



**Oncor and LCRA TSC Hartring to Upland
138-kV Line and Benedum Autotransformer
Addition Project – ERCOT Independent
Review Study Status Update**

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RPG Meeting
April 29, 2025

Recap – Introduction

- Oncor and LCRA TSC submitted the Hartring to Upland 138-kV Line and Benedum Autotransformer Addition Project for Regional Planning Group (RPG) review in August 2024
 - This Tier 2 project is estimated at \$94.0 million
 - Filing of Certificate of Convenience and Necessity (CCN) will be required
 - Expected in-service date (ISD) date are
 - Oncor: Summer 2025
 - LCRA TSC: June 2026 (coincides to the completion of the 22RPG010 Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Project)
 - Addresses post-contingency thermal overloads and voltage violations due to significant oil and gas load growth
- ERCOT is currently conducting an ERCOT Independent Review (EIR) of this project
- Oncor and LCRA TSC presented a project overview and ERCOT presented the EIR scope at the October RPG meeting
 - <https://www.ercot.com/calendar/10162024-RPG-Meeting>
- ERCTO provided status update at the March RPG meeting
 - <https://www.ercot.com/calendar/03182025-RPG-Meeting>

Recap – Preliminary Results of Reliability Assessment – Need Analysis

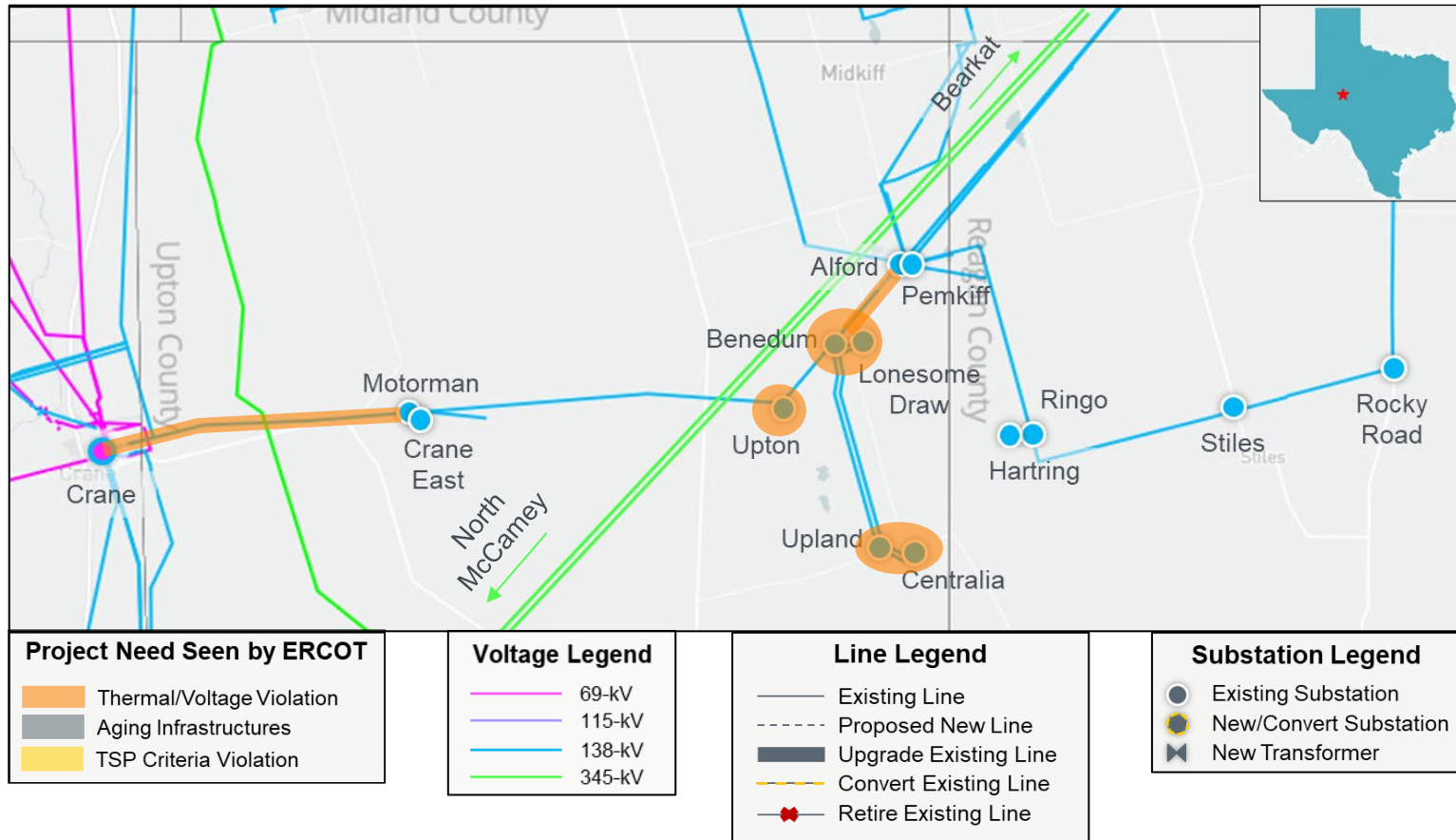
- ERCOT conducted steady-state load flow analysis for the study base case according to the NERC TPL-001-5.1 and ERCOT Planning Criteria to identify the project need

