Oncor West Texas 345-kV Infrastructure Rebuild Project – ERCOT Independent Review Scope

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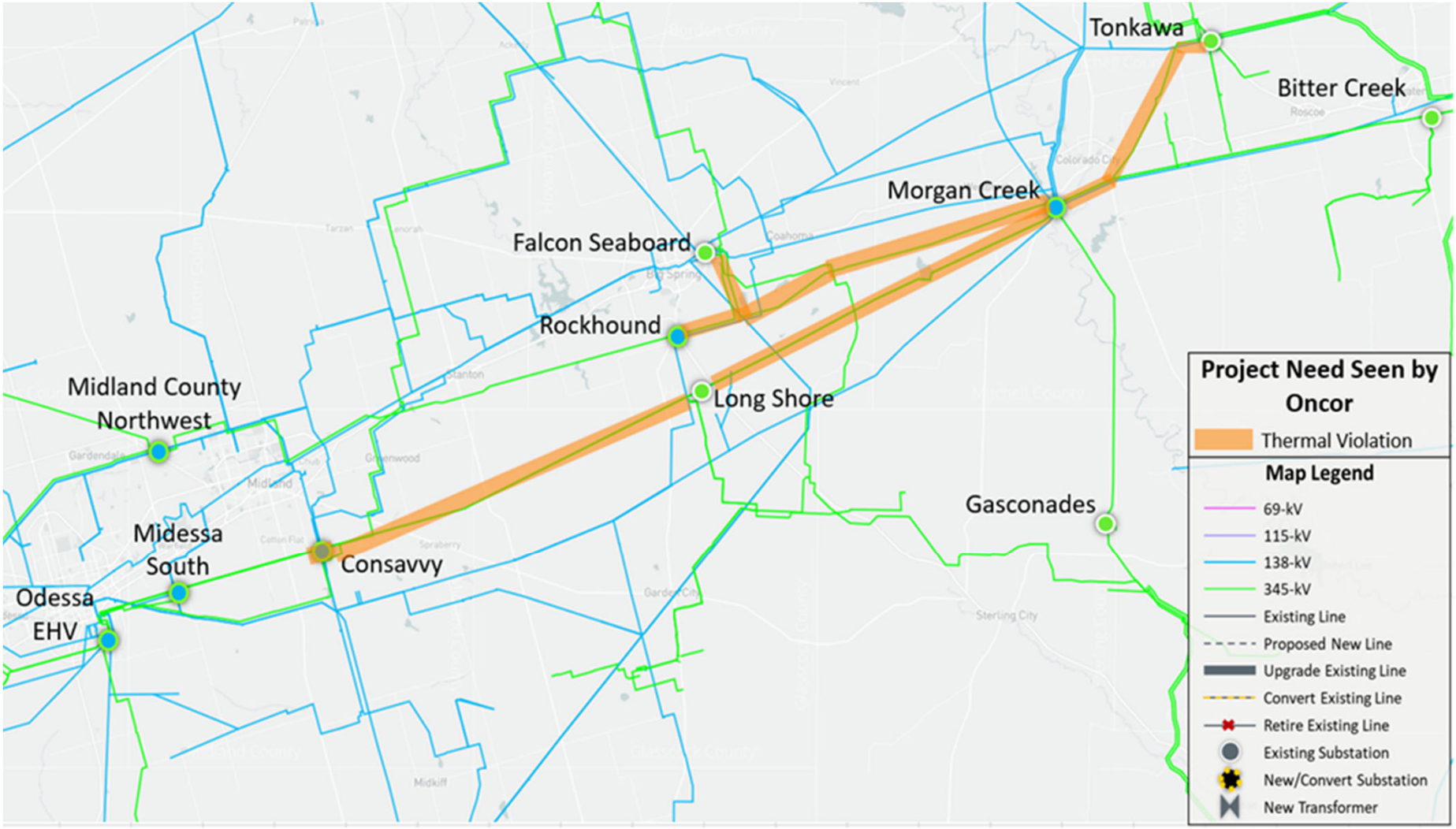
RPG Meeting
March 18, 2024

