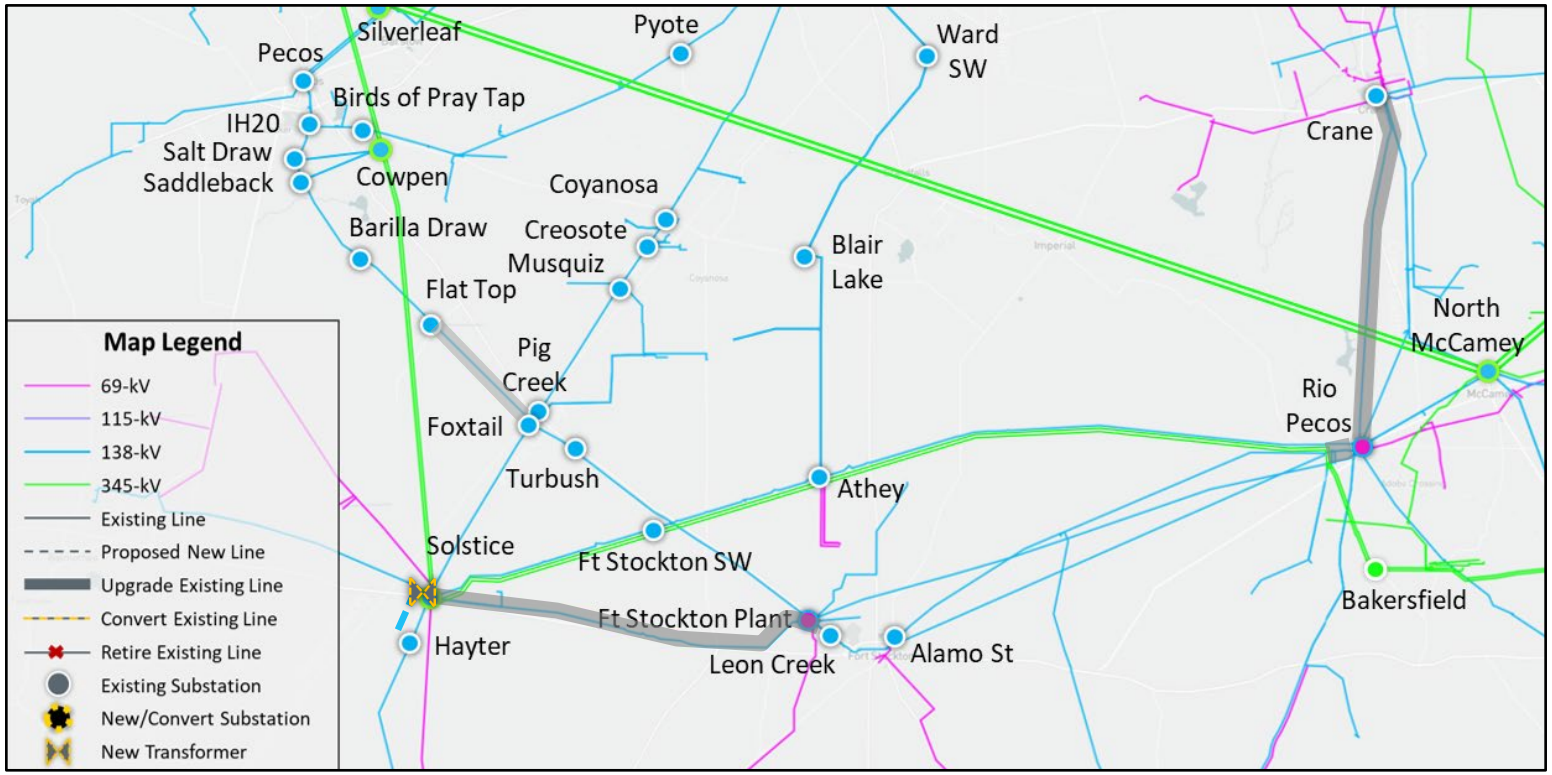
NOTE: An alternative version of this option was tested where the existing Tarbush – Leon Creek 138-kV line was looped into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and tie the Woodhouse to Ft. Stockton SW station