Contingency Category	Voltage Violations	Thermal Overloads	Unsolved Power Flow
N-0 (P0)	None	None	None
N-1 (P1, P2-1, P7)	10	2	None
G-1+N-1 (P3)*	None	None	None
X-1+N-1 (P6-2)**	None	None	None
Total	10	2	None

* G-1: Odessa Ector CC Train, and Permian Basin all five units

** X-1: Einstein and North McCamey 345/138-kV transformers

Recap – Map with Violations Seen by ERCOT



Recap – Preliminary Results of Reliability Assessment – Options Evaluation

- ERCOT conducted steady-state load flow analysis for the study base case according to the NERC TPL-001-5.1 and ERCOT Planning Criteria to evaluate and compare options

Option	N-1		G-1**+N-1		X-1**+N-1		Unsolved Powerflow
	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations	
1	None	None	None	None	None	None	None
2	None	None	None	None	2	None	None
3	None	None	None	None	None	None	None
4	None	None	None	None	None	None	None

* G-1: Odessa Ector CC Train, and Permian Basin all five units

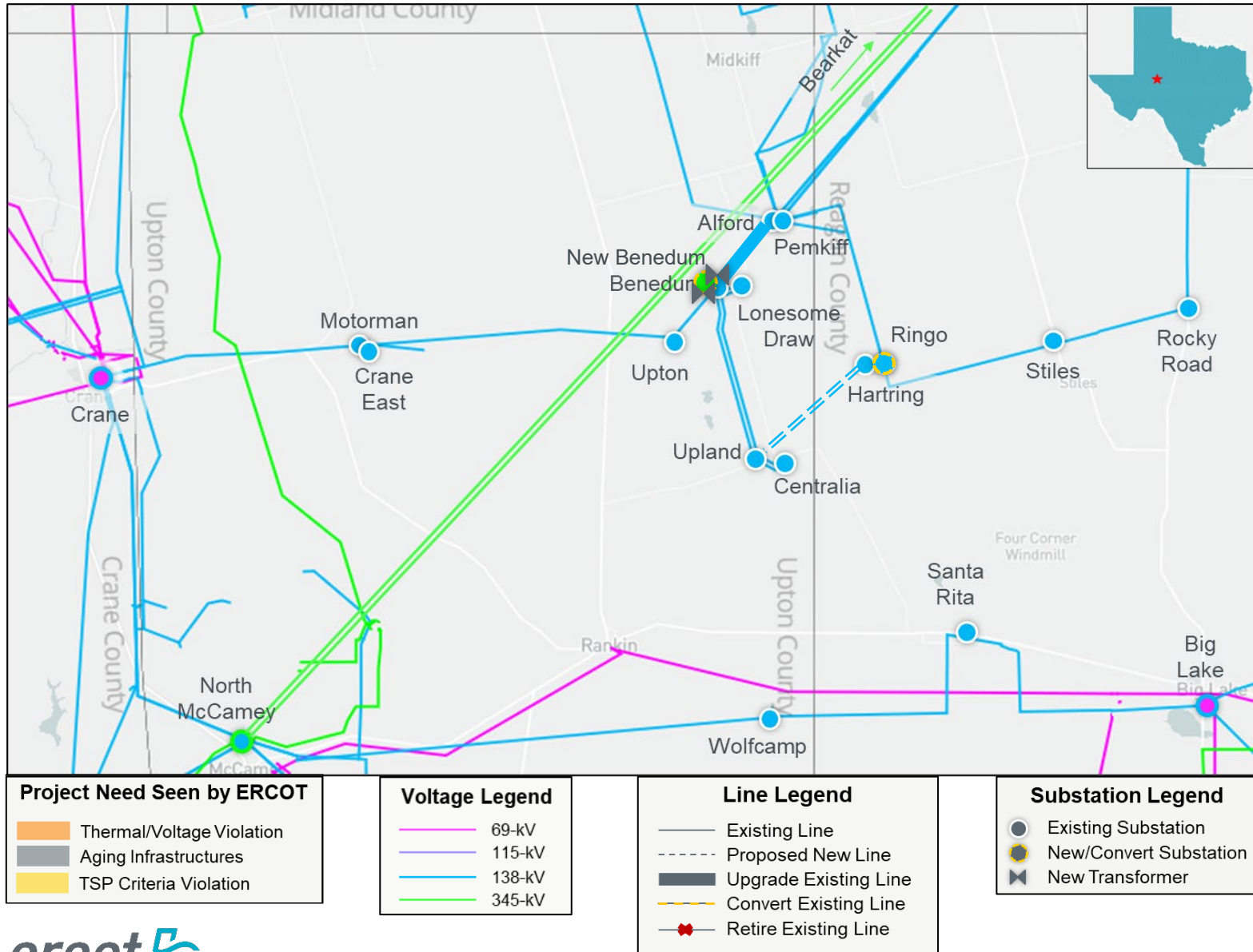
** X-1: Einstein and North McCamey 345/138-kV transformers

