

# Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition

ERCOT Regional Planning Group Submittal

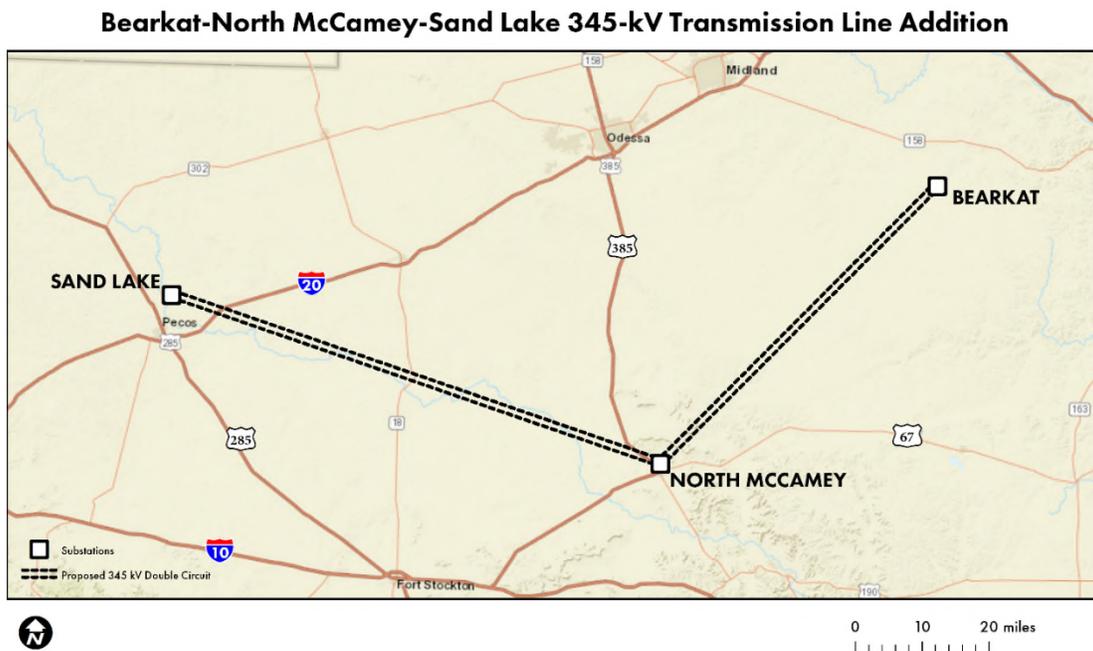
April 7, 2022



## Executive Summary

LCRA Transmission Services Corporation (LCRA TSC), Wind Energy Transmission Texas (WETT), and Oncor are submitting the proposed Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project to the Regional Planning Group (RPG) for review and comment. Pursuant to ERCOT Nodal Protocols Section 3.11.4.6, this project is being submitted as a Tier 1 project. The approximate geographic location of the proposed project is shown in Figure 1.

The ERCOT Delaware Basin Load Integration Study<sup>1</sup> identified the addition of Bearkat – North McCamey 345-kV double-circuit transmission line and North McCamey – Sand Lake 345-kV double-circuit transmission line as the necessary Stage 2 upgrade that would be triggered when the load in the Delaware Basin Study Area exceeded 4,022 MW. In 2020, Oncor and its third-party consultant, IHS Markit, conducted a bottom-up analysis of electric load based on oil and gas industry intelligence, equipment requirements, and market dynamics. This analysis is summarized in the “West Texas Forecasted Load Additions: Permian Basin”<sup>2</sup> report filed by ERCOT to the Public Utility Commission of Texas (PUCT) in April 2020. In a subsequent letter<sup>3</sup>, ERCOT concurred that the IHS Markit load forecast is reasonable and should be considered in the Permian Basin expansion strategy going forward. Furthermore, the ERCOT 2021 Regional Transmission Plan (RTP) and the ERCOT 2021 Permian Basin Load interconnection study concluded that the Delaware Basin Area Stage 2 upgrade will be needed by Summer of 2026.