Recap: Option 2



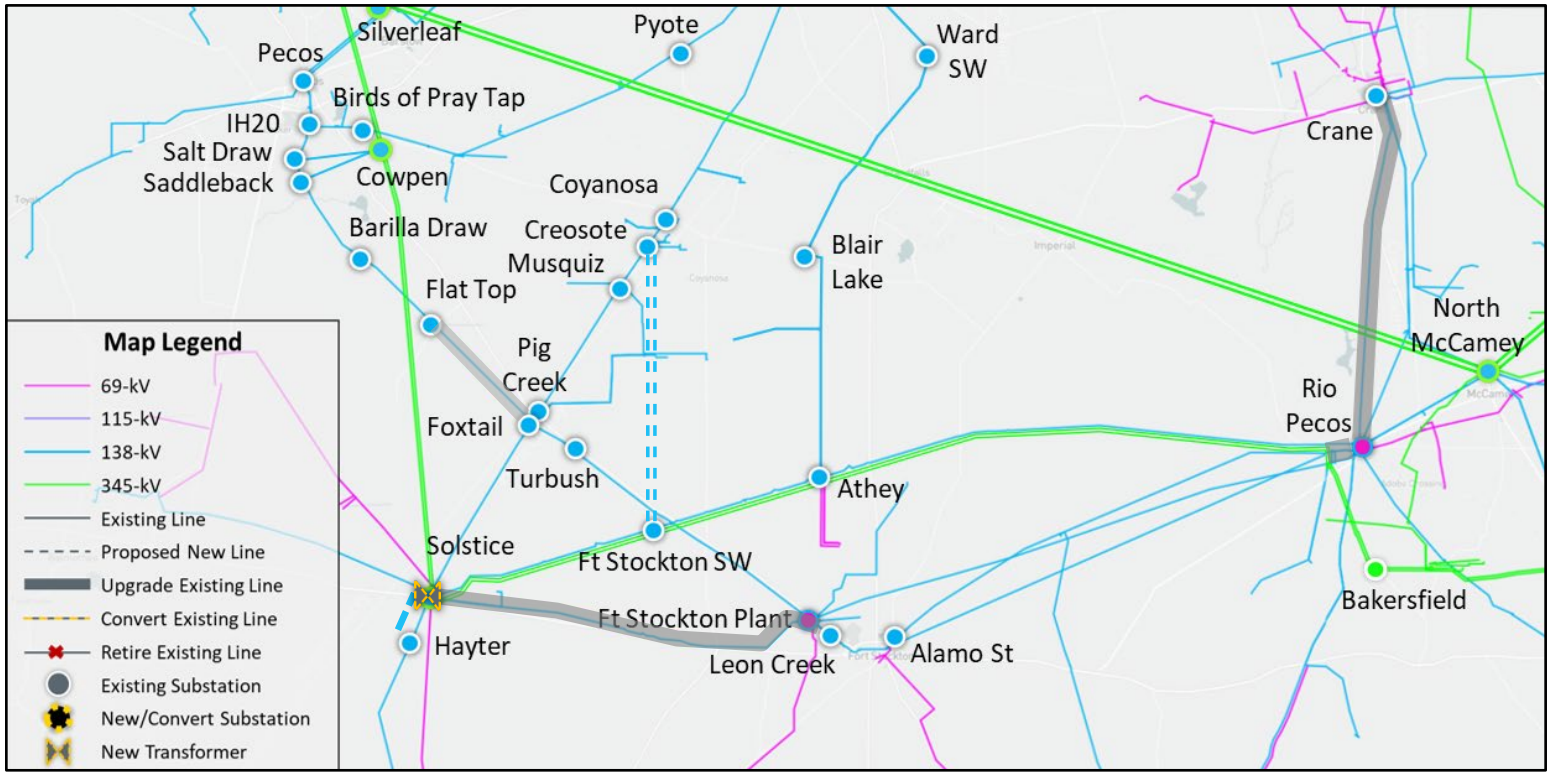
- Construct a new ~20-mile Coyanosa – Athey 138-kV double-circuit lines with rating of 717 MVA or above
- Construct a new ~10-mile Athey – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above

Recap: Option 3



- Upgrade the existing 8.6-mile Flattop – Foxtail 138-kV line with rating of 717 MVA or above
- Add a second circuit to the existing 1.67-mile Hayter – Solstice 138-kV line with rating of 717 MVA or above
- Upgrade the two existing Solstice Transformers to 800 MVA rating & Bypass the PST at Solstice substation
- Upgrade the existing 25.6-mile Solstice – Ft. Stockton Plant – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above