- Options 1, 3, and 4 were selected as short-listed option for further evaluation

Recap – Option 1 (TSP Proposed)

- Reconfigure the existing Ringo 138-kV substation to a 6-breaker ring bus configuration, reroute the existing Pemkiff to Ringo 138-kV transmission line and the existing Ringo to Stiles 138-kV transmission line to terminate into new breakers at the existing Ringo 138-kV substation;
- Construct a new Hartring to Upland 138-kV double-circuit transmission line on double-circuit capable structures with both circuit in place with normal and emergency ratings of at least 614 MVA, which requires a CCN and new ROW, approximately 9.0-mile;
 - Each of these circuits will have a terminal breaker end point at the existing Ringo and Benedum substations;
- Ensure all Oncor 138-kV terminal equipment associated with this project meet or exceeds ratings of 3200 A;
- Install a new 345-kV yard adjacent to the existing Benedum 138-kV substation in a breaker-and-a-half configuration;
 - Install two 345/138-kV transformers at Benedum with normal and emergency ratings of at least 800 MVA;
 - Cut-in one circuit of the planned Bearkat to North McCamey 345-kV double-circuit transmission line into the new Benedum 345-kV yard;
- Upgrade the existing Benedum to Alford 138-kV single-circuit transmission line on a double-circuit structures with one circuit in place with normal and emergency ratings of at least 942 MVA, 4.3-mile; and
 - Upgrade 138-kV terminal equipment at the existing Benedum 138-kV station with ratings of at least 4000 A;

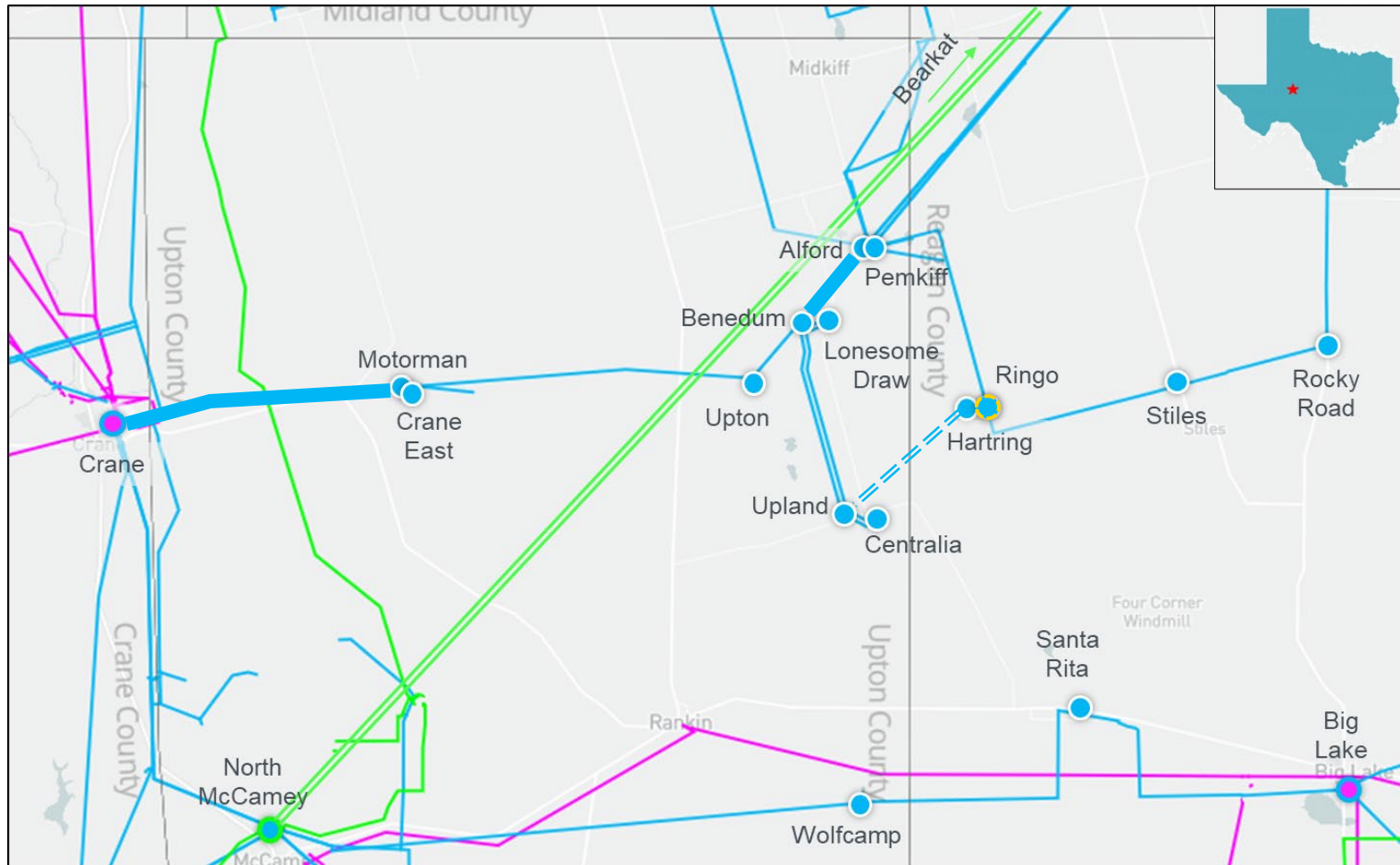
Recap – Option 1 (TSP Proposed Project)