**Figure 1: Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition**

<sup>1</sup> ERCOT Delaware Basin Load Integration Study, published December 2019

<sup>2</sup> [https://interchange.puc.texas.gov/Documents/27706\\_439\\_1147915.pdf](https://interchange.puc.texas.gov/Documents/27706_439_1147915.pdf)

<sup>3</sup> [https://interchange.puc.texas.gov/Documents/27706\\_468\\_1096555.pdf](https://interchange.puc.texas.gov/Documents/27706_468_1096555.pdf)

LCRA TSC, WETT, and Oncor recommend adding the Bearkat – North McCamey 345-kV double-circuit transmission line and North McCamey– Sand Lake 345-kV double-circuit transmission line by no later than June 2026. The in-service date may change based on several factors, including environmental assessments, licensing requests, regulatory approval, rights-of-way acquisitions, supply chain constraints and/or construction process.

We request that this project be designated as critical to the reliability of the ERCOT system based on the timing of the latest load forecasts for the area and the inability to fully serve customer load requests absent these system improvements. Oncor, LCRA TSC, and WETT will work with ERCOT to implement Constraint Management Plans (“CMPs”) based on operational conditions as required.

The cost estimate for the project is \$477.6M, which consists of \$236.6M for LCRA TSC scope, \$131.5M for Oncor scope, and \$109.5M for WETT scope. These estimates include a 20% mileage adder to account for routing that increases the length of the transmission line compared to the straight-line distance. These cost estimates do not include uncertain factors that may be revealed during a more detailed routing study/CCN-level cost estimate (e.g., environmental/cultural components, etc.). Cost estimates provided within this submittal are subject to revision as additional information is revealed.

## **Introduction**

The Delaware Basin area is in the ERCOT Far West Weather Zone and spans eight counties: Brewster, Culberson, Jeff Davis, Loving, Pecos, Reeves, Ward, and Winkler. Distribution Service Providers (DSPs) in ERCOT that serve load in the Delaware Basin include American Electric Power (AEP) Texas, Golden Spread Electric Cooperative (GSEC), Oncor Electric Delivery Company, Rio Grande Electric Cooperative (RGEC), and Texas-New Mexico Power Company (TNMP).

ERCOT completed the Delaware Basin Load Integration study in December 2019 after several months of extensive review from Transmission Service Providers (TSPs) and stakeholders. The report was presented and discussed at the December 2019 Regional Planning Group (RPG) meeting. Appendix A in the report describes the transmission projects needed to meet higher-than-forecasted electricity demand driven by the oil and natural gas industry and the associated economic expansion in the Delaware Basin area. This study provided a roadmap to meet the reliability criteria to serve the rapidly increasing load.

In early 2021, the Delaware Basin Region load levels in the Steady State Working Group case for summer 2023 were seen to exceed the Stage 1 load-level trigger. As a result, STEC and LCRA TSC proposed the Bakersfield to Big Hill 345-kV Second Circuit Addition Project to the Regional Planning Group (RPG). On June 10, 2021, ERCOT RPG completed an independent review of the Delaware Basin Stage 1 upgrades.

In 2021, ERCOT, with review and input from TSPs and other stakeholders, completed the Permian Basin Load Interconnection Study and identified transmission upgrades, especially long lead time transmission upgrades, necessary to reliably serve existing and projected oil and gas loads in the Permian Basin area. This study identified the addition of Bearkat – North McCamey and North McCamey- Sand Lake 345-kV double-circuit transmission lines (Stage 2 upgrades) as preferred projects.

In the 2021 Regional Transmission Plan (RTP), ERCOT adopted the IHS Markit Study Permian Basin load forecast and identified the need for the Bearkat – North McCamey and North McCamey – Sand Lake 345-kV double-circuit transmission lines (Stage 2 upgrades) starting in Summer 2026 to resolve voltage collapse and other reliability violations.

This project proposal developed by LCRA TSC, WETT, and Oncor confirms the prior study work completed by ERCOT and stakeholders.

