Bearkat – North McCamey – Sand Lake 345-kV Transmission Addition Project – ERCOT Independent Review

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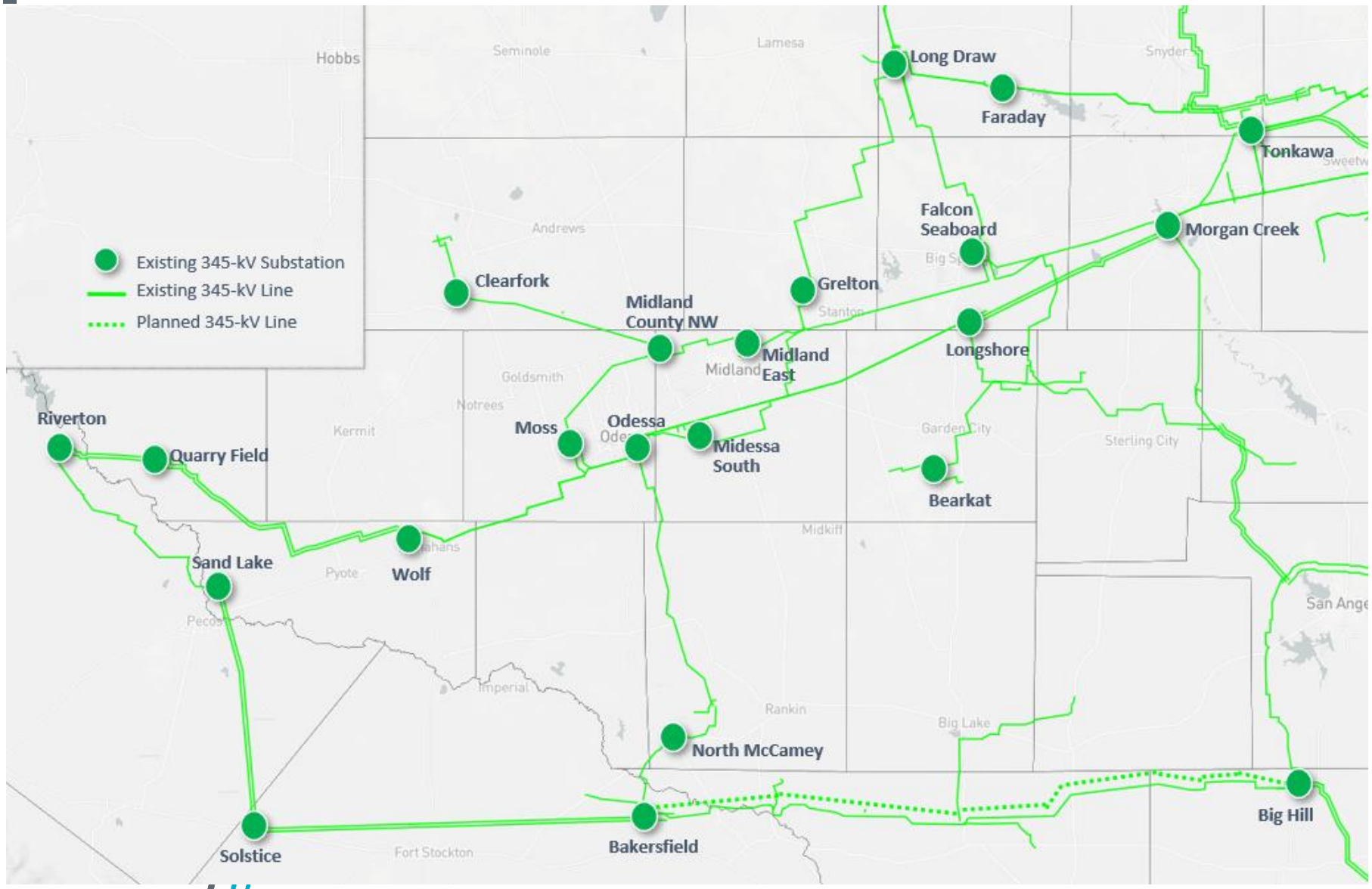
Introduction