Recap – Option 3

- Reconfigure the existing Ringo 138-kV substation to a 6-breaker ring bus configuration, reroute the existing Pemkiff to Ringo 138-kV transmission line and the existing Ringo to Stiles 138-kV transmission line to terminate into new breakers at the existing Ringo 138-kV substation;
- Construct a new Hartring to Upland 138-kV double-circuit transmission line on double-circuit capable structures with both circuit in place with normal and emergency ratings of at least 614 MVA, which will require a CCN and new right of way (ROW), approximately 9.0-mile;
 - Each of these circuits will have a terminal breaker end point at the existing Ringo and Benedum substations;
- Ensure all Oncor 138-kV terminal equipment associated with this project meet or exceeds ratings of 3200 A;
- Upgrade the existing Crane to Motorman 138-kV single-circuit transmission line with normal and emergency ratings of at least 942 MVA, 12.1-mile; and
- Upgrade the existing Benedum to Alford 138-kV single-circuit transmission line on a double-circuit structures with normal and emergency ratings of at least 942 MVA, 4.3-mile.

Recap – Option 3



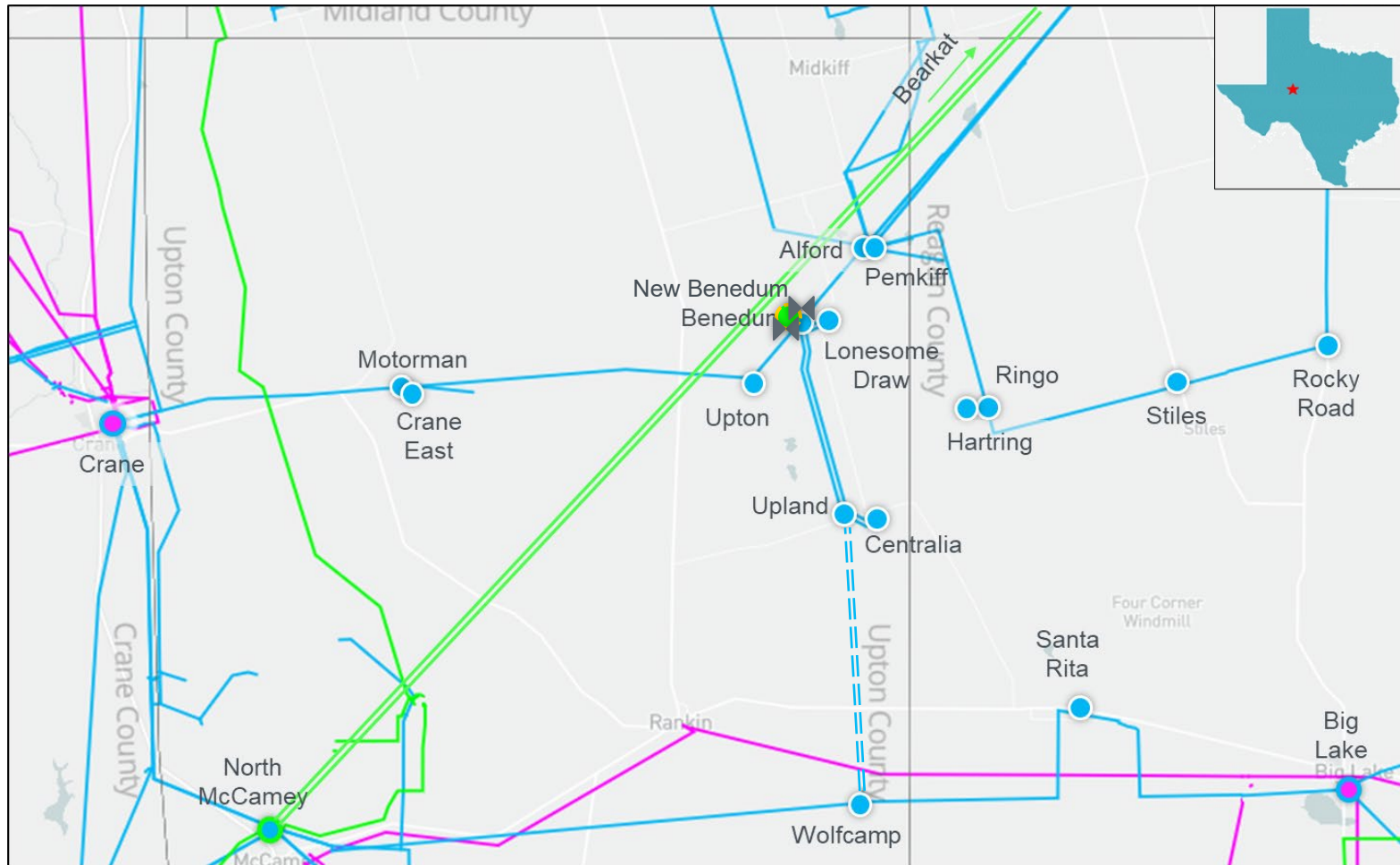
<p>Project Need Seen by ERCOT</p> <ul style="list-style-type: none"> Thermal/Voltage Violation Aging Infrastructures TSP Criteria Violation 	<p>Voltage Legend</p> <ul style="list-style-type: none"> 69-kV 115-kV 138-kV 345-kV 	<p>Line Legend</p> <ul