Recap

- Oncor submitted the West Texas 345-kV Infrastructure Rebuild Project for Regional Planning Group (RPG) review in November 2023
  - This Tier 1 project is estimated to cost $1.12 billion and will require a Certificate of Convenience and Necessity (CCN)
  - Estimated in-service date is Summer 2028
  - Addresses thermal overloads and load growth
- Oncor provided an overview presentation at January RPG Meeting
  - https://www.ercot.com/calendar/01172024-RPG-Meeting
- ERCOT conducted an independent review of this RPG project

Recap: Study Area with Project Need as Seen by Oncor



Background

- The Far West Weather Zone, which includes the Study area for this project, has experienced significant growth in oil and natural gas industry demand
- Due to the significant load growth and because of lack of long-term load commitment from the oil and gas customers, ensuring that necessary transmission improvements are in place in time is a significant challenge for both ERCOT and TSPs
- As part of the efforts to address this challenge, ERCOT previously completed two studies 1) Delaware Basin Load Integration Study in December 2019 and 2) Permian Basin Load Interconnection Study in December 2021.
- Both studies incorporated extensive review and input by TSPs and stakeholders.

Background (Cont.)

- Permian Basin Load Interconnection Study completed in December 2021
  - Identified the reliability challenges as well as a set of transmission upgrades, especially long lead time transmission upgrades, to connect and reliably serve the existing and projected oil and gas loads in the Permian Basin area. The study utilized a forecast from the IHS Markit study published in April 2020
  - Identified Reliability Needs encompassing the entire study area within the scope of this ERCOT Independent Review
  - Included cases for years 2025 and 2030
- ERCOT reviewed the results of the Permian Basin Load Interconnection Study and concluded that the Oncor West Texas 345-kV Infrastructure Rebuild Project aligns with ERCOT Preferred Project IDs 1, 2, 3 and 25
- ERCOT conducted an additional study to confirm the project need based on the scope presented presentation at February 12, 2024 RPG Meeting
  - https://www.ercot.com/calendar/02122024-RPG-Meeting

Study Assumption - Update

- The initial scope was modified to allow the 138-kV, 2023 RTP Placeholder projects show in the table below to remain in the base case.
- This change was made to focus on 345-kV needs identified in the Oncor West Texas 345-kV Infrastructure Rebuild Project Submittal as well as the 2021 ERCOT Permian Basin Load Interconnection Study

RTP Project ID	Project Name	TSP	County
2021-W5	Sacroc - Deep Creek Sub 138-kV Line Upgrade	ONCOR	Scurry
2023-W10	Dermott - Scurry Chevron - Kndrsacrc - Oncor900041 Tap - Knapp - Bluff Creek 138-kV Line Upgrade	ONCOR	Scurry

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	58 miles of 345-kV lines	None
G-1+N-1 (P3)*	None	197 miles of 345-kV lines	None
X-1+N-1 (P6-2)**	None	57 miles of 345-kV lines	None

* G-1: Odessa Ector CC Train, Falcon Seaboard CC Train
** X-1: Consavvy and Einstein 345/138-kV transformers

Results of Reliability Assessment – Preferred Upgrades

Comparison of Results with and without West Texas 345-kV Infrastructure Rebuild Project (WTIP)

Contingency Category	Thermal Overloads Base Case	Thermal Overloads WTIP added
N-0 (P0)	None	None
N-1 (P1, P2-1, P7)	58 miles of 345-kV lines	None
G-1+N-1 (P3)*	197 miles of 345-kV lines	None
X-1+N-1 (P6-2)**	57.3 miles of 345-kV lines	None

* G-1: Odessa Ector CC Train, Falcon Seaboard CC Train
** X-1: Consavvy and Einstein 345/138-kV transformers

Dynamic Stability Analysis

- ERCOT assessed the TSP's Dynamic Stability Analysis of the West Texas 345-kV Infrastructure Rebuild Project and concurs with the conclusion that "..the proposed project will not have an adverse effect on the transmission system dynamic stability in the project vicinity."