LCRA Transmission Services Corporation (LCRA TSC), Wind Energy Transmission Texas (WETT), and Oncor jointly submitted the Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project to the Regional Planning Group (RPG) review in April 2022. This is a Tier 1 project that is estimated at $477.6 Million

- Proposed in-service date is June 2026. LCRA TSC, Oncor, and WETT have requested a need for "critical status designation"
- Address the reliability need driven by rapid load growth in the Delaware Basin area by
  - Adding approximately 71 miles of double-circuit 345-kV transmission line from existing Bearkat substation to existing North McCamey substation
  - Adding approximately 94 miles of double-circuit 345-kV transmission line from existing North McCamey substation to existing Sand Lake substation
  - Reconfigure each of the existing substations into a breaker-and-a-half substation (as a minimum configuration)
- ERCOT conducted an independent review of this RPG project

Study Area – 345-kV Transmission



Background

- The Far West Weather Zone, which includes the Delaware Basin area, 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 the challenge, ERCOT completed the Delaware Basin Load Integration Study in December 2019 and Permian Basin Load Interconnection Study in December 2021 through extensive review and input by TSPs and stakeholders

Background (Cont.)

- Delaware Basin Load Integration Study completed in December 2019
  - Identified the reliability needs in the region
  - Provided a roadmap of long lead time transmission improvements for the continued oil and gas load growth in the Delaware Basin area
  - Stage 1 upgrade was endorsed in June 2021 and is expected to be complete in 2023

Stage	Estimated Delaware Basin Load Level (MW)	Upgrade Element	Trigger
1	3,052	Add a second circuit on the existing Big Hill - Bakersfield 345-kV line	Import Needs
2	4,022	A new Bearkat - North McCamey - Sand Lake double-circuit 345-kV line	Import Needs
3	4,582	A new Riverton - Owl Hills single-circuit 345-kV line	Culberson Loop Needs
4	5,032	Riverton - Sand Lake 138-kV to 345-kV conversion and a new Riverton - Sand Lake 138-kV line	Culberson Loop Needs
5	5,422	A new Faraday - Lamesa - Clearfork - Riverton double-circuit 345-kV line	Import Needs

Background (Cont.)

- Permian Basin Load Interconnection Study completed in December 2021
  - Identified the reliability challenges and 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 utilizing the demand forecast from the IHS Markit study published in April 2020
  - 2021 Permian Basin Load Interconnection Study included the cases for year 2025 and 2030. The Delaware Basin area load levels are 3,789 MW and 4,898 MW for 2025 and 2030 respectively

- Among the preferred transmission upgrades identified in the Permian Basin Load Interconnection Study, the Stage 2 upgrade was also identified to maintain grid reliability under multiple P7 contingencies (i.e., N-1 conditions) in the 2030 study case

Study Assumptions and Methodology

- As noted in the Permian Basin Load Interconnection Study Report, ERCOT decided to conduct the independent review of this RPG project by reviewing the results of the two special studies

- ERCOT reviewed the results of the Delaware Basin Load Integration Study and Permian Basin Load Interconnection Study and concluded that the RPG project aligns with the Stage 2 upgrade

- ERCOT conducted additional study using the 2021 RTP final reliability case to confirm the project need, based on the assumptions in the next slide

Study Assumptions and Methodology (Cont.)

- Study Area
  - Study area is the Far West Weather Zone
- Study Case Development
  - Starting Case
    - 2026 West and Far West summer peak case was used to build the study base case (2021RTP_2026_SUM_WFW_12232021)
  - Transmission Assumption
    - Backout the Stage 2 upgrade
    - All RPG-approved Tier 1, Tier 2, and Tier 3 transmission projects in the Far West area as well as the Tier 4 projects within the Delaware Basin area expected to be in-service by 2026 were added
  - Generation Assumption
    - Solar generation in the Far West Weather Zone was assumed to be offline to represent a stressed system condition during the review of the 2021 RTP final reliability case
    - New generators planned to connect to the study area and met Planning Guide Section 6.9(1) for inclusion in the planning models were added
  - Load Assumption
    - The load level of the Far West Weather Zone remains the same as in the 2021 RTP case. The loads outside of the West and Far West Weather Zones were adjusted necessary for power balance consistent with the 2021 RTP assumptions