style="list-style-type: none"> Existing Line Proposed New Line Upgrade Existing Line Convert Existing Line Retire Existing Line 	<p>Substation Legend</p> <ul style="list-style-type: none"> Existing Substation New/Convert Substation New Transformer
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Recap – Option 4

- Construct a new Upland to Wolfcamp 138-kV double-circuit transmission line on double-circuit capable structures with both circuit in place with normal and emergency ratings of at least 614 MVA, which will require new ROW, approximately 14.4-mile;
- Install a new 345-kV yard adjacent to the existing Benedum 138-kV substation in a breaker-and-a-half configuration;
 - Install two 345/138-kV transformers at Benedum with normal and emergency ratings of at least 800 MVA; and
 - Cut-in one circuit of the planned Bearkat to North McCamey 345-kV double-circuit transmission line into the new Benedum 345-kV yard.

Recap – Option 4



Project Need Seen by ERCOT	Voltage Legend	Line Legend	Substation Legend
<ul style="list-style-type: none"> Thermal/Voltage Violation Aging Infrastructures TSP Criteria Violation 	<ul style="list-style-type: none"> 69-kV 115-kV 138-kV 345-kV 	<ul style="list-style-type: none"> Existing Line Proposed New Line Upgrade Existing Line Convert Existing Line Retire Existing Line 	<ul style="list-style-type: none"> Existing Substation New/Convert Substation X New Transformer