Recap: Option 4 – Similar to Option 3



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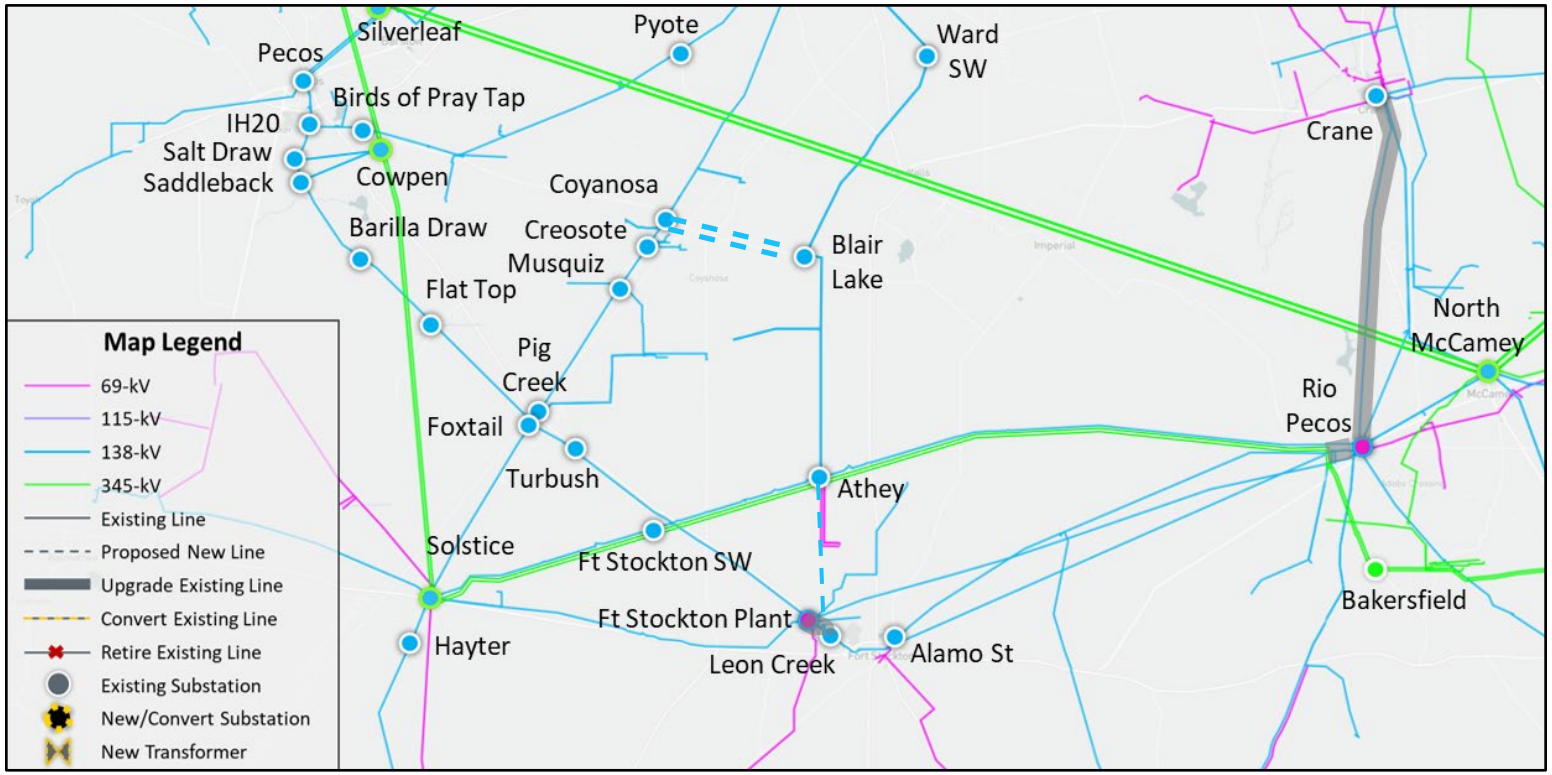
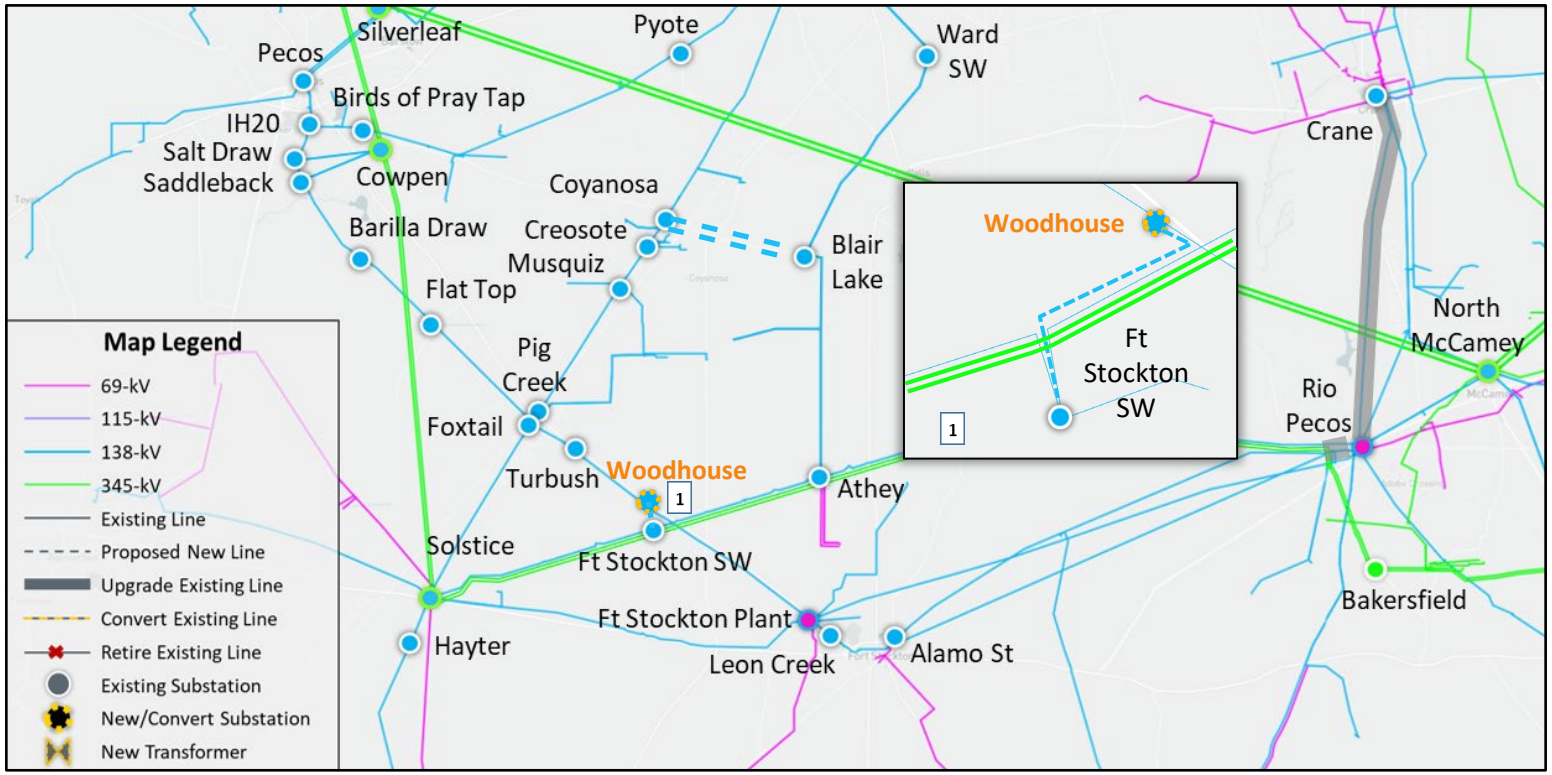
- Upgrade the existing 25.6-mile Solstice – Ft. Stockton Plant – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above
- Construct a new ~21.64-mile Creosote – Fort Stockton Switch 138-kV line with rating of 717 MVA or above

