ERCOT Independent Review of the WETT Bearkat Area Transmission Improvements Project

Version 1.0

Document Revisions

Date	Version	Description	Author(s)
09/19/2018	1.0	Final	Priya Ramasubbu, Ehsan Ur Rehman, Aditi Upadhyay
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1. Executive Summary

On August 15, 2017, Wind Energy Transmission Texas, LLC (WETT) submitted the Bearkat Area Transmission Improvements Project to the Regional Planning Group (RPG) as an economic-driven project to address the transmission congestion resulting in restriction on the wind generation in the Bearkat area under the contingency loss of the Bearkat – Sand Bluff 345-kV line. When ERCOT began the independent review of this project in October, 2017, there were 404 MW of wind generation in operation and 454 MW of wind generation had met the Planning Guide Section 6.9 conditions for inclusion in the planning models in the Bearkat area. During the ERCOT independent review of this project, three significant system changes occurred in 2018. The following three changes were also considered in the study:

- The Lubbock integration into ERCOT was approved by the PUCT in March, 2018[1];
- Additional 510 MW wind generation met the Planning Guide Section 6.9 conditions for inclusion in the planning models in the Bearkat area in May, 2018; and
- The Far West Transmission Project 2 was endorsed by ERCOT Board in June, 2018.

In the independent review, ERCOT identified transmission congestion on the 138-kV system in the Einstein area, and a total of nine transmission upgrade options were evaluated. All nine options passed the ERCOT economic planning criteria, and ERCOT concluded that the upgrades identified in Option 3 would provide the best long-term net societal benefit under various scenarios while improving the transfer capability of the generation in the Bearkat area. Option 3 is estimated to cost $53.26 million and is described as follows:

- Add a new bay at the 345-kV Longshore station;
- Add a new bay at the 345-kV Bearkat station; and
- Add a new approximately 27-mile 345-kV single circuit line (double circuit capable) from Bearkat station to Longshore station.

According to the RPG submittal, the project is expected to be in-service by the end of 2021.

In accordance with the ERCOT Nodal Protocols Section 3.11.4.8, ERCOT designates both WETT and Oncor as co-providers of the recommended transmission addition.

[1] http://interchange.puc.texas.gov/Documents/47576_369_972779.PDF

2. Introduction

On August 15, 2017, based on the findings of the Full Interconnection Study reports of Bearkat area wind generation projects, Wind Energy Transmission Texas, LLC (WETT) submitted the Bearkat Area Transmission Improvements Project to the Regional Planning Group (RPG) to address thermal and dynamic stability constraints under the contingency loss of the Bearkat – Sand Bluff 345-kV line. The MW outputs from the existing and planned wind generation in the Bearkat area will need to be limited in anticipation of the Bearkat – Sand Bluff 345-kV line contingency in order to relieve thermal constraints on the 138-kV lines in the Einstein area. ERCOT's analysis found the thermal constraints to be more restrictive than the dynamic constraints.

Based on Planning Guide Section 3.1.3.1, the project proposed by WETT is an economic-driven project. It was classified as a Tier 1 project pursuant to Protocol Section 3.11.4.7 at the time of the RPG submittal, with an estimated cost of $69.9 Million and requiring new right of way (ROW). WETT's proposal included the following transmission additions:

- Tap 345-kV Grelton – Odessa line and add a new 345-kV Crespin station, 18 miles from Grelton;
- Add a new approximately 31-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the 345-kV Crespin station; and
- Add a new bay at the 345-kV Bearkat station to accommodate the new Bearkat to Crespin line.

ERCOT conducted an independent review of the project to identify transmission upgrades necessary to relieve the transmission congestion while meeting the ERCOT economic planning criteria. Figure 2.1 shows a map of the study area.