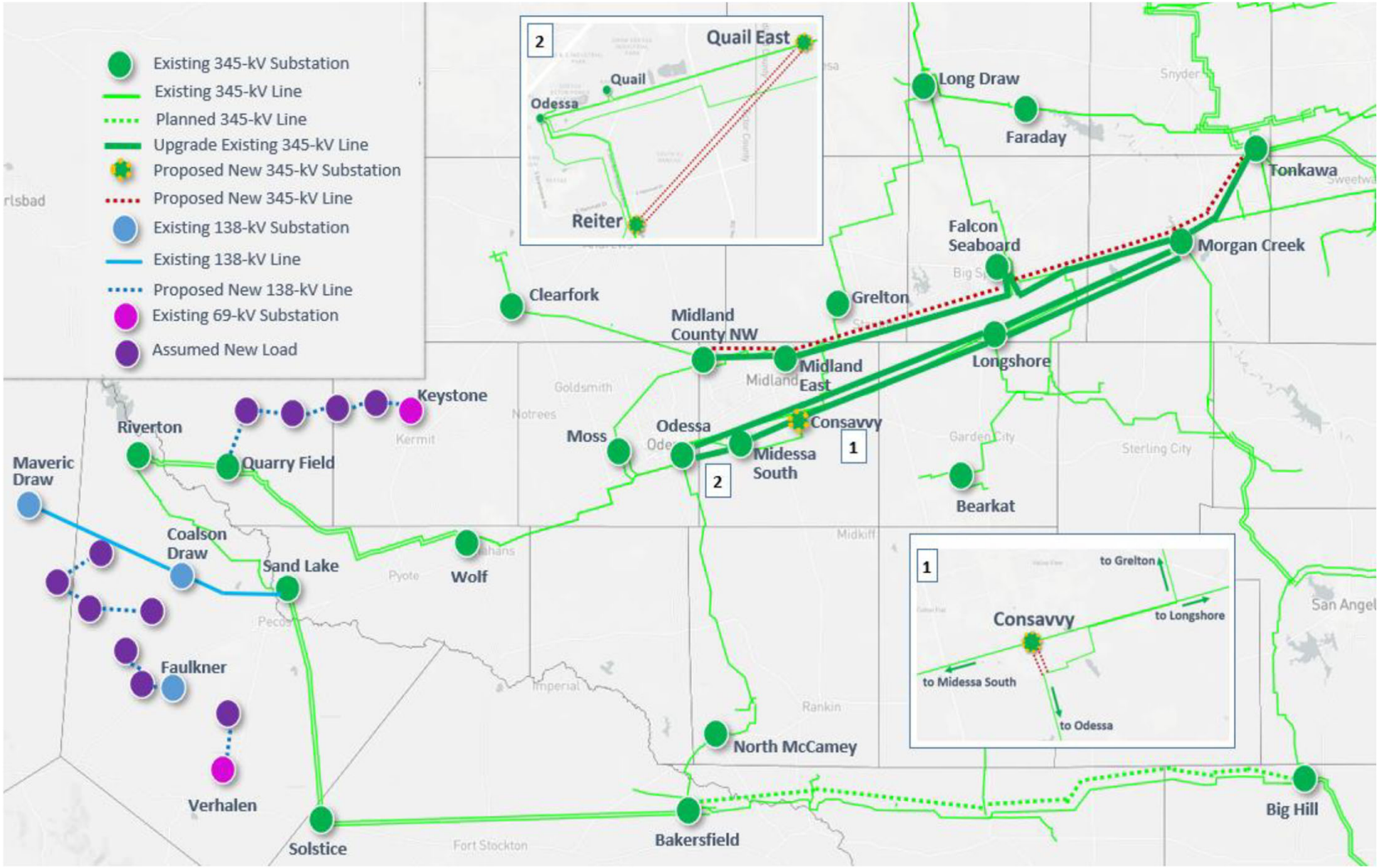
- Dynamic Stability Assessments will continue to be performed on an annual basis for this area.