## Assessment of the Project Scope

This project will implement the Stage 2 upgrades identified in the roadmap for transmission improvements in the ERCOT Delaware Basin Load Integration Study report. To that extent, this project submission builds on the planning analysis presented in ERCOT’s report.

## Evaluation of System Needs

In the Delaware Basin Load Integration Study, ERCOT developed a roadmap identifying sequential upgrade stages to accommodate the load growth in the Delaware Basin area. The transmission upgrades at each stage in the roadmap only include the long lead-time transmission improvements (e.g., new 345-kV transmission system facilities). Local upgrades to 138-kV transmission elements needed to serve load were assumed to be in-service prior to the Stage 2 upgrades.

Figure 2 shows the triggers for the transmission upgrades at each stage in terms of the load level in the Delaware Basin area. Table 1 lists the details of the transmission upgrades associated with each stage in the developed roadmap. The triggers and limits are based on either thermal or steady state voltage stability criteria violations under the N-1, G-1+N-1, X-1+N-1, and N-1-1 contingency conditions.

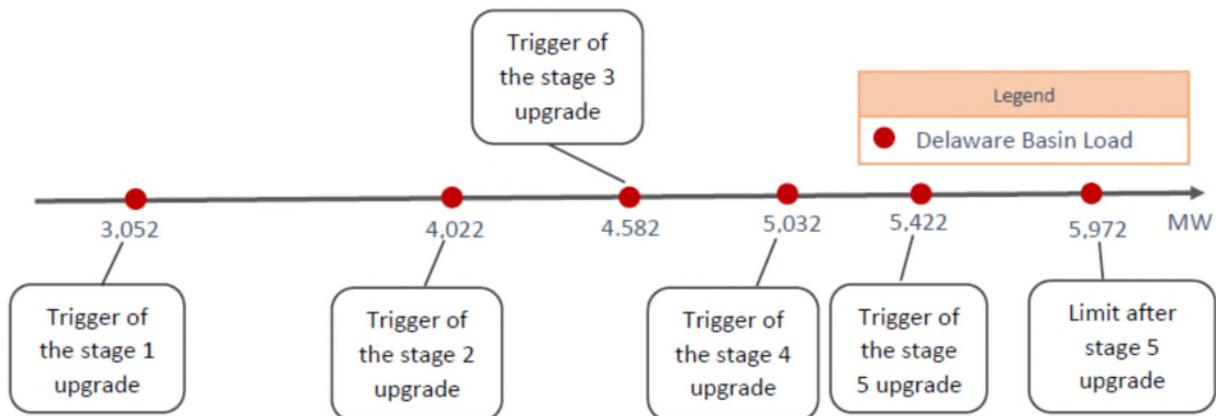


Figure 2: Delaware Basin Transmission Upgrade Roadmap

**Table 1. Delaware Basin Transmission Upgrade Roadmap – Detailed Project List**

Stage	Delaware Basin Load Level	Upgraded Element	Status
1	3,052 MW	Add a second circuit on the existing Big Hill – Bakersfield 345-kV line	Endorsed by ERCOT and in implementation by LCRA TSC and STEC
2	4,022 MW	Add a new Bearkat – North McCamey – Sand Lake double circuit 345-kV line	Proposed by LCRA TSC, Oncor, and WETT
3	4,582 MW	Add a new Riverton – Owl Hills single circuit 345-kV line	Future
4	5,032 MW	Convert Riverton – Sand Lake 138-kV to 345-kV and add a new Riverton – Sand Lake 138-kV line	Future
5	5,422 MW	Add a new Faraday – Lamesa – Clearfork – Riverton double-circuit 345-kV line	Future

### Load Analysis

In the ERCOT Delaware Basin Load Integration Study, the Delaware Basin load trigger for the Stage 2 upgrade is 4,022 MW. Table 2 shows the Delaware Basin load totals for the SSWG cases published on October 22, 2021. A detailed list of the buses and load values used to calculate these totals can be provided upon request.