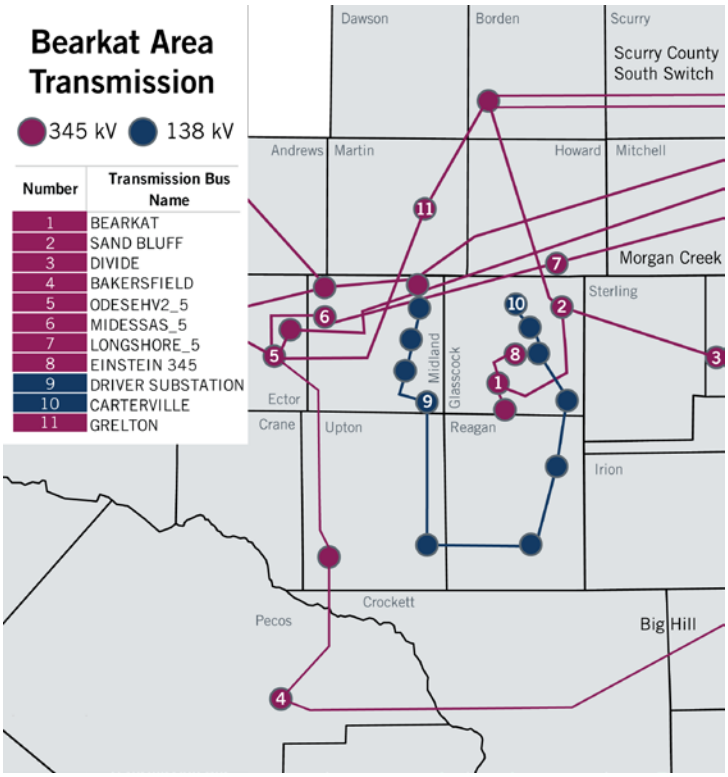

Figure 2.1: Bearkat Area Map

After ERCOT started the independent review of this project in October, 2017, three significant system changes occurred in 2018, including new generation addition in the Bearkat area and two major transmission projects that could present a material impact to the proposed project:

- Two Kontiki wind generation projects, with total of 510 MW of capacity, met ERCOT Planning Guide Section 6.9 conditions for inclusion in the planning models in May, 2018. Table 2.1 lists the existing and planned wind generation projects interconnection at the Bearkat 345-kV station;
- The PUCT approved the integration of Lubbock into ERCOT in March, 2018; and
- The Far West Transmission Project 2 was endorsed by ERCOT Board in June, 2018.

These changes were incorporated into the study as detailed in the subsequent sections.

Table 2.1 Wind Generation Interconnecting at the 345-kV Bearkat Substation

Wind Generation Project Name	Wind Generation Capacity (MW)	Commercial Operation Date
Rattlesnake Den Wind Phase 1 G1	104	In-service
Rattlesnake Den Wind Phase 1 G2	103	In-service
Niels Bohr (Bearkat Wind A)	197	In-service
Harald (Bearkat Wind B)	162	08/2019
Edmondson Ranch Wind	292	09/2019
Kontiki Wind A	255	09/2019
Kontiki Wind B	255	09/2020
TOTAL	**1,368**	

3. Criteria, Study Assumptions and Methodology

3.1. Study Criteria

Pursuant to Protocol Section 3.11.2(5), for a transmission project to pass the ERCOT economic planning criteria the expected annual production cost (PC) savings of the project must be equal to or exceed the first year annual revenue requirement for the project. Based on the most recent review of financial assumptions, the first year annual revenue requirement for a project is assumed to be 15% of the project's estimated capital cost[2].

3.2. Study Assumptions

3.2.1. Study Base Cases

The 2023 economic study case from the 2017 Regional Transmission Plan (RTP) was used as the base case for economic analysis. The 2023 case was selected since it represented the available production cost model year closest to the proposed in-service date of the project.

ERCOT performed a dynamic stability analysis using the 2017 DWG 2022 High Wind Low Load (HWLL) flat start case with the ERCOT Board-endorsed Far West Transmission Project 2 included in the case.

ERCOT performed a transfer capability analysis using the 2017 RTP 2023 SUM West/Far West case with the ERCOT Board-endorsed Far West Transmission Project 2 included in the case.

3.2.2. Base Case Modifications

The following modifications were made to the economic study case to perform this independent review.

Transmission:

- The ERCOT Board-endorsed CenterPoint Freeport transmission project was added to the economic study case.
- The ERCOT Board-endorsed Oncor Far West Transmission Project 2 was added to the economic study case.
- The Lubbock Integration project was not modeled in the initial economic study case, but was added in an updated economic study case with updated Panhandle export constraint as discussed in Section 5.5.

Generation:

- Generation units that recently met ERCOT Planning Guide Section 6.9 conditions for inclusion in the Planning models as of May 31, 2018 (shown in Table 3.1) were added to the economic study case.