Recap: Option 5



- Construct a new ~12.24-mile Coyanosa – Blair Lake 138-kV double-circuit line with rating of 717 MVA or above
- Construct a new ~10-mile Athey – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.12-mile Ft. Stockton Plant – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above

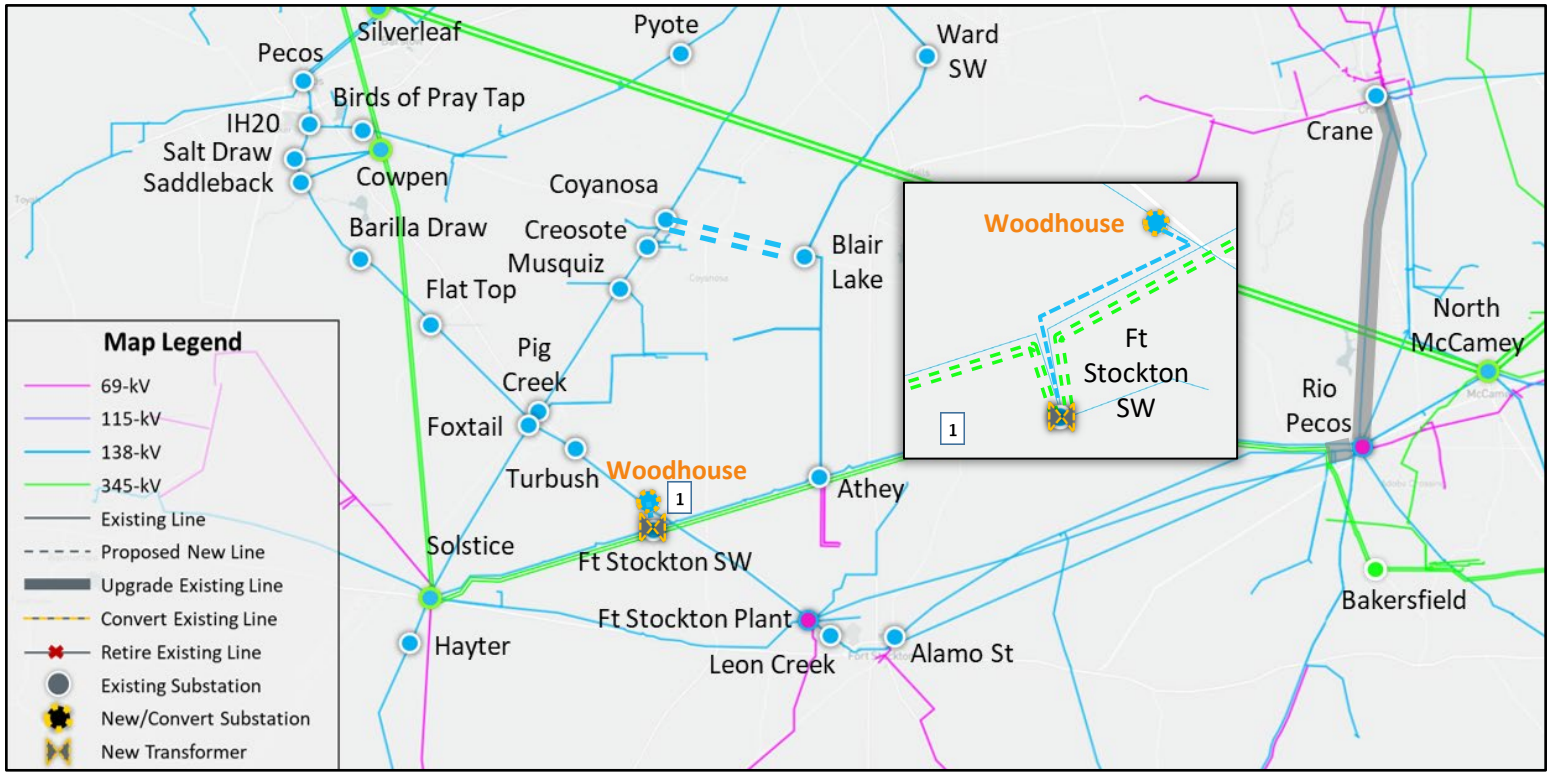
Recap: Option 6



- Construct a new ~12.24-mile Coyanosa – Blair Lake 138-kV double-circuit line with rating of 717 MVA or above
- Construct a new Woodhouse 138-kV station by cutting into Tarbush – Leon Creek 138-kV line near Ft. Stockton SW
- Create a new ~0.1-mile Woodhouse – Ft. Stockton SW 138-kV tie-line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above

NOTE: An alternative version of this option was tested where the existing Tarbush – Leon Creek 138-kV line was looped into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and tie the Woodhouse to Ft. Stockton SW station