**Table 2. Delaware Basin Load in 2021 SSWG U1 Cases in Summer On-Peak Cases**

Year	MW	MVAR
2022	3360	1023
2023	3949	1212
2024	<b>4341</b>	1339
2025	<b>4405</b>	1359
2026	<b>4433</b>	1366
2027	<b>4445</b>	1369
2028	<b>4468</b>	1374

As shown in Table 2, the 4,022 MW Stage 2 load level is exceeded by Summer 2024 (bolded and in red font). The significant load growth appearing in years 2022-2024 is consistent with the oil and gas industry’s practice of providing load forecast information for only one to two years into the future. LCRA TSC, WETT, and Oncor communicated with DSPs who serve load in the Delaware Basin to confirm the load levels shown in Table 2 were still valid and can be accounted for. By March 30, 2022, all associated DSPs confirmed that the values listed in Table 2 are expected to be met or exceeded. In addition, the “IHS Markit West Texas Forecasted Load” report indicated that “both the Delaware and Midland basins areas are experiencing rising power demand, driven by rising industrial loads due to ongoing and forecasted increases in oil and gas activity due to continued oil and natural gas growth along with large load interconnections.” In addition to the findings of the IHS Markit study, the area DSPs have continued to observe load growth in the Delaware Basin due to new customer loads and electrification activities,

including the conversion and integration of gas-powered and/or on-site generation-powered equipment to transmission grid-served electrical operation in order to improve equipment reliability. Additionally, area DSPs have also seen an increase in data center and crypto currency related large load requests that may materialize prior to 2024.

### **Stability Analysis**

LCRA TSC, Oncor, and WETT conducted stability analysis using the 2024 High Wind Low Load (HWLL) Dynamics Working Group (DWG) flat start case published in February 2021 to assess the impact of the Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project. Contingencies at Bearkat, North McCamey, and Sand Lake Substations and contingencies that are a part of the McCamey Generic Transmission Constraint (GTC) were analyzed. Based on the results of this analysis, the Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project is not expected to worsen system stability in this portion of the system and no new stability criteria violations were observed with the new system elements in place.