[2] Additional information available at https://mis.ercot.com/pps/tibco/mis/Pages/Grid+Information/Long+Term+Planning

Table 3.1 New Generators that met PG Section 6.9 conditions as of May, 2018

Project Name	Generation Capacity (MW)	Commercial Operation Date
Rattlesnake Den Wind Phase 1 G1	104	In-service
Rattlesnake Den Wind Phase 1 G2	103	In-service
Niels Bohr (Bearkat Wind A)	197	In-service
Harald (Bearkat Wind B)	162	8/1/2019
Edmondson Ranch Wind	292	9/1/2019
Tahoka Wind	505	10/1/2018
FEGC	129	6/1/2018
Cabezon Wind	238	4/1/2019
Wildrose Wind (Swisher)	212	10/30/2019
Loma Pinta Wind	200	12/31/2018
Waymark Solar	182	12/15/2018
Cactus Flats Wind	148	06/15/2018
Emerald Grove Solar	108	5/1/2019
Mirage	11	10/1/2018
Brazoria Energy Center	96	10/4/2018
Freeport LNG (LEVEE)	87	6/1/2019
Lamesa Solar B (Phase II)	50	12/1/2018
Kontiki Wind A	255	9/1/2019
Kontiki Wind B	255	9/1/2020

- Unit retirement and mothball information was updated based on information as of January 1, 2018 as shown in Table 3.2.

Table 3.2 New Generator Retirements as of January, 2018

Project Name	Generation Capacity (MW)	Mothball/ Retirement Date
Barney M Davis Unit 1	335	12/31/2017
Big Brown Unit 1	606	2/12/2018
Big Brown Unit 2	602	2/12/2018
Monticello Unit 1	580	1/04/2018
Monticello Unit 2	580	1/04/2018
Monticello Unit 3	790	1/04/2018
Sandow Unit 4	600	1/11/2018
Sandow Unit 5	600	1/11/2018
Spencer Unit 4	61	1/03/2018
Spencer Unit 5	61	1/03/2018

Load:

- Loads expected for 2023 associated with the Far West Transmission Project 2 were added to the economic study case.

Natural Gas Price:

- The natural gas price forecast was updated using the Energy Information Administration (EIA) High Oil and Gas (HOG) production case from the 2018 EIA Annual Energy Outlook (AEO), modeled in nominal dollars. Table 3.3 shows the natural gas price used for study year 2023.

Table 3.3 Monthly Natural Gas Price Forecast for Year 2023 (HOG)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2023	3.44	3.41	3.37	3.21	3.22	3.23	3.24	3.27	3.27	3.29	3.38	3.51

- ERCOT also considered higher and lower natural gas price sensitivities, as shown in Tables 3.4 and 3.5, to evaluate the long-term economic benefits of each option. The high natural gas price forecast was estimated using the 2018 Reference production case from the 2018 EIA AEO. The low natural gas price forecast was estimated by decreasing the gas price forecast in Table 3.3 by 10%.

Table 3.4 Low Monthly Natural Gas Price Forecast for Year 2023

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2023	3.09	3.06	3.03	2.88	2.89	2.90	2.91	2.94	2.94	2.96	3.04	3.15

Table 3.5 High Monthly Natural Gas Price Forecast for Year 2023

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2023	4.58	4.54	4.48	4.27	4.28	4.29	4.32	4.35	4.35	4.38	4.49	4.66

3.3. Study Methodology

The economic analysis was completed using a 2009 base weather year condition to obtain the annual congestion in the economic study case. ERCOT identified and evaluated options to relieve the congestion in the Bearkat area. Each option that met the economic criteria was evaluated further through sensitivity analyses with different gas price assumptions to study the long-term economic benefits of each option. In addition, ERCOT performed a power transfer analysis for each option to understand the long-term performance of each option in terms of potential power transfer limitations out of the Bearkat area.

3.4. Tools

UPLAN version 10.2.0.7, an hourly production-cost model that simulates security-constrained unit commitment and economic dispatch, was used to perform the economic analysis.

TARA version 880e was used to perform the transfer capability analysis.

PTI PSS/E version 33 was used to perform the dynamic stability analysis.