Option 7 – Similar to Option 6



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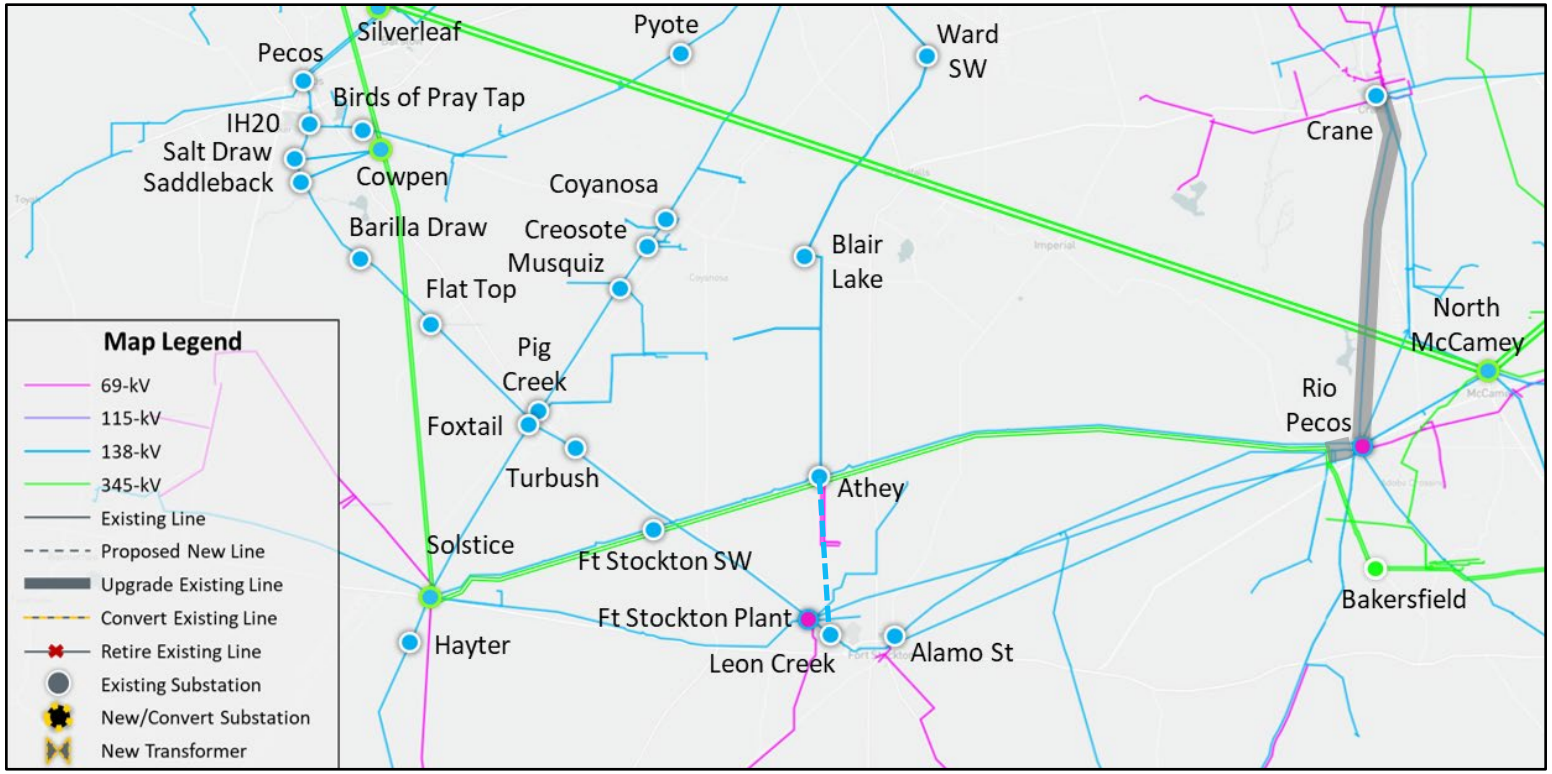
- Construct a new Woodhouse 138-kV station by cutting into Tarbush – Leon Creek 138-kV line near Ft. Stockton SW
- Create a new ~0.1-mile Woodhouse – Ft. Stockton SW 138-kV tie-line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above
- Install two new 345/138-kV transformers with 800 MVA rating at the existing Ft. Stockton SW 138-kV substation and cut into the existing Solstice – Bakersfield 345-kV double-circuit lines

