



**ONCOR Nacogdoches Southeast Switch –  
Redland Switch-Lufkin Switch 345-kV Loop  
Project – ERCOT Independent Review**

**Ben Richardson**  
**System Development, Transmission Planning**

**Regional Planning Group**  
April 15, 2021

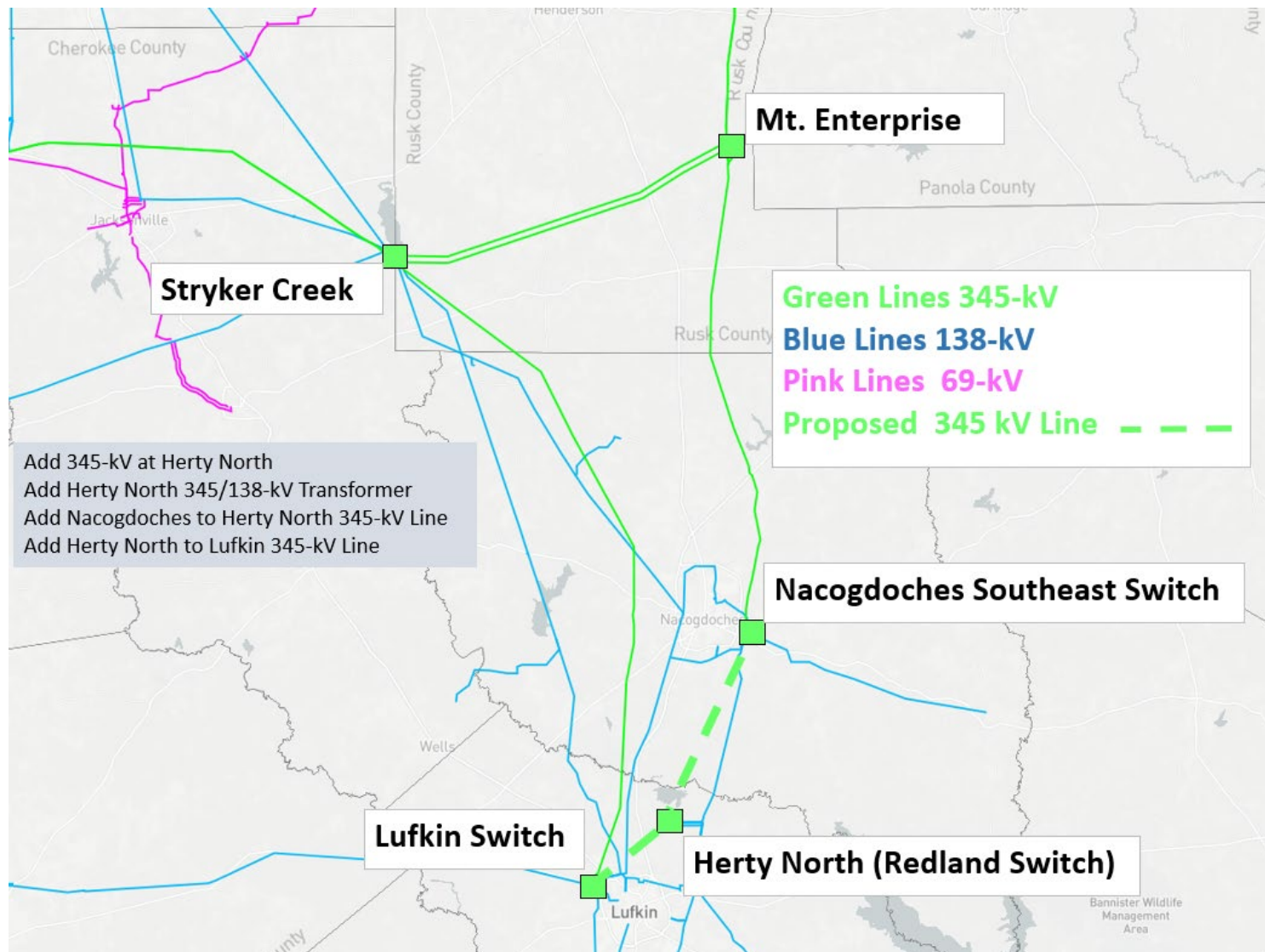
# Introduction

- Oncor submitted the Nacogdoches Southeast Switch – Redland Switch - Lufkin Switch 345-kV Loop Project for Regional Planning Group review in October 2020. This is a Tier 2 project that is estimated to cost \$71 million:
  - Proposed for Summer 2023, or sooner, in-service date
  - Addresses thermal violations, load growth, improves dynamic performance and operational flexibility
- ERCOT provided study scope and status updates for ONCOR Nacogdoches Southeast Switch – Redland Switch-Lufkin Switch 345-kV Loop Project at previous RPG meetings:
  - [https://www.ercot.com/files/docs/2020/12/10/ERCOT\\_EIR\\_Oncor\\_Nacogdoches\\_Lufkin\\_Scope.pdf](https://www.ercot.com/files/docs/2020/12/10/ERCOT_EIR_Oncor_Nacogdoches_Lufkin_Scope.pdf)
  - [https://www.ercot.com/files/docs/2021/08/16/ERCOT\\_EIR\\_Oncor\\_Nacogdoches\\_Lufkin\\_081721\\_Status.pdf](https://www.ercot.com/files/docs/2021/08/16/ERCOT_EIR_Oncor_Nacogdoches_Lufkin_081721_Status.pdf)
- ERCOT will present the results of ERCOT Independent Review and make a recommendation during this presentation