4. Project Need and Options

4.1. Project Need

Annual production-cost simulations were run on the economic study case. No stability interface limit for Bearkat was applied to any of the simulations as ERCOT confirmed that the thermal limit was more limiting than the stability limit. The generation out of the Bearkat area was dispatched by UPLAN based on the thermal limits of the 138-kV and 345-kV lines in the region. Table 4.1 shows the congested element identified in the area in the economic study case. With total of 1,368 MW of wind generation in the Bearkat area, congestion in the neighboring Einstein 138-kV area under the contingency loss of the Bearkat – Sand Bluff 345-kV line was identified. This resulted in the line congestion for approximately 50.8% of hours in 2023, causing the wind generators in the Bearkat area to be curtailed.

Table 4.1 Bearkat Area Congested Elements in the Economic Study Case

Congested Element	kV Level	Capacity (MW)	Percentage of Congestion (%)	Contingency
Carterville – Eisltap	138	271	50.8	Bearkat – Sand Bluff 345-kV line

4.2. Initial Options

A total of nine initial options were identified and evaluated in this study as described below along with their initial capital cost estimates. The geographic estimated locations of these nine options are available in the appendix. ERCOT did not consider the upgrade of the 138-kV system in the Einstein area to be a viable option due to the amount of transmission lines and transformers that would need to be upgraded and the fact that the stability limits would constrain the generation in the area.

- **Option 1**
  - Add a new 345-kV Coulomb station
  - Add a new bay at the 138-kV Driver station
  - Add a new 345/138-kV transformer (750 MVA) at Coulomb station
  - Add a new bay at the 345-kV Bearkat station
  - Add a new approximately 18-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the 345-kV Coulomb station

  The total cost estimate for Option 1 is approximately $54.95 Million.

- **Option 2**
  - Tap the 345-kV Longshore – Midessa line and add a new 345-kV Crespin station, approximately 24 miles from Longshore
  - Add a new bay at the 345-kV Bearkat station
  - Add a new approximately 23-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the new Crespin station

  The total cost estimate for Option 2 is approximately $55.61 Million.

- **Option 3**

  - Add a new bay at 345-kV Longshore station
  - Add a new bay at the 345-kV Bearkat station
  - Add a new approximately 27-mile 345-kV single circuit line (double circuit capable) from Bearkat station to Longshore station

  The total cost estimate for Option 3 is approximately $58.06 Million.

- **Option 4**

  - Tap the 345-kV Grelton – Odessa line and add a new 345-kV Crespin station, approximately 18 miles from Grelton
  - Add a new approximately 31-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the new Crespin station
  - Add a new bay at the 345-kV Bearkat station to accommodate the new Bearkat to Crespin line

  The total cost estimate for Option 4 is approximately $69.87 Million.

- **Option 5**

  - Add a new bay at the 345-kV Grelton station
  - Add a new approximately 39-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the Grelton station
  - Add a new bay at the 345-kV Bearkat station

  The total cost estimate for Option 5 is approximately $80.54 Million.

- **Option 6**

  - Add a new 345-kV Coulomb station adjacent to the 138-kV Driver station
  - Add a new bay at the 138-kV Driver station
  - Add a new 345/138-kV transformer (750 MVA) at Coulomb station
  - Add a new approximately 18-mile 345-kV single circuit line (double circuit capable) from the Bearkat station to the new Coulomb station
  - Tap the 345-kV Grelton – Odessa EHV line and add a new 345-kV Crespin station, approximately 20 miles from the Odessa EHV station
  - Add a new bay at the 345-kV Bearkat station
  - Add a new approximately 16-mile 345-kV single circuit line (double circuit capable) from the new Coulomb station to the new Crespin station

  The total cost estimate for Option 6 is approximately $93.47 Million.

- **Option 7**
  - Add a new bay at the 345-kV Divide station
  - Add a new bay at the 345-kV Bearkat station
  - Add a new approximately 51-mile 345-kV single circuit line (double circuit capable) from Bearkat station to Divide station

  The total cost estimate for Option 7 is approximately $102.15 Million.

- **Option 8**
  - Add a new bay at the 345-kV Odessa EHV station
  - Add a new approximately 54-mile 345-kV single circuit line (double circuit capable) from Bearkat station to Odessa EHV station
  - Add a new bay at the 345-kV Bearkat station

  The total cost estimate for Option 8 is approximately $106.50 Million.