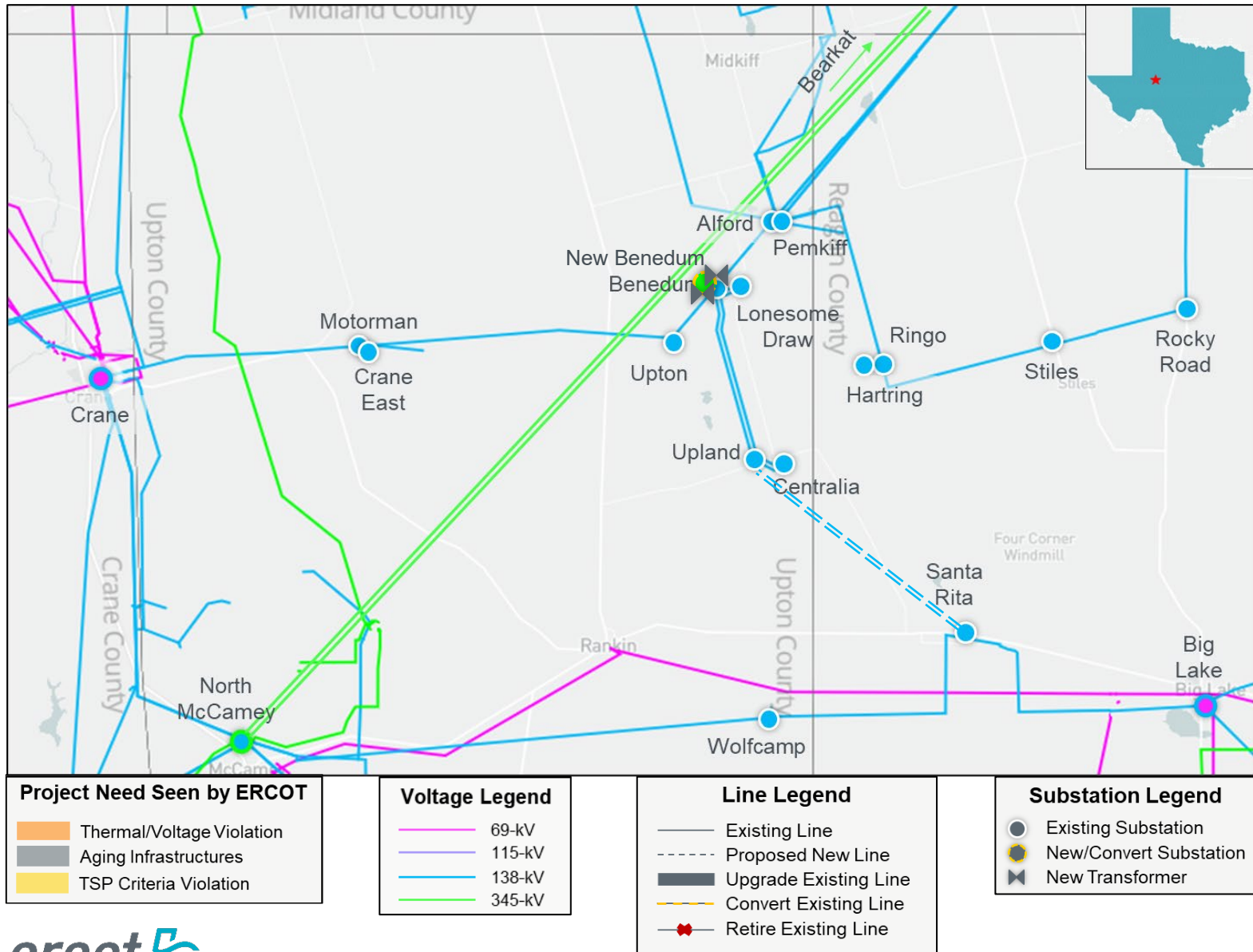
Status Update

- Options Evaluation
 - Option 5 (updated Option 4 based on feedback from TSP)
 - Long-Term Load-Serving Capability Assessment
 - Planned Maintenance Outage Evaluation
 - Cost Estimate and Feasibility Assessment from Transmission Service Providers (TSPs)
- ERCOT Preferred Option Selected
 - Congestion Analysis

Option 5

- Construct a new Upland to Santa Rita 138-kV double-circuit transmission line on double-circuit capable structures with both circuit in place with normal and emergency ratings of at least 614 MVA, which will require new ROW, approximately 15.3-mile;
- Install a new 345-kV yard adjacent to the existing Benedum 138-kV substation in a breaker-and-a-half configuration;
 - Install two 345/138-kV transformers at Benedum with normal and emergency ratings of at least 800 MVA; and
 - Cut-in one circuit of the planned Bearkat to North McCamey 345-kV double-circuit transmission line into the new Benedum 345-kV yard.

Option 5



Preliminary Results of Reliability Assessment – Options Evaluation

- ERCOT conducted steady-state load flow analysis for the study base case according to the NERC TPL-001-5.1 and ERCOT Planning Criteria to evaluate and compare the new Option 5 with the short-listed options

Option	N-1		G-1*+N-1		X-1**+N-1		Unsolved Powerflow
	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations	Thermal Violations	Voltage Violations	
1	None	None	None	None	None	None	None
3	None	None	None	None	None	None	None
4	None	None	None	None	None	None	None
5	None	None	None	None	1	None	None

* G-1: Odessa Ector CC Train, and Permian Basin all five units

** X-1: Einstein and North McCamey 345/138-kV transformers

Long-Term Load-Serving Capability Evaluation

- Assumptions
 - Adjusted load up in the study area, excluding Flexible Loads in the area
 - Adjusted conforming load down outside of Far West to balance power
 - Based on N-1 contingency
- Preliminary results show that Option 1 has the highest incremental long-serving capability into the study area