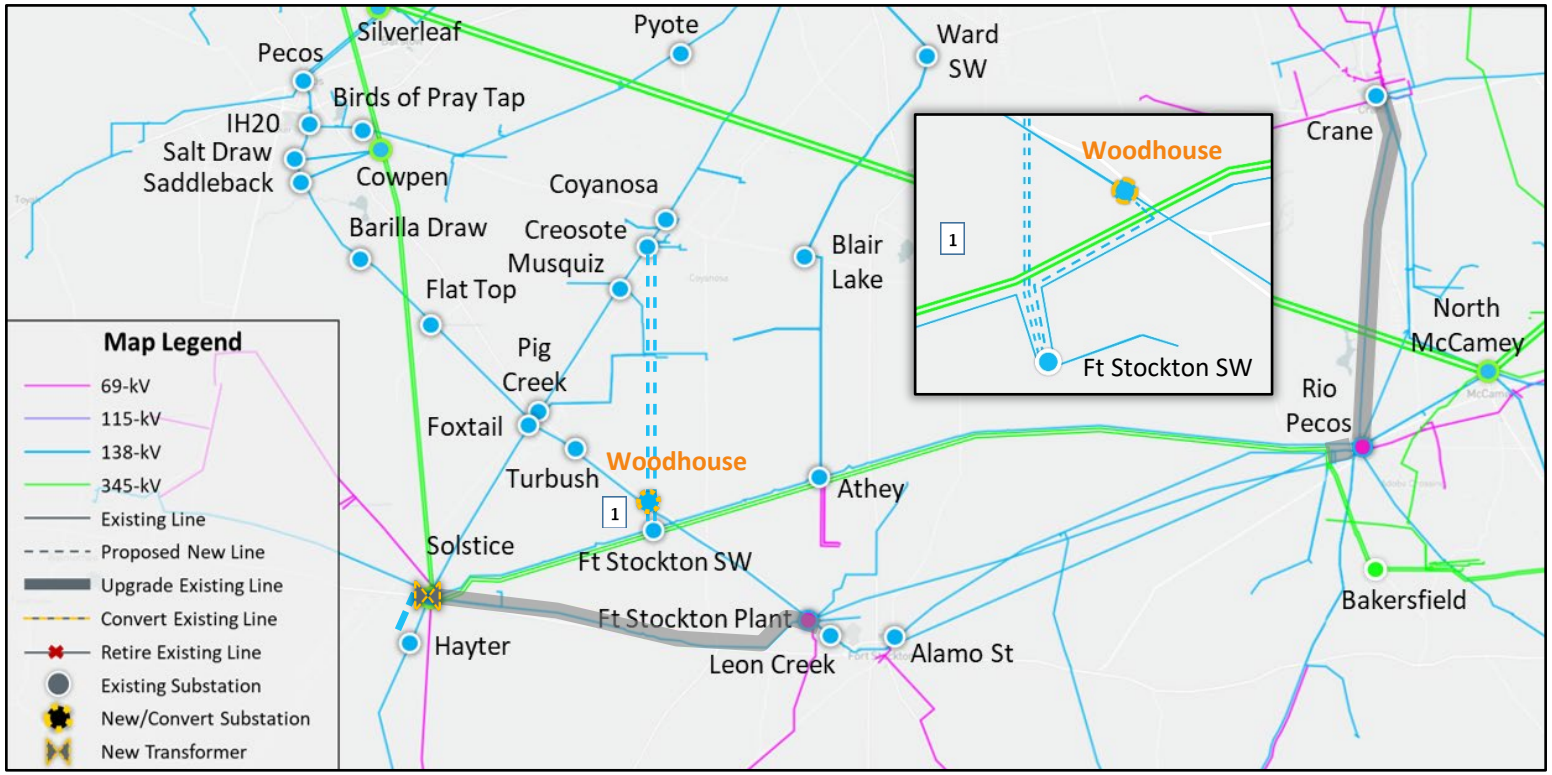
NOTE: An alternative version of this option was tested where the existing Tarbush – Leon Creek 138-kV line was looped into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and tie the Woodhouse to Ft. Stockton SW station

Recap: Option 8



- Construct a new ~10-mile Athey – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 23.65-mile Rio Pecos – Crane 138-kV line with rating of 717 MVA or above
- Upgrade 0.6-mile second circuit of the existing Rio Pecos – Girvin 138-kV double-circuit lines with rating of 717 MVA or above

Recap: Option 9 – Similar to Option 4



- Add a new second circuit to the existing 1.67-mile Hayter – Solstice 138-kV line with rating of 717 MVA or above
- Upgrade the two existing Solstice Transformers to 800 MVA rating & Bypass the PST at Solstice
- Upgrade the existing 25.6-mile Solstice – Ft. Stockton Plant – Leon Creek 138-kV line with rating of 717 MVA or above
- Upgrade the existing 0.6-mile second circuit Rio Pecos – Girvin 138-kV double-circuit line with rating of 717 MVA or above
- Construct a new ~21.64-mile Creosote – Fort Stockton Switch 138-kV double-circuit lines with rating of 717 MVA or above
- Construct a new Woodhouse 138-kV by cutting into the existing Tarbush – Leon Creek 138-kV line and tie into Ft. Stockton SW 138-kV station

NOTE: An alternative version of this option was tested where the existing Tarbush – Leon Creek 138-kV line was looped into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and tie the Woodhouse to Ft. Stockton SW station

Recap: Updates Included for All Options

- Reactive support
  - 160 MVAR capacitor banks (modeled as 4 blocks of 40 MVAR) at Airport (38340) and Coyanosa (38380) substations were split into two separate 80 MVAR capacitor banks (modeled as 2 blocks 40 MVAR) at each substation