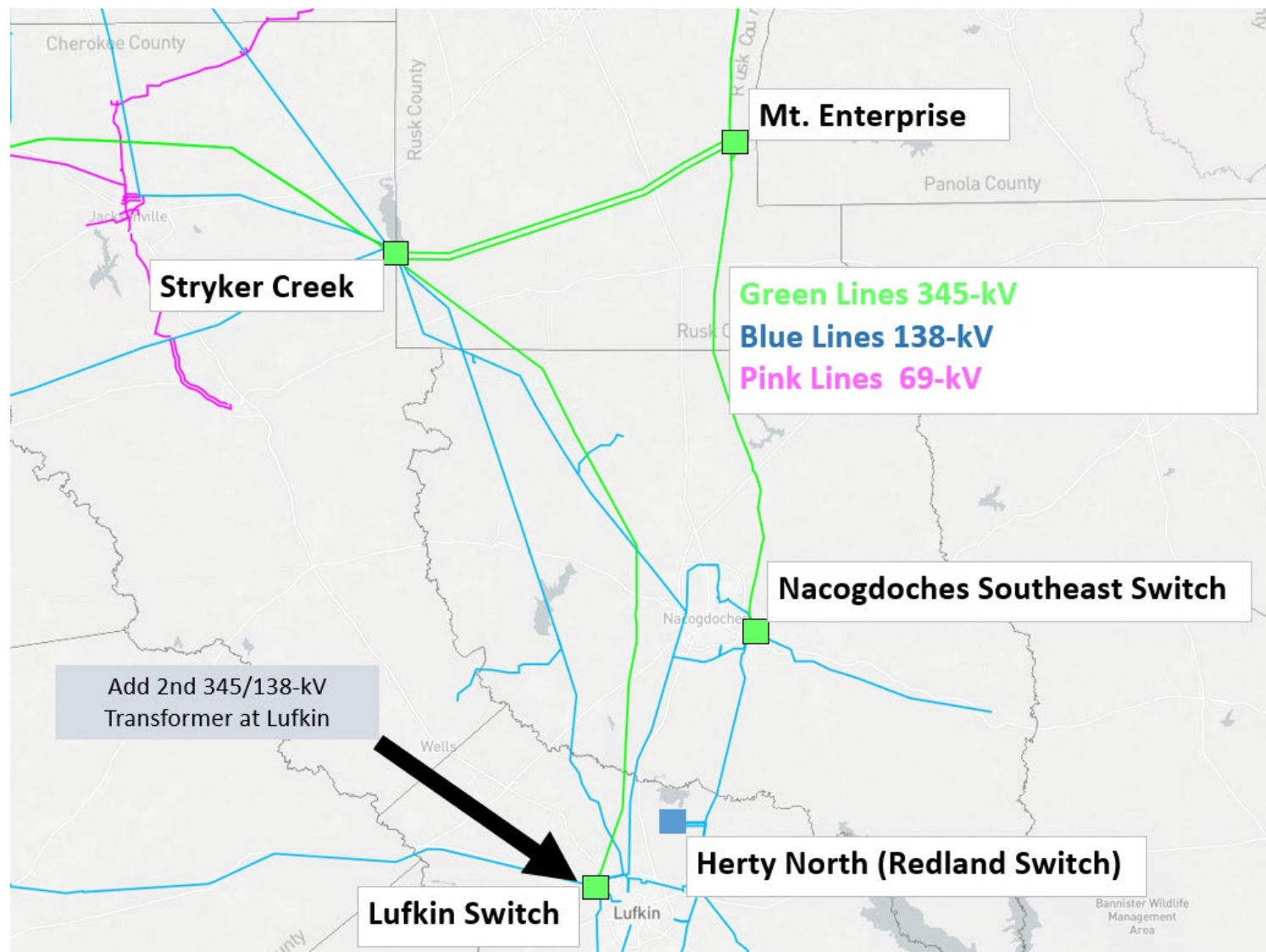
# Recap

- ERCOT presented the reliability issue (i.e., thermal overload on a 138 kV line under X-1+N-1) and introduced four options to address the reliability issues
- ERCOT worked with Oncor to obtain cost estimates and feasibility of each option
- PGRR095 (Minimum Deliverability Criteria) was approved by ERCOT BOARD on March 7, 2022