Option	Incremental Load-Serving Capability into study area (~MW)
1	1,056
3	665
4	265
5	466

Planned Maintenance Outage Evaluation

- ERCOT conducted planned maintenance outage analysis
 - Load level in the Far West weather zone was scaled down to 96% of the summer peak load in the study base case based on ERCOT load forecast, historical load, and ratio of residential/commercial load from TSP, in order to mimic the non-summer peak load condition
 - N-2 contingencies were tested as a proxy for N-1-1, and then tested the applicable violating contingencies with system adjustments
 - The transmission elements in the study area were monitored in the maintenance outage evaluation
- Planned maintenance outage analysis results

Option	Voltage Violations	Thermal Overloads	Unsolved Power Flow
1	None	None	None
3	12	None	None
4	7	3	None
5	9	4	1

Cost Estimate and Feasibility Assessment – Short-Listed Options

- TSPs performed feasibility assessments and provided final cost estimates for the short-listed options

Option	Cost Estimates* (~\$M)	CCN Required (~Miles)	Feasibility	Expected ISD** (Month Year)
1	97.7	Yes (9.0)	Yes	Oncor: Nov 2025, LCRATSC: May 2028
3	74.7	Yes (9.0)	Yes	Oncor: Nov 2025, LCRATSC: May 2028
4	114.3	Yes (14.4)	Yes	Oncor: December 2028, LCRATSC: May 2028
5	117.3	Yes (15.3)	Yes	Oncor: December 2028, LCRATSC: May 2028

* The estimated cost does not include new CCN or land acquisition related cost

** The expected ISD is tentative and are subject to change based on requirements for various approvals, ROW acquisition and construction progress

Comparison of Short-Listed Options

	Option 1	Option 3	Option 4	Option 5
Address the project needs	Yes	Yes	Yes	Yes
Meets ERCOT and NERC Reliability Criteria	Yes	No	No	No
Improves Long-Term Load-Serving Capability	Yes	Yes	Yes	Yes
Requires CCN (~Miles)	9.0	9.0	14.4	15.3
Expected ISD** (Month Year)	Oncor: November 2025, LCRATSC: May 2028		Oncor: December 2028, LCRATSC: May 2028	
Cost Estimate* (~\$M)	97.7	74.7	114.3	117.3
Feasible	Yes	Yes	Yes	Yes

* The cost estimates were provided by the TSPs

** The expected ISD is tentative and are subject to change based on requirements for various approvals, ROW acquisition, and/or construction progress

ERCOT Preferred Option

- Option 1 was selected as the ERCOT preferred option because it:
 - Addresses project need in the Delaware Basin area
 - Meets ERCOT and NERC Reliability Criteria
 - Improves long-term load-serving capability for future load growth in the area
 - Requires the least amount of CCN mileage

Additional Analysis

- Congestion analysis
 - Congestion analysis was performed for the preferred option using the 2024 RTP 2029 economic case
 - The preferred option did not result in any new congestion within the study area