SSR Assessment

Sub-Synchronous Resonance (SSR) Assessment

- Pursuant Nodal Protocol Section 3.22.1.3(2), ERCOT conducted a SSR assessment for the recommended project (West Texas 345-kV Infrastructure Rebuild Project) and found no adverse SSR impacts to the existing and planned generation resources in the study area

MAP – Preferred Upgrades (2025)



Sensitivity Analyses

Generation Addition Sensitivity Analysis

- Per Planning Guide Section 3.1.3(4)(a), ERCOT performed a generation addition sensitivity and determined relevant generators not able to resolve reliability criteria violations

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Generation Addition Sensitivity Analysis

- Per Planning Guide Section 3.1.3(4)(a), ERCOT performed a generation addition sensitivity and determined relevant generators are not able to resolve reliability criteria violations

GINR	Project Name	County	Fuel	Capacity (MW)
21INR0031	Indigo Solar	Fisher	SOL	125
23INR0300	Greater Bryant G Solar	Midland	SOL	42
21INR0268	Greyhound Solar	Ector	SOL	609
22INR0262	Deville Solar	Callahan	SOL	425
16INR0104	Big Sampson Wind	Crockett	WIN	400
23INR0086	Hanson Solar	Coleman	SOL	401
24INR0057	Hanson Storage	Coleman	OTH	101
21INR0263	Monarch Creek Wind	Throckmorton	WIN	344
22INR0274	Crowded Star Solar II	Jones	SOL	189
21INR0207	Quantum Solar	Haskell	SOL	374
21INR0021	Green Holly Solar	Dawson	SOL	414
21INR0022	Red Holly Solar	Dawson	SOL	260
21INR0029	Green Holly Storage	Dawson	OTH	50
21INR0033	Red Holly Storage	Dawson	OTH	50
25INR0400	Maldives Solar (Alternate POI)	Scurry	SOL	184

Sensitivity Analyses

Load Scaling Sensitivity Analysis

- Per Planning Guide Section 3.1.3(4)(b), ERCOT evaluated the load scaling sensitivity and concluded that the load scaling assumed in the study case would not have any material impact on the project need because of the following reasons

Congestion Analysis – In Progress

Next Steps

Tentative Timeline

- ERCOT Independent Review report
  - March 2024
- ERCOT Independent Review recommendation to TAC
  - April 2024
- Seek ERCOT Board of Directors endorsement
  - April 2024

Thank you!

Stakeholder comments also welcomed through:

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Appendix – Preferred Upgrade

- ERCOT recommends the addition of the West Texas 345-kV Infrastructure Rebuild Project (WTIP) based on the review of the Permian Basin Load Interconnection Study completed December 2021, and the results from the additional studies
  - Construct a new Ranger Camp 345/138-kV substation, approximately 1.0 mile north of the existing Morgan Creek 345/138-kV Switch, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 14-breaker 345-kV breaker-and-a-half bus arrangement and a 16-breaker 138-kV breaker-and-a-half bus arrangement, with one new 177 MVA (nameplate) 138/69-kV transformer, and a 2-breaker 69-kV single bus arrangement. All 345-kV equipment will be rating at least 2988 MVA, 138-kV at least 765 MVA and 69-kV at least 239 MVA.
    - Disconnect the following 345-kV lines at Morgan Creek and terminate at new Ranger Camp 345-kV:
      - Morgan Creek to Falcon Seaboard with approximately 1.4 miles in new right-of-way
      - Morgan Creek to Tonkawa with approximately 0.94 miles in new right-of-way

Appendix – Preferred Upgrade – Cont.