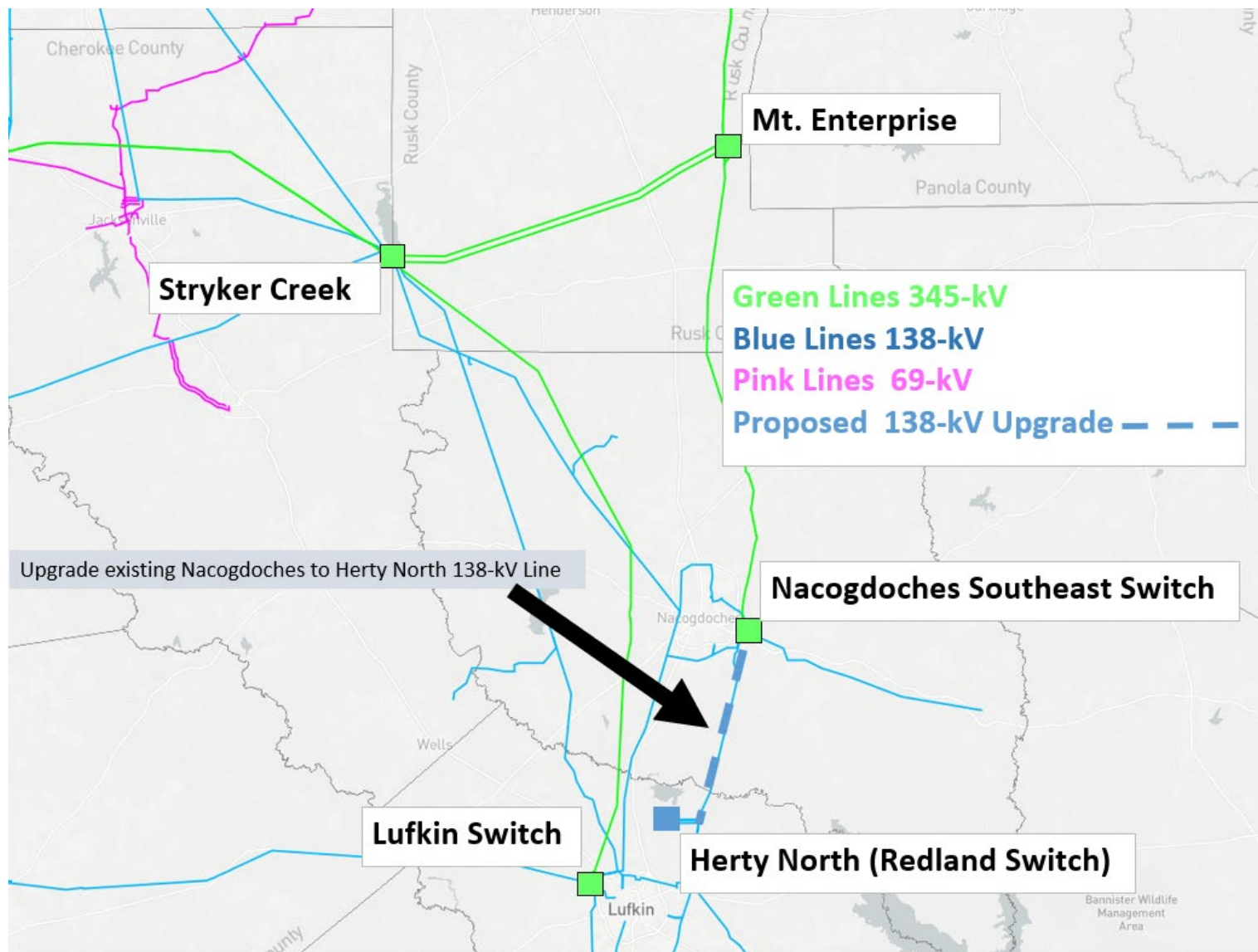
# Option 1



# Option 2

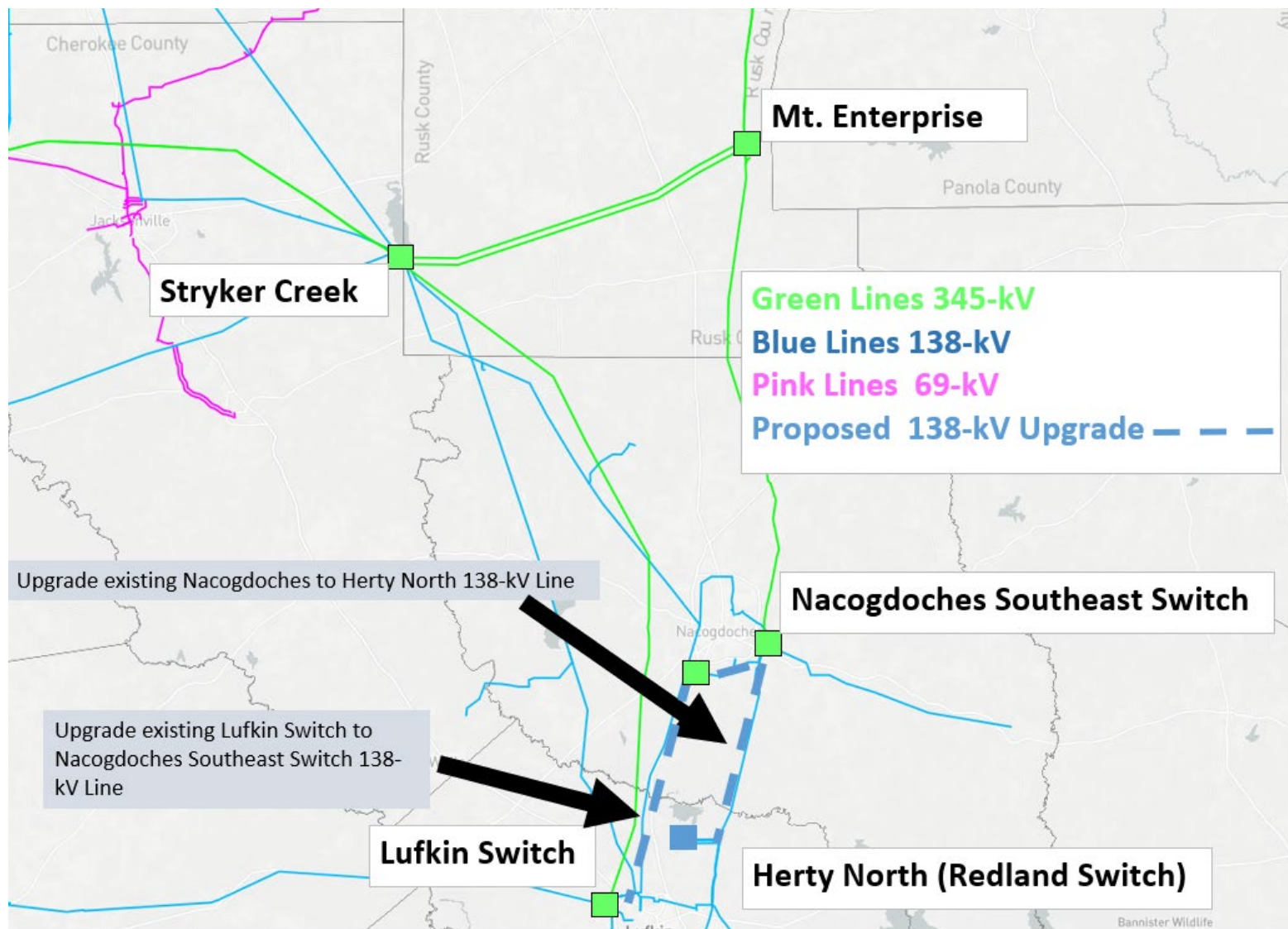


# Option 3





# Option 4



# Additional Analysis

- Minimum Deliverability Criteria (approved by ERCOT Board of Directors on March 7, 2022):
  - Generation at Martin Lake, Stryker Creek, Tenaska Gateway and Nacogdoches initially dispatched close at maximum capacities
- Maintenance Outage Assessment was performed based on the following assumptions:
  - Stryker Creek to Lufkin 345-kV line out of service + (N-1)
- Long-term Load Serving Capability:
  - 2021 RTP 2027 East/Coast Summer Peak case available at the time of the study was used



# Minimum Deliverability Comparison

Option	Met Reliability Criteria?	Minimum Deliverability Analysis*	
		Met Deliverability Criteria?	Overload When Dispatchable Units Locked at 100%