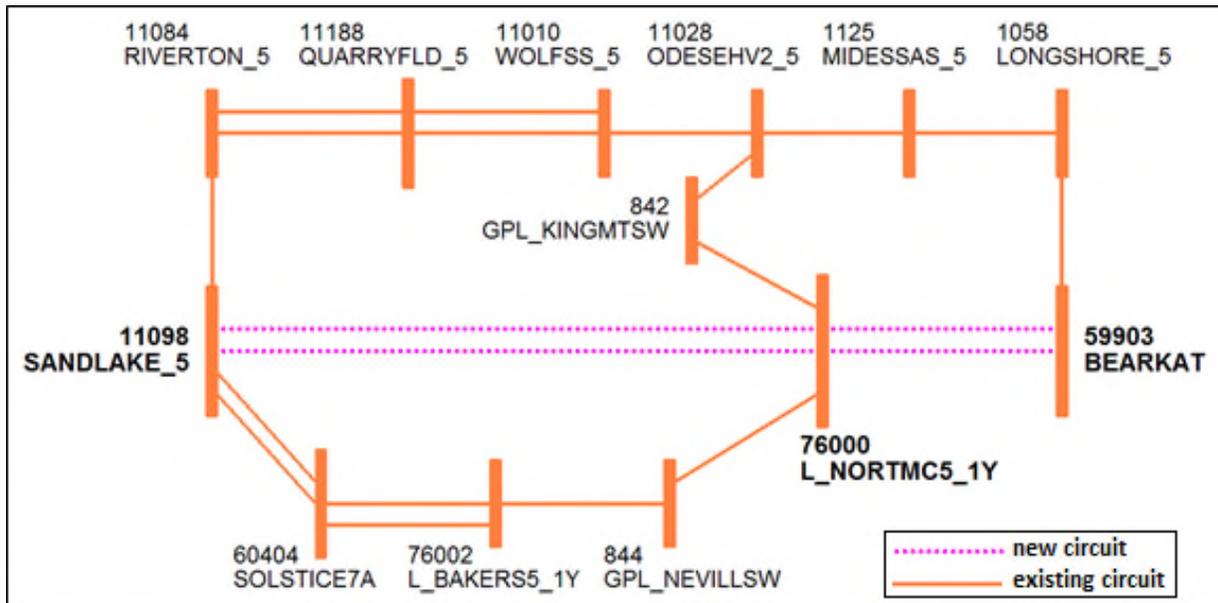
### **Short Circuit Analysis**

LCRA TSC, Oncor, and WETT conducted a Short Circuit Analysis to assess the impact of the Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project using the ERCOT SPWG future year 2026 short circuit case. Based on the results of this analysis, the maximum fault duty experienced by the surrounding 345-kV substations will be 26 kA. All existing circuit breakers are rated at 63 kA, and no appreciable increase to the available fault duty will be realized by this project. Therefore, the line additions do not cause the need to upgrade any existing equipment for short circuit reasons.

### **Subsynchronous Resonance (SSR) Analysis**

The Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project creates new radial paths for generators to series compensated transmission lines. Based on this finding, ERCOT performed frequency scans on these new radial paths and those frequency scans indicated the project causes a modest decrease in subsynchronous resonance (SSR) exposure for generation projects located in the vicinity of Bearkat and a decrease in exposure for projects located near North McCamey. Based on these results, ERCOT has concluded that no further SSR analysis is necessary.

## Project Scope



**Figure 3: *Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project Schematic***

LCRA TSC and WETT will add approximately 71 miles of new 345-kV double-circuit transmission line with a bundled conductor with a minimum rating of 2,564 MVA on a new right-of-way between LCRA TSC-owned North McCamey and WETT-owned Bearkat substations. LCRA TSC and WETT will add terminal equipment at North McCamey and Bearkat, respectively, to accommodate the new transmission circuits.

LCRA TSC and Oncor will add approximately 94 miles of new 345-kV double-circuit transmission line with a bundled conductor with a minimum rating of 2,564 MVA on a new right-of-way between LCRA TSC-owned North McCamey and Oncor-owned Sand Lake substations. LCRA TSC and Oncor will add terminal equipment at North McCamey and Sand Lake, respectively, to accommodate the new transmission circuits.

All substation equipment at North McCamey, Bearkat, and Sand Lake substations connected in series with the new transmission circuits shall have a minimum continuous rating of 5,000 A and short circuit rating of 63 kA.

**Table 3: Cost estimates<sup>4</sup> for Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition**

Scope	TSP(s)	Cost
Bearkat - North McCamey 345-kV Double Circuit (71 miles which includes 20% routing adder)	LCRA TSC (50%) WETT (50%)	\$194.5 M LCRA TSC: \$95.1M WETT: \$99.4M
North McCamey - Sand Lake 345-kV Double Circuit (94 miles which includes 20% routing adder)	LCRA TSC (50%) Oncor (50%)	\$251.9 M LCRA TSC: \$126.0M Oncor: \$126.0M
North McCamey terminal equipment (4 Circuits)	LCRA TSC	\$15.5 M
Bearkat terminal equipment (2 Circuits)	WETT	\$10.1 M
Sand Lake terminal equipment (2 Circuits)	Oncor	\$5.5 M

## Alternatives Evaluated

This project is proposing to implement a portion of the roadmap for transmission improvements in the ERCOT Delaware Basin Load Integration study, which evaluated several (>10) alternatives informed by TSP input and shortlisted a set of four options leading to the staged roadmap of improvements. As a result, no other alternatives are being considered as this evaluation was robustly conducted as part of the ERCOT study.

## Recommendation

In concurrence with the ERCOT Delaware Basin Load Integration Study, ERCOT 2021 RTP, and ERCOT Permian Basin Load Integration Study, LCRA TSC, WETT and Oncor recommend adding the Bearkat – North McCamey 345-kV double-circuit transmission line and North McCamey – Sand Lake 345-kV double-circuit transmission line with a minimum rating of 2,564 MVA for each circuit by no later than June 2026.

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<sup>4</sup> Latest available estimate prior to final issued design, and subject to revision as additional factors may be identified.