Analysis Performed

- Options Evaluation
  - Reliability Analysis (N-1)
  - Planned Maintenance Outage Analysis
  - Long-Term Load Serving Capability Assessment
- Short-listed Options Identified

Preliminary Results of Reliability Assessment – Options

Option	Voltage Violations	Thermal Overloads	Unsolved Power Flow
Base case	None	None	None
1, 1-Alternative*	None	None	None
2	None	None	None
3	None	None	None
4	None	None	None
5	None	None	None
6, 6-Alternative*	None	None	None
7, 7-Alternative*	None	None	None
8	None	None	None
9, 9-Alternative*	None	None	None

* The alternative versions invloves looping in the existing Tarbush – Leon Creek 138-kV line into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and to tie the Woodhouse to Ft. Stockton SW

Preliminary Results of Planned Maintenance Outage Analysis - Options

- ERCOT conducted planned maintenance outage analysis on nine options to determine relative performance between the options

Option	Voltage Violations	Thermal Overloads	Unsolved Power Flow
1, 1-Alternative*	12**	None	None
2	None	None	None
3	13**	16.82 miles of 138-kV lines	5 + 2 = 7
4	12**	None	5 + 8 13
5	None	None	None
6, 6-Alternative*	3	2.92 miles of 138-kV lines	None
7, 7-Alternative*	None	2.92 miles of 138-kV lines	None
8	3	17.27 miles of 138-kV lines	None
9, 9-Alternative*	12**	None	None

* The alternative versions involves looping in the existing Tarbush – Leon Creek 138-kV line into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and to tie the Woodhouse to Ft. Stockton SW

** These are pre-existing off-peak voltage violations not related to the project, which can be solved by adding an 80 MVAR (2 blocks of 40 MVAR) capacitor bank at Athey or Blair Lake 138-kV substations

- Based on the results in the above table, Option 1, 2, 5, and 9 were selected for further evaluation

Long-Term Load Serving Capability Assessment

- Assumptions
  - Adjusted load up in the study area, excluding Flexible Loads in the area
  - Adjusted conforming load down outside of Far West WZ to balance power
  - Based on N-1 contingency
- Preliminary Findings
  - Options 1, 1-Alternative, and 2 provide similar performance and are 24% higher in terms of long-term load serving capability than Options 5, 9, and 9-Alternative
  - Options 5, 9, and 9-Alternative provide similar performance

Option	Incremental Load Serving Capability (MW)
Base case	52
1, 1-Alternative*	189
2	190
5	153
9, 9-Alternative*	152

* The alternative versions invloves looping in the existing Tarbush – Leon Creek 138-kV line into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and to tie the Woodhouse to Ft. Stockton SW

Preliminary Results Options Evaluation

- Among the seven options evaluated, ERCOT identified Options 1, 1-Alternative, 2, 5, 9, and 9-Alternative as short-listed options for further evaluation
  - These six options address the reliability need in the study area

	Option					
	1	1 Alternative*	2	5	9	9 Alternative*
Address the project needs	Yes	Yes	Yes	Yes	Yes	Yes
Meets ERCOT and NERC Reliability Criteria	Yes	Yes	Yes	Yes	Yes	Yes
Require CCN (approximate miles)	Yes (28.5)	Yes (28.5)	Yes (30.0)	Yes (22.2)	Yes (21.6)	Yes (21.6)
Existing transmission upgrades (miles)	24.25	24.25	24.25	24.37	27.87	27.87
New Substation	Yes	No	No	No	Yes	No

* The alternative versions invloves looping in the existing Tarbush – Leon Creek 138-kV line into Ft. Stockton SW 138-kV station instead of building the new Woodhouse 138-kV station and to tie the Woodhouse to Ft. Stockton SW

Next Steps and Tentative Timeline

- ERCOT will continue to evaluate the short-listed options and provide status updates at future RPG meetings
  - Cost estimates and feasibility assessment
  - Congestion analysis
    - Perform based on the preferred transmission upgrade to ensure that the identified transmission upgrades do not result in new congestion within the study area
  - Generation addition and load scaling sensitivity analyses (Planning Guide (PG) section 3.1.3 (4))
  - Subsynchronous Resonance (SSR) Assessment (Nodal Protocol Section 3.22.1.3(2))
- Tentative timeline
  - Final status update at February RPG meeting
  - EIR report to be posted in the MIS in February 2024
  - EIR recommendation to TAC in March 2024
  - EIR recommendation to R&M in April 2024
  - Seek ERCOT Board of Directors endorsement in April 2024

Thank you!

Stakeholder comments also welcomed through:

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