Oncor Wilmer 345/138-kV Switch Project – ERCOT Independent Review Project Update

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RPG Meeting
November 12, 2024

Recap: Introduction

- Oncor submitted the Wilmer 345/138-kV Switch Project for Regional Planning Group (RPG) review in July 2024
  - This Tier 1 project is estimated to cost $158.2 million and will require Certificate of Convenience and Necessity (CCN) filings
  - Estimated in-service date is May 2026
  - Addresses the thermal overloads in the Dallas, Kaufman, and Ellis Counties in the North Central weather zone
- Oncor provided an overview presentation and ERCOT provided the study scope at the September RPG Meeting
  - https://www.ercot.com/calendar/09252024-RPG-Meeting
- ERCOT provided a project update at the October RPG Meeting
  - https://www.ercot.com/calendar/10162024-RPG-Meeting
- This project is currently under ERCOT Independent Review (EIR)

Recap: Study Assumptions

- Study Region
  - North Central weather zone, focusing on the transmission elements in the Dallas, Ellis, Kaufman, and Rockwall Counties
- Steady-State Base Case
  - Final 2023RTP_2028_SUM_NNC_12222023
- Transmission
  - See Appendix A for the list of transmission projects added
  - See Appendix B for the list of placeholder projects that were removed
- Generation
  - See Appendix C for the list of generation projects added
- Load
  - 756 MW of recently approved load was added to the study base case

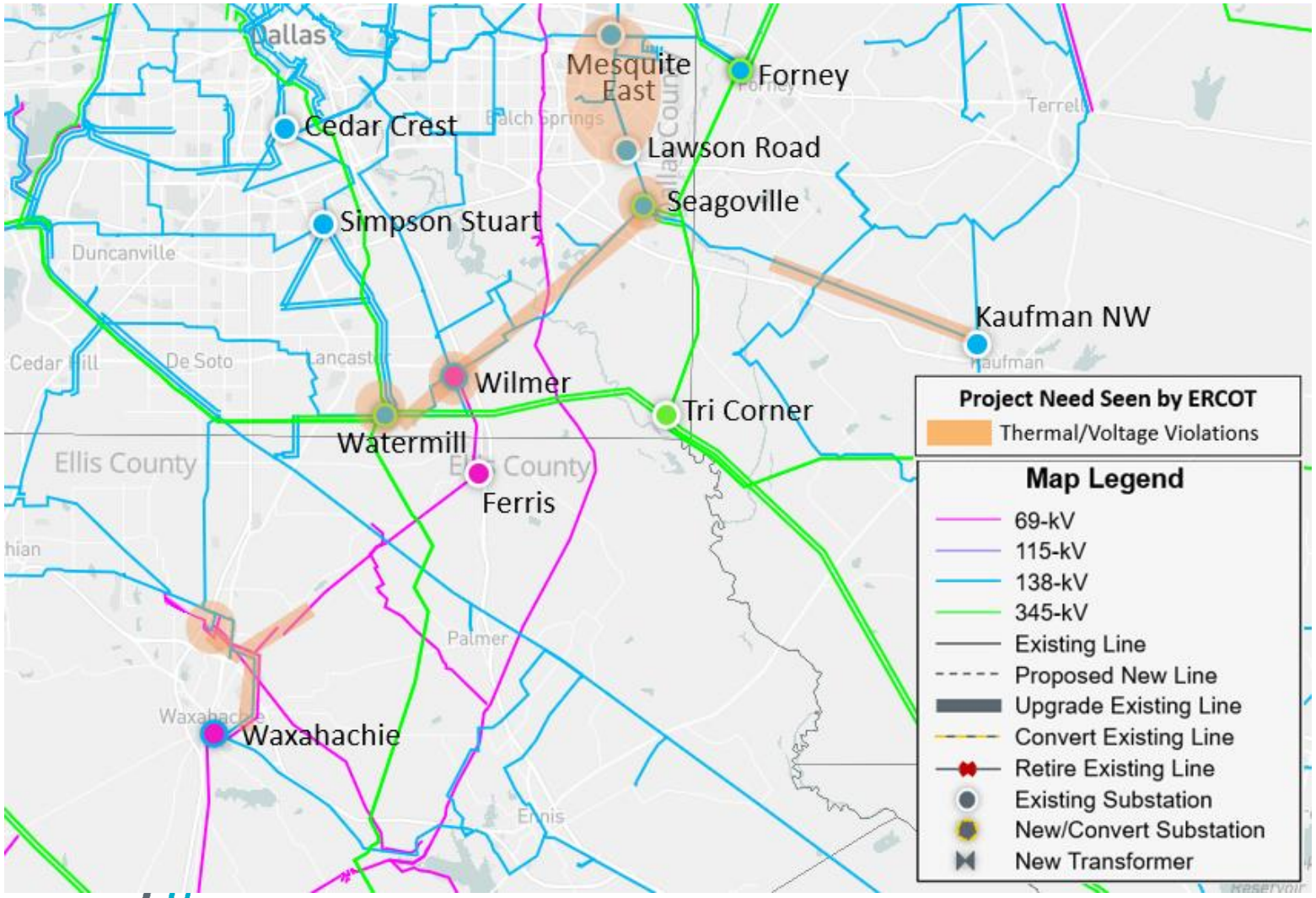
Recap: Preliminary Results of Reliability Assessment – Need Analysis