- **Option 9**
  - Add a new approximately 90-mile 345-kV single circuit (double circuit capable) from Bearkat station to Bakersfield station
  - Add a new bay at the 345-kV Bearkat station
  - Add a new bay at the 345-kV Bakersfield station

  The total cost estimate for Option 9 is approximately $162.00 Million.

5. Option Evaluations

5.1. Initial Option Evaluations

An initial economic analysis was performed to test the effectiveness of the project options. The study results showed that all nine options met the ERCOT economic criteria since all of the options resulted in annual production cost savings greater than 15% of their estimated capital cost. The results also indicated that all options alleviated the congestion without causing any further congestion in the area. Table 5.1 shows the results of the economic analysis performed for each option.

Table 5.1 Economic Analysis Results

Option	Capital Cost ($M)[1]	Annual Production Cost Savings ($M)[2]	Annual Production Cost Savings to Capital Cost Ratio (%)
Option 1	54.95	25.58	47 %
Option 2	55.61	31.75	57 %
Option 3	58.06	33.86	58 %
Option 4	69.87	35.15	50 %
Option 5	80.54	35.57	44 %
Option 6	93.47	36.78	39 %
Option 7	102.15	33.46	33 %
Option 8	106.50	35.93	34 %
Option 9	162.00	34.56	21 %

Note:

(1). Based on initial capital cost estimate provided by WETT except Option 9 which was estimated by ERCOT.

(2). Initial economic analysis did not include the Lubbock Integration project.

5.2. Net Present Value Analysis to Estimate Net Societal Benefits

Since all nine options met the ERCOT economic criteria, ERCOT conducted a Net Present Value (NPV) analysis to estimate and compare net societal benefits realized by each option for a time period of 15 and 30 years. In this NPV analysis, ERCOT assessed the 30-year period as being consistent with the depreciated life span of a project while also considered the 15-year period to accommodate the level of uncertainties that may exist in the results of the 30-year period.

For the NPV analysis, additional economic analysis was performed for the different gas price assumptions described in Section 3.2.2, and the results are summarized in Table 5.2. The annual production cost savings in Table 5.2 were escalated using an annual 2.5% of inflation rate, and then discounted these savings back using an 8% discount rate to calculate the present values in 2022 dollars. The project capital costs (in 2022 dollars) of each option were subtracted from the discounted savings in order to estimate the net societal benefits of each option associated with the 15-year and 30-year periods.

The results of the NPV analysis are summarized in Table 5.3. Option 3 and Option 4 are expected to provide the best net societal benefits among all options tested.

Table 5.2 NG Price Sensitivity Economic Analysis Results

Option	Capital Cost ($M)[1]	Annual Production Cost Savings ($M)[2]		
		HOG ($3.32)	Low NG Price ($2.99)	High NG Price ($4.42)
Option 1	54.95	25.58	22.46	36.05
Option 2	55.61	31.75	25.77	40.75
Option 3	58.06	33.86	26.84	44.86
Option 4	69.87	35.15	27.56	52.00
Option 5	80.54	35.57	27.88	49.31
Option 6	93.47	36.78	29.47	52.12
Option 7	102.15	33.46	26.95	48.60
Option 8	106.50	35.93	29.97	51.80
Option 9	162.00	34.56	31.00	51.98

Note:
(1) Based on initial capital cost estimate provided by WETT except Option 9 that was estimated by ERCOT.
(2) Initial economic analysis did not include Lubbock Integration project.

Table 5.3 Net Present Value Analysis Results

Option	Capital Cost ($M)[1]	Net Societal Benefit[3] (HOG = $3.32)[2]		Net Societal Benefit (Low NG Price = $2.99) [2]		Net Societal Benefit (High NG Price = $4.42) [2]	
		15-Year Net Savings ($M)	30-Year Net Savings ($M)	15-Year Net Savings ($M)	30-Year Net Savings ($M)	15-Year Net Savings ($M)	30-Year Net Savings ($M)
Option 1	54.95	190.6	306.0	159.7	261.1	294.0	456.7
Option 2	55.61	250.8	394.0	191.7	308.0	339.7	523.5
Option 3	58.06	268.9	421.6	199.5	320.6	377.6	579.9
Option 4	69.87	268.3	426.8	193.3	317.6	434.7	669.3
Option 5	80.54	260.3	420.8	184.3	310.1	396.1	618.5
Option 6	93.47	257.7	423.6	185.4	318.4	409.2	644.3
Option 7	102.15	215.0	366.0	150.7	272.3	364.6	583.9
Option 8	106.50	234.5	396.6	175.6	310.8	391.3	625.0
Option 9	162.00	158.2	314.1	123.0	262.9	330.3	564.8