1	Yes	Yes	None
2	Yes	Yes	None
3	Yes	No	100% loading (16-mile line) under P6.2
4	Yes	Yes	None

\* The load in the East weather zone of the study case was adjusted to approximately 89.6 % of its summer peak load level based on the coincident factor assumed in the 2021 RTP Coincident Cases

Based on these results Option 3 was eliminated from short-listed Options

# Maintenance Outage Comparison

Maintenance outage analysis was performed for Options 1, 2 and 4 to compare the performance under maintenance outage conditions

Option	Voltage Violation	Thermal Violations
1	No	No
2	No	Yes*
4	No	No

Note:

\* Stryker Creek to Lufkin 345-kV line out of service + (N-1)

Based on these results Option 2 was eliminated from short-listed Options

# Short-listed Options

- Based on the review of the results ERCOT identified Option 1 and Option 4 as the short-listed options.
- ERCOT conducted additional analyses to evaluate the long-term load serving performance of the two short-listed options.

Option	Overload When Dispatchable Units Locked at 100%	Highest line loading in Nacogdoches Study Area When Dispatchable Units Locked at 100%
1	None	65%
4	None	88%

Note:

- 2021 RTP 2027 East/Coast Summer Peak case available at the time of the study was used for the load serving capability analysis
- Based on Minimum Deliverability Criteria with coincident peak load in East Weather Zone only

# Short-listed Options Comparison

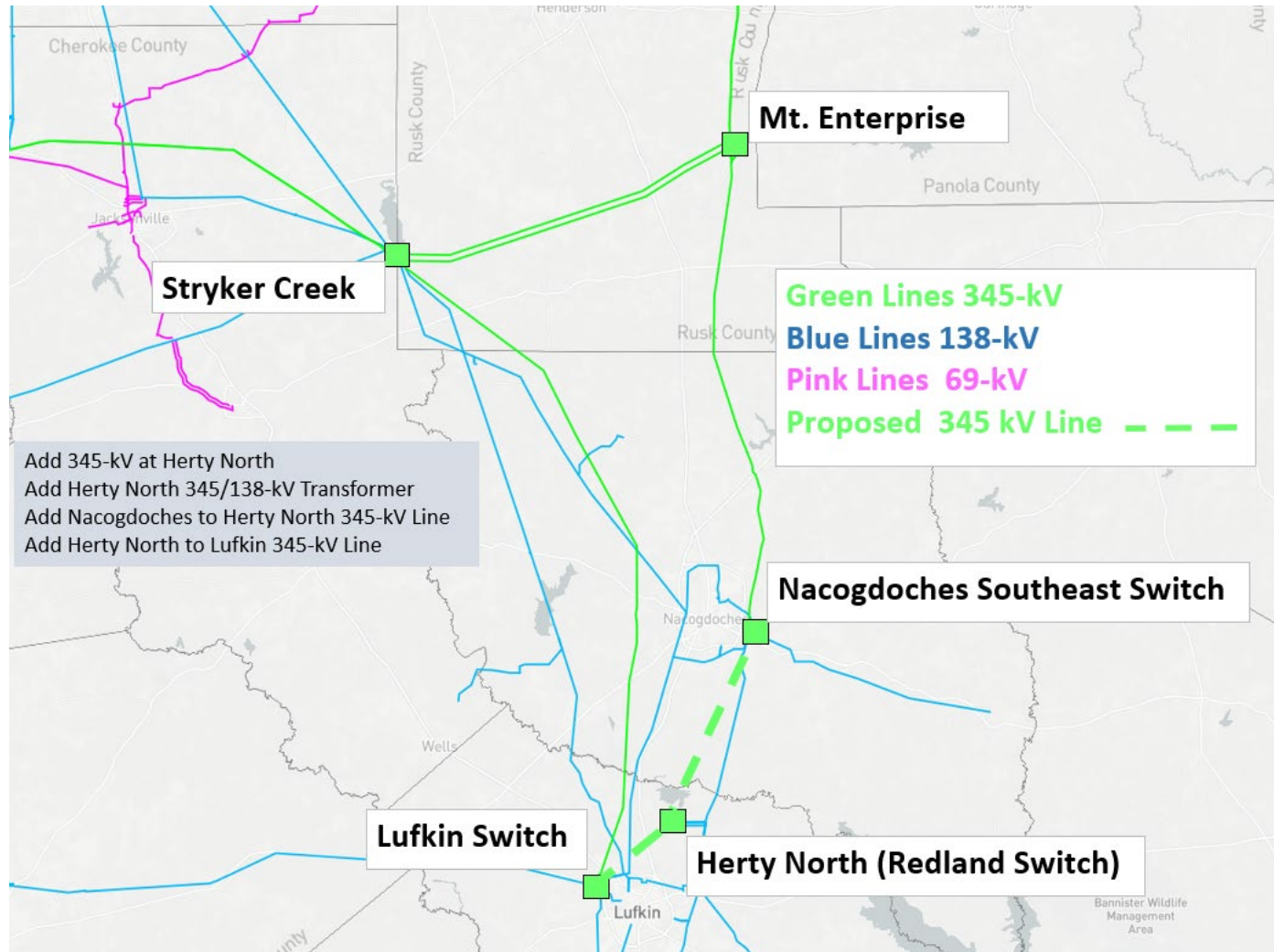
	Option 1	Option 4
Met ERCOT and NERC Reliability Criteria?	Yes	Yes
Long-term Load Serving Performance	Better	-
Improved Operational Flexibility	Better (by completing 345-kV loop)	-
Capital Cost Estimates	\$71.26 M	\$62.62 M