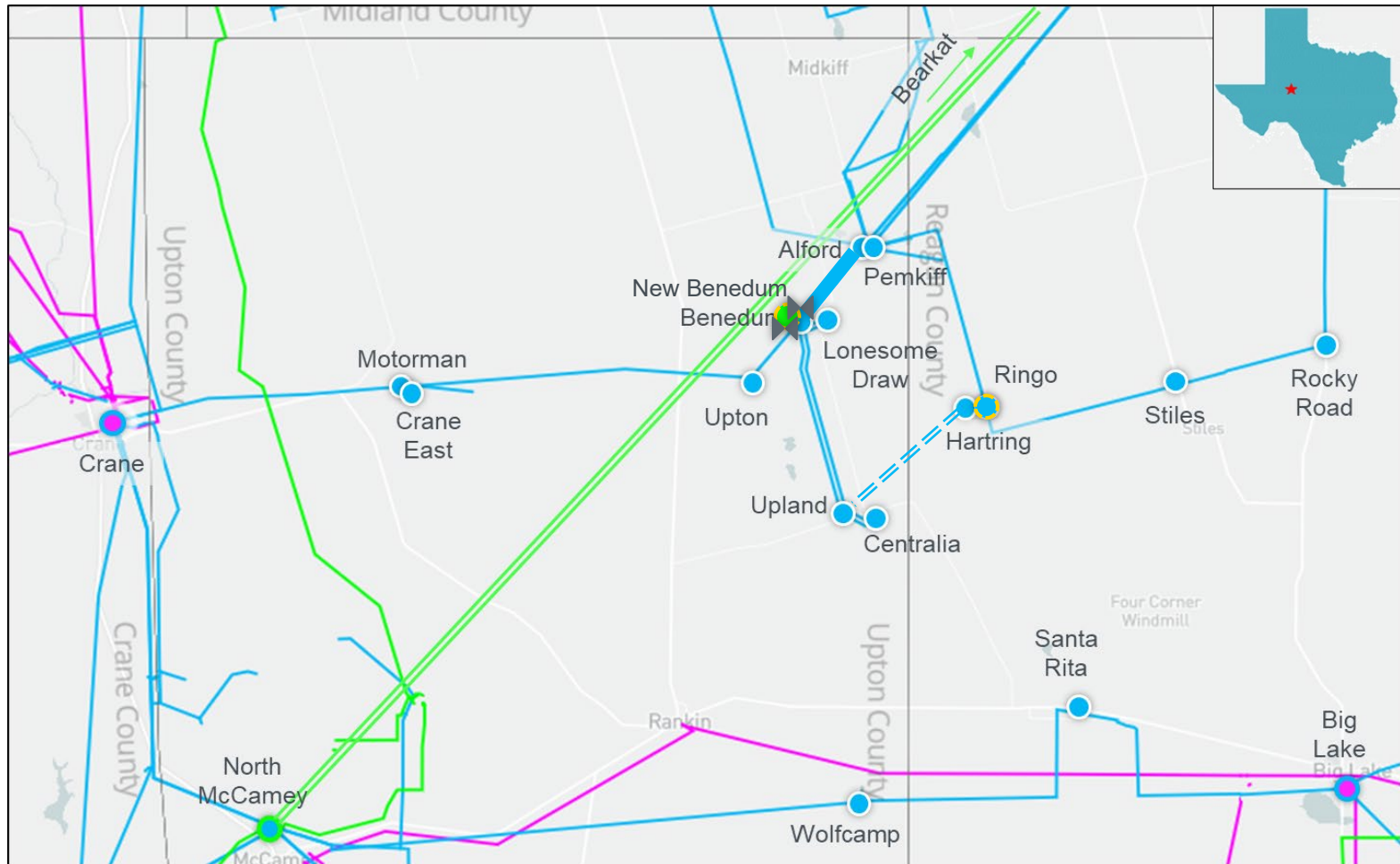
ERCOT Recommendation

- ERCOT recommends Option 1
 - Estimated Cost: approximately \$97.7million
 - Expected ISD: November 2025 (Oncor) and May 2028 (LCRATSC)
 - The expected ISD may change based on requirements for environmental assessment, licensing requests, regulatory approval, rights-of-way acquisition and construction progress
 - CCN filling will be acquired to
 - Construct a new Upland to Hartring 138-kV double-circuit transmission line, approximately 9.0-mile

ERCOT Recommended Option

- Reconfigure the existing Ringo 138-kV substation to a 6-breaker ring bus configuration, reroute the existing Pemkiff to Ringo 138-kV transmission line and the existing Ringo to Stiles 138-kV transmission line to terminate into new breakers at the existing Ringo 138-kV substation;
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 - Each of these circuits will have a terminal breaker end point at the existing Ringo and Benedum substations;
- Ensure all Oncor 138-kV terminal equipment associated with this project meet or exceeds ratings of 3200 A;
- Install a new 345-kV yard adjacent to the existing Benedum 138-kV substation in a breaker-and-a-half configuration;
 - Install two 345/138-kV transformers at Benedum with normal and emergency ratings of at least 800 MVA;
 - Cut-in one circuit of the planned Bearkat to North McCamey 345-kV double-circuit transmission line into the new Benedum 345-kV yard;
- Upgrade the existing Benedum to Alford 138-kV single-circuit transmission line on a double-circuit structures with one circuit in place with normal and emergency ratings of at least 942 MVA, 4.3-mile; and
 - Upgrade 138-kV terminal equipment at the existing Benedum 138-kV station with ratings of at least 4000 A.

Map of ERCOT Recommended Option



Project Need Seen by ERCOT	Voltage Legend	Line Legend	Substation Legend
<ul style="list-style-type: none"> Thermal/Voltage Violation Aging Infrastructures TSP Criteria Violation 	<ul style="list-style-type: none"> 69-kV 115-kV 138-kV 345-kV 	<ul style="list-style-type: none"> Existing Line Proposed New Line Upgrade Existing Line Convert Existing Line Retire Existing Line 	<ul style="list-style-type: none"> Existing Substation New/Convert Substation X New Transformer



Next Steps and Tentative Timeline

- Tentative Time
 - EIR report to be posted in the MIS in May 2025

Thank you!



Stakeholder comments also welcomed through:

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