Reliability Need

- The study results showed potential voltage instability under certain NERC Category P7 contingency (i.e., N-1 condition)

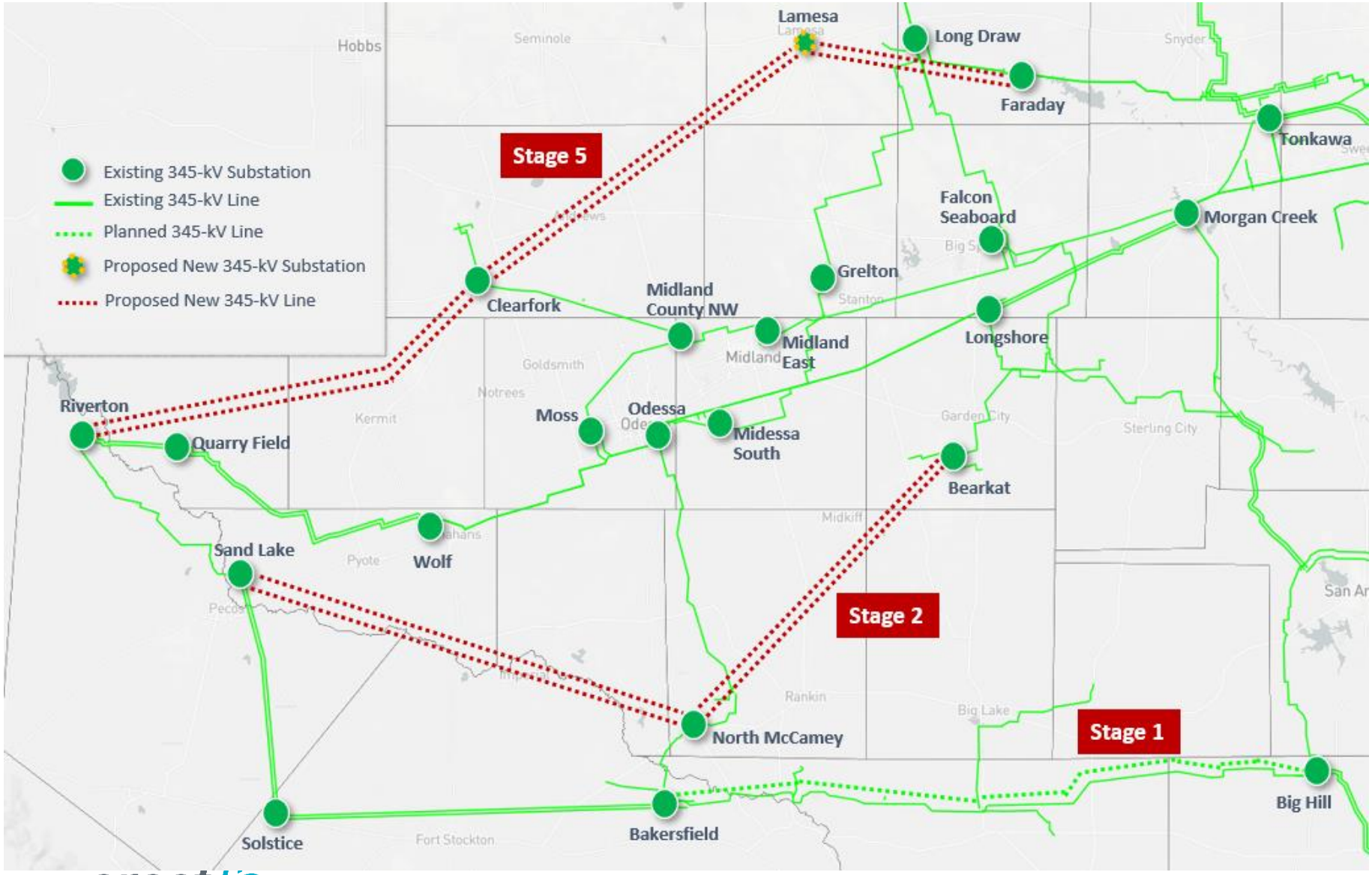
- ERCOT confirmed that the Stage 2 upgrade addresses the potential voltage instability issue that may occur under the critical NERC Category P7 contingency