- Disconnect the following 138-kV transmission lines at Morgan Creek and terminate at new Ranger Camp 138-kV:
  - Morgan Creek to Eskota
  - Morgan Creek to Barber Lake West
  - Morgan Creek to Barber Lake East
  - Morgan Creek to Sun
  - Morgan Creek to Cosden
- Disconnect the following 69-kV transmission lines at Morgan Creek and terminate at new Ranger Camp 69-kV:
  - Morgan Creek to Colorado City
  - Morgan Creek to Big Spring
- Relocate existing 177 MVA (nameplate) 138/69-kV transformer from Morgan Creek Switch to new Ranger Camp Switch

- Construct a new breaker-and-a-half rung with two new 345-kV breakers at Tonkawa 345-kV Switch. New breakers will be rating at least 2988 MVA
- Rebuild Morgan Creek (Ranger Camp) to Tonkawa 345-kV transmission line, replace with two new Morgan Creek (Ranger Camp) to Tonkawa 345-kV lines, with conductors rated to at least 2988 MVA, in existing (estimated 21.3-mile) right-of-way, installed on new, common double-circuit towers

Appendix – Preferred Upgrade – Cont.

- Construct a new Cattleman 345/138-kV Switch, approximately 2.0 mile southwest of existing Morgan Creek 345/138-kV Switch, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 15-breaker 345-kV breaker-and-a-half bus arrangement and a 9-breaker 138-kV breaker-and-a-half bus arrangement. All 345-kV equipment will be rating at least 2988 MVA and 138-kV at least 765 MVA
- Disconnect the following 345-kV transmission lines at Morgan Creek and terminate at new Cattleman 345-kV:
  - Morgan Creek to Champion Creek/LCRA Bitter Creek double circuit transmission lines with approximately 1.25 miles in new right-of-way
  - Morgan Creek to LCRA Gasconades with approximately 2.13 miles in new right-of-way
  - Morgan Creek to Consavvy
  - Morgan Creek to Longshore

Appendix – Preferred Upgrade – Cont.

- Disconnect the following 138-kV transmission lines at Morgan Creek and terminate at new Cattleman 138-kV:
  - Morgan Creek to McDonald Road
- Construct two new Cattleman to Ranger Camp 345-kV transmission lines, with conductors rated to at least 2988 MVA, in a new (estimated 4.2-mile) right-of-way, installed on new, common double-circuit towers
- Rebuild Morgan Creek 138-kV Switch, in existing Morgan Creek 345/138-kV Switchyard from existing 12-breaker double-bus arrangement to a new 10-breaker 138-kV breaker-and-a-half bus arrangement
- Construct two new Morgan Creek to Morgan Creek CT Yard 138-kV transmission lines with separate single-circuit capable structures, leaving one vacant and the other occupied with conductors rated to at least 614 MVA in existing (estimated 0.1 mile) right-of-way
- Construct two new Morgan Creek to Ranger Camp 138-kV transmission lines, with conductors rated to at least 614 MVA, in existing (estimated 1.2-mile) right-of-way, installed on new, common double-circuit towers

Appendix – Preferred Upgrade – Cont.