Note:
(1) Based on initial capital cost estimate provided by WETT except Option 9 that was estimated by ERCOT.
(2) Initial economic analysis did not include Lubbock Integration project.
(3) The project cost of each option was considered to be the capital cost of the project for purposes of this analysis.

5.3. Transfer Capability Analysis

ERCOT also conducted a transfer capability analysis for the generation in the Bearkat area to estimate the maximum power transfer limit that can be achieved by each option. The 2017 RTP 2023 SUM West/Far West case with the ERCOT Board-endorsed Far West Transmission Project 2 was used for

transfer capability analysis. ERCOT assumed that all wind generation at the Bearkat 345-kV substation was the source, and the rest of the ERCOT system was considered the sink. The 2023 WFW reliability study case from the 2017 RTP was used to calculate the transfer limits. The achievable transfer limit for each of the options is summarized in Table 5.4.

Table 5.4 Transfer Analysis Results

Option	Capital Cost ($M)	Bearkat Area Generation Limit (MW)
Option 1	54.95	1015
Option 2	55.61	1619
Option 3	58.06	1618
Option 4	69.87	1528
Option 5	80.54	1359
Option 6	93.47	1659
Option 7	102.15	1594
Option 8	106.50	1402
Option 9	162.00	1388

5.4. McCamey Area Stability Analysis for Option 9

Option 9 was initially considered a project that may not only help the Bearkat area but also be beneficial to the existing Generic Transmission Constraints (GTC) in the McCamey area. ERCOT performed a dynamic stability analysis using the 2017 DWG 2022 HWLL flat start case with the ERCOT Board-endorsed Far West Transmission Project 2. The stability study results indicated system response improvement, and no stability issues for the McCamey area with the inclusion of the Far West Transmission Project 2. Therefore, Option 9 was determined to provide no additional benefit to the McCamey GTC under the existing McCamey system conditions.

5.5. Short-Listed Options

Based on the results of the NPV analysis and the transfer capability analysis, ERCOT short-listed Options 2, 3, 4, and 6 for the following reasons:

- Both Option 3 and Option 4 provide the best overall net societal benefits while providing relatively high transfer limits
- Option 6 was selected as it also provides an overall net societal benefit better than other options and is estimated to provide the best transfer capability among all options
- Option 2 was selected because it is one of the least cost 345-kV options and provides a high transfer limit, while providing relatively good overall net societal benefits

The short-listed options were further analyzed with the LP&L Load Integration project added to the economic study case to create a LP&L economic study case. Based on the ERCOT independent review report of the Proposed Panhandle Transmission Upgrades[3], a Panhandle export constraint of 4067 MW (90% of the estimated Panhandle export limit) was used in the LP&L economic study cases by monitoring the following 345-kV transmission paths (interface):

[3] Available at http://www.ercot.com/content/wcm/key_documents_lists/79528/10._ERCOT_Independent_Review_Panhandle_Upgrades_V1FINAL.pdf

- Tesla – Jim Treece/Riley (double circuits)
- Tesla – Edith Clarke (double circuits)
- Cottonwood – Edith Clarke (double circuits)
- Cottonwood – Dermott (double circuits)
- Ogallala – Abernathy
- White River – Abernathy

Annual production cost savings from the LP&L economic study case and net societal benefits of the four short-listed options are summarized in Table 5.5. The estimated capital costs of the short-listed options were also further reviewed by the TSPs relevant to the options. Based on feedback from the TSPs, ERCOT updated the cost estimates, which are also shown in Table 5.5.