Project Alternatives

- In the Delaware Basin Load Integration Study, ERCOT evaluated a number of options to improve the capability to import power into the Delaware Basin area
  - Stage 1: Adding a second circuit on the existing Big Hill – Bakersfield 345-kV line, endorsed in June 2021 and is expected to be implemented in 2023
  - Stage 2: Adding a new Bearkat - North McCamey - Sand Lake double-circuit 345-kV line (~$371 Million in 2019 dollar and $477.6 million in 2021 dollar, estimated new rights-of-way: 164 miles)
  - Stage 5: Adding a new Faraday - Lamesa - Clearfork - Riverton double-circuit 345-kV line (Stage 5 upgrade, estimated cost: $444 Million in 2019 dollar, estimated new rights-of-way: 193 miles)

- Stage 2 vs. Stage 5
  - The estimated load serving capabilities are similar for the Stage 2 and Stage 5 upgrades as described in the Delaware Basin Load Integration Study
  - The Stage 2 upgrade requires less amount of miles of new rights-of-way and lower project cost compared to the Stage 5 upgrade

Project Alternatives - Map



Preferred Upgrade

- ERCOT recommends the addition of a new Bearkat - North McCamey - Sand Lake double-circuit 345-kV line based on the review of the Delaware Basin Load Integration Study, Permian Basin Load Interconnection Study, and results from the additional studies
  - Add a new Bearkat - North McCamey - Sand Lake double-circuit 345-kV line (~164 miles), with the minimum normal and emergency rating of at least 2,564 MVA
  - Reconfigure each of the existing substations into a breaker-and-a-half substation (as a minimum configuration)

Dynamic Stability Analysis

- ERCOT assessed the potential impact of the preferred upgrade (Stage 2 upgrade) on the existing McCamey GTC

- As the Stage 2 upgrade provides additional new 345-kV transmission outlets to the McCamey area, it is expected to improve the system strength by reducing the overall system impedances and reactive losses. Therefore, the Stage 2 upgrade is expected to improve the dynamic stability of the existing system in the McCamey 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 (Stage 2 upgrade) and found no adverse SSR impacts to the existing and planned generation resources in the study area

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

GINR	Project Name	County	Fuel	Capacity (MW)
20INR0143	Soda Lake Solar 2	Crane	Solar	202.99
20INR0249	Appaloosa Run Wind	Upton	Wind	175
21INR0005	Hutt Wind	Midland	Wind	336
21INR0021	Green Holly Solar	Dawson	Solar	413.6
21INR0022	Red Holly Solar	Dawson	Solar	260
21INR0029	Green Holly Storage	Dawson	Battery	50
21INR0033	Red Holly Storage	Dawson	Battery	50
21INR0268	Greyhound Solar	Ector	Solar	608.7
22INR0363	Hayhurst Texas Solar	Culberson	Solar	46.2
22INR0485	House Mountain 2 Batt	Brewster	Battery	61.62
22INR0495	TIMBERWOLF BESS 2	Upton	Battery	150

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
  - The Delaware Basin area is remotely located at the westernmost part of the ERCOT system relying on two major 345-kV import paths (i.e., Odessa/Moss – Wolf – Riverton and Bakersfield – Solstice). The load scaling outside the Delaware Basin area would not provide any material impact on the project need (i.e., voltage collapse under NERC P7 Contingency) driven by significant and rapid oil and gas load additions

Congestion Analysis

- ERCOT conducted a congestion analysis to identify any potential impact on system congestion related to the addition of the recommended project, using the 2021 RTP 2026 economic study case

- The results of the congestion analysis indicated the Stage 2 upgrade did not cause new or additional congestion

Conclusion

- ERCOT recommends the Stage 2 upgrade as the preferred solution based on the following considerations:
  - Estimated cost: ~477.6 Million
  - Estimated new right of way: ~164 miles
  - Anticipated implementation: by 2026

Next Steps

Tentative Timeline

- ERCOT Independent Review report
  - June or early July, 2022
- ERCOT Independent Review recommendation to TAC
  - July 27, 2022
- Seek ERCOT Board of Directors endorsement
  - August 16, 2022

Stakeholder Comments Also Welcomed to Sun Wook Kang:

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