- Construct two new Morgan Creek to Cattleman 138-kV transmission lines, with conductors rated to at least 614 MVA, in existing (estimated 0.82-mile) right-of-way and new (estimated 2.48-mile) right-of-way, installed on new, common double-circuit towers
- Construct a new Prong Moss 345-kV Switch, approximately 29.4 miles southwest of existing Morgan Creek 345/138-kV Switch, and along the existing Morgan Creek to Midland East 345-kV corridor, and approximately 7.0 miles south of existing Falcon Seaboard generating station in a 12-breaker 345-kV breaker-and-a-half bus arrangement. All equipment will be rating at least 2988 MVA
  - Tap Prong Moss 345-kV Switch into existing Morgan Creek (Ranger Camp) to Falcon Seaboard 345-kV transmission line with, approximately 0.1 mile, new transmission line segment in new right-of-way
  - Tap Prong Moss 345-kV Switch into Morgan Creek (Ranger Camp) to Midland East 345-kV transmission line with, approximately 0.1 mile, new transmission line segment in new right-of-way
  - Rebuild Morgan Creek (Ranger Camp) to Prong Moss, replace with two new Morgan Creek (Ranger Camp) to Prong Moss 345-kV transmission lines with conductors rated to at least 2988 MVA, in existing (estimated 29.4-mile) right-of-way installed on new, common double-circuit towers

Appendix – Preferred Upgrade – Cont.

- Rebuild Prong Moss to Midland East 345-kV line, replace with two new Prong Moss to Midland East 345-kV transmission lines with conductors rated to at least 2988 MVA, in existing (estimated 41.2-mile) right-of-way, installed on new, common double-circuit towers

- Rebuild Midland East to Midland County Northwest 345-kV transmission line, replace with two new Midland East to Midland County Northwest 345-kV transmission lines, with conductors rated to at least 2988 MVA, in 16.3 miles of existing (estimated 17.3-mile) right-of-way and 1.0 miles of new right-of-way, installed on new, common double-circuit towers
- Rebuild Longshore 345-kV Switch, and upgrade from existing 6-breaker ring-bus configuration to a 11-breaker 345-kV breaker-and-a-half bus arrangement. All equipment will be rating at least 2988 MVA
  - Disconnect the Morgan Creek (Cattleman) to Longshore Flyby 345-kV transmission line at Flyby and terminate at rebuild Longshore 345-kV with approximately 0.1 miles line in existing right-of-way
- Upgrade all terminal equipment at 2-breaker Midessa South 345-kV Switch to at least 2988 MVA
- Upgrade all terminal equipment at 3-breaker, ring bus, Quail East 345-kV Switch to at least 2988 MVA

Appendix – Preferred Upgrade – Cont.

- Upgrade all terminal equipment on both breaker-and-a-half rungs of Odessa EHV 345-kV Switch to at least 2988 MVA
- Construct a new Reiter 345/138-kV Switch, approximately 3.0 mile south of the existing Odessa EHV 345/138-kV Switch, along the Odessa EHV to Moss/Wolf 345-kV double-circuit transmission line, with two new 600 MVA (nameplate) 345/138-kV transformers, in a 12-breaker 345-kV breaker-and-a-half bus arrangement and a 10-breaker 138-kV breaker-and-a-half bus arrangement. All 345-kV equipment will be rating at least 2988 MVA, and 138-kV at least 765 MVA
- Tap new Reiter 345-kV Switch into existing Odessa EHV to Moss 345-kV transmission line with, approximately 0.2 mile, new transmission line segment in new right-of-way
- Tap new Reiter 345-kV Switch into existing Odessa EHV to Wolf 345-kV transmission line with, approximately 0.1 mile, new transmission line segment in new right-of-way
- Tap new Reiter 345-kV Switch into existing Odessa EHV to Moss&Odessa EHV to Wolf 345-kV double-circuit transmission line with, approximately 0.1 mile, new transmission line segment in new right-of-way

Appendix – Preferred Upgrade – Cont.

- Upgrade Tesoro 345-kV Switch by adding two new breaker-and-a-half rungs. New breakers will be rating at least 2988 MVA
- Construct two new Reiter to Tesoro 345-kV transmission lines, with conductors rated to at least 2988 MVA, in new (estimated 4.0-mile) right-of-way, installed on new, common double-circuit towers
- Rebuild Morgan Creek (Cattleman) to Odessa EHV 345-kV double-circuit transmission line, with conductors rated to at least 2988 MVA, in existing (estimated 88.7-mile) right-of-way installed on common double-circuit towers