Although Option 1 is slightly more expensive than Option 4, Option 1 provides the following benefits over Option 4:

- Better long-term load serving margin by producing lower line loadings
- Better operational flexibility during the maintenance of the 345-kV equipment in the area since it provides two sources of 345-kV to Lufkin, Nacogdoches and Redland
- Better voltage support for the entire Southeast Area by creating a 345-kV loop and an additional power injection point at Redland
- Transformer redundancy by installing a new 345/138-kV transformer at the Redland
- Relatively shorter duration of construction outages

# Preferred Option

ERCOT prefers Option 1



# Additional Analysis

- Congestion Analysis:
  - Congestion analysis was performed for the preferred Option 1 using the 2021 RTP 2026 Starting Economic case
  - Option 1 did not result in any new congestions within the study area
- Sub-synchronous resonance (SSR) Assessment:
  - SSR assessment was performed for the preferred Option 1 per Nodal Protocol Section 3.22.1.3
  - No adverse SSR impacts were identified for Option 1



# ERCOT Recommendation

- ERCOT recommends Option 1 as the preferred option
  - Estimated Cost: \$71.26 Million
  - CCN will be required
- Option 1 consists of the following system improvements:
  - Build a new Redland 345-kV Switch with five 345-kV circuit breakers in a breaker-and-a-half arrangement with one 600 MVA 345/138-kV transformer and two new 138-kV circuit breakers.
  - Reconfigure Nacogdoches Southeast 345-kV Switch into a ring bus arrangement and install 2 new 345-kV circuit breakers.
  - Install a new Nacogdoches Southeast Switch to Redland Switch 345-kV line in the vacant position on the existing 13.4-mile double-circuit towers occupied by the existing Nacogdoches Southeast Switch to Redland Switch 138-kV line.
  - Reconfigure the Lufkin 345-kV Switch into a ring bus arrangement and install 2 new 345-kV circuit breakers.
  - Build a new Redland Switch - Lufkin Switch 345-kV line in a new (estimated 9.5-mile) right-of-way between Redland Switch and Lufkin Switch.

# Deliverables

- Timeline
  - EIR Report to be posted in the MIS – April 2022



Stakeholder Comments Also Welcomed to Sun Wook Kang:  
[skang@ercot.com](mailto:skang@ercot.com)