Table 5.5 Comparison of Short-Listed Options

Option	Capital Cost ($M)	Transfer Limit (MW)	Annual Production Cost Savings ($M) (HOG = $3.32)	Net Societal Benefit (HOG = $3.32)	
				15-Year Net Savings ($M)	30-Year Net Savings ($M)
Option 2	53.11	1,619	30.94	245.62	385.19
Option 3	53.26	1,618	31.70	252.97	395.97
Option 4	68.62	1,528	32.44	242.89	389.24
Option 6	103.32	1,659	33.04	209.56	358.61

The results indicate that Option 3 is the best option, providing the most net societal benefit compared to the other short-listed options.

5.6. Potential Reliability Issues at Driver 138-kV Station

During ERCOT's independent review of this project, potential load growth and reliability issues at the Driver 138-kV substation were identified by TSPs serving the area. ERCOT noted that a second 345/138-kV transformer would be required to be installed at Driver based on ERCOT's reliability performance criteria if Option 6 were used to solve the potential reliability issues in the area. This will not only result in significant increase in the capital cost of Option 6 but also cause challenges in modifying the existing Driver substation due to site, existing bus configuration, and control house constraints. Additionally, ERCOT's preliminary review of the system in the area indicated that there may be solution(s) less costly than a new 345/138-kV injection into the Driver substation as contemplated in Option 6. At the time of this report, ERCOT has not identified reliability issues based on the latest load forecast in this area. Therefore, ERCOT recommends that any future reliability issue associated with the Driver area load be handled through a separate RPG project.

6. Sensitivity Analysis

6.1. Generation Addition Sensitivity Analysis per Planning Guide Section 3.1.3(4)(a)

Reviewing the ERCOT Generation Interconnection Status (GIS) Report at the time of the study, ERCOT found no new generator interconnection projects with signed Interconnection Agreements (IA) that did not meet Planning Guide Section 6.9 conditions in the Bearkat area. Moreover, any new generation addition to the existing system in the Bearkat area will only aggravate the transmission congestion issues. Therefore, ERCOT determined that generation addition sensitivity analysis was not necessary.

6.2. Load Scale Impact Sensitivity Analysis per Planning Guide Section 3.1.3(4)(b)

ERCOT did not use load scaling to create the models used in this analysis. Therefore, no load scaling impact sensitivity analysis was conducted.

7. Subsynchronous Resonance (SSR) Vulnerability Assessment

Following Protocol Section 3.22.1.3(2), ERCOT performed a SSR vulnerability assessment using topology check, and the results indicated that Option 3 strengthens the transmission network and increases the number of transmission circuit outages required to have a Generation Resource become radial to series capacitors. The SSR assessment results showed no SSR vulnerability for any existing Generation Resources or Generation Resources satisfying Planning Guide Section 6.9 conditions for inclusion in the Planning models at the time of this study.

8. Conclusion and Recommendation

All studied options relieved the expected congestion for the planned amount of generation in the Bearkat area and met the ERCOT economic planning criteria. Option 3 displays the best performance of net societal benefit under various scenarios while improving the transfer limit of generation out of the Bearkat area. Additionally, Option 3 had one of the lowest capital cost estimates of the options studied. Based on these results, ERCOT recommends Option 3 as the preferred option. The following facilities constitute the preferred option:

- Add a new bay at the 345-kV Longshore station
- Add a new bay at the 345-kV Bearkat station
- Add a new approximately 27-mile 345-kV single circuit line (double circuit capable) from Bearkat station to Longshore station

The total cost estimate for Option 3 is approximately $53.26 Million.

9. Designated Provider of Transmission Facilities

In accordance with the ERCOT Nodal Protocols Section 3.11.4.8, ERCOT staff is to designate transmission providers for transmission additions reviewed through the RPG process. The default providers will be those that own the end points of the new transmission additions. These providers can agree to provide or delegate the new facilities or inform ERCOT if they do not elect to provide them. If different providers own the two ends of the recommended transmission addition, ERCOT will designate them as co-providers and they can decide between themselves what parts of the recommended transmission addition they will each provide.

Wind Energy Transmission Texas, LLC (WETT) owns the Bearkat 345-kV substation, and Oncor owns the Longshore 345-kV substation. Therefore, ERCOT designates both WETT and Oncor as co-providers of the Bearkat – Longshore 345-kV line.

10. Appendix A

10.1. Cost estimates	 Bearkat_Cost_Estimates.xlsx
10.2. Options Maps	 Bearkat_Options_Maps.pptx