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

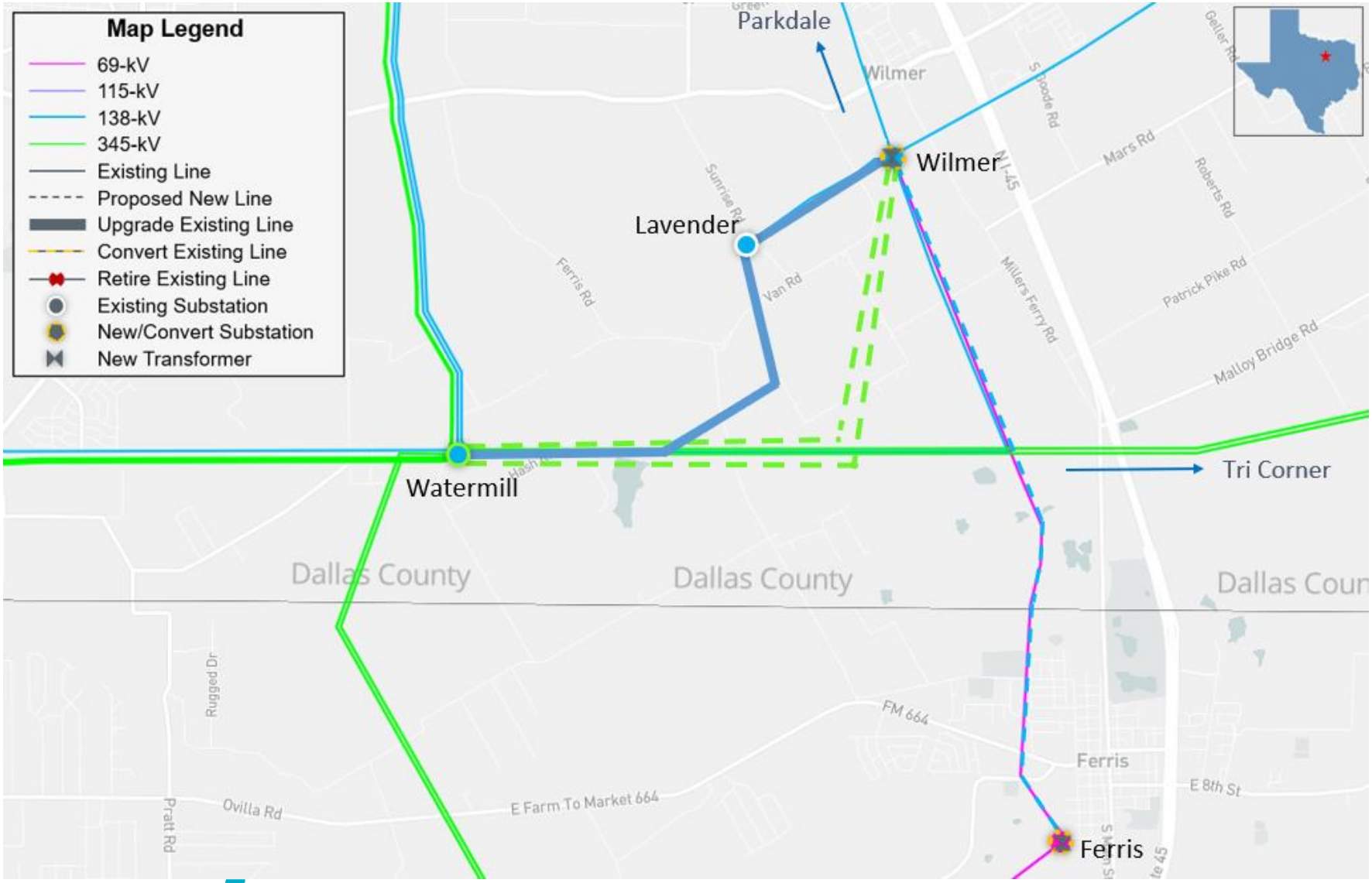
Contingency Category*	# of Unsolved Contingencies	# of Thermal Overloads	# of Bus Voltage Violations
N-0 (P0)	None	None	None
N-1 (P1, P2-1, P7)	None	8	6
G-1+N-1 (P3)*	None	None	None
X-1+N-1 (P6-2)*	2	3	11
Total	**2**	**11**	**17**

*G-1 Generator tested: Forney Energy Center CC1
*X-1 Transformers tested: Watermill T2, Seagoville T1, and Forney T2

Recap: Study Area Map with Project Need Seen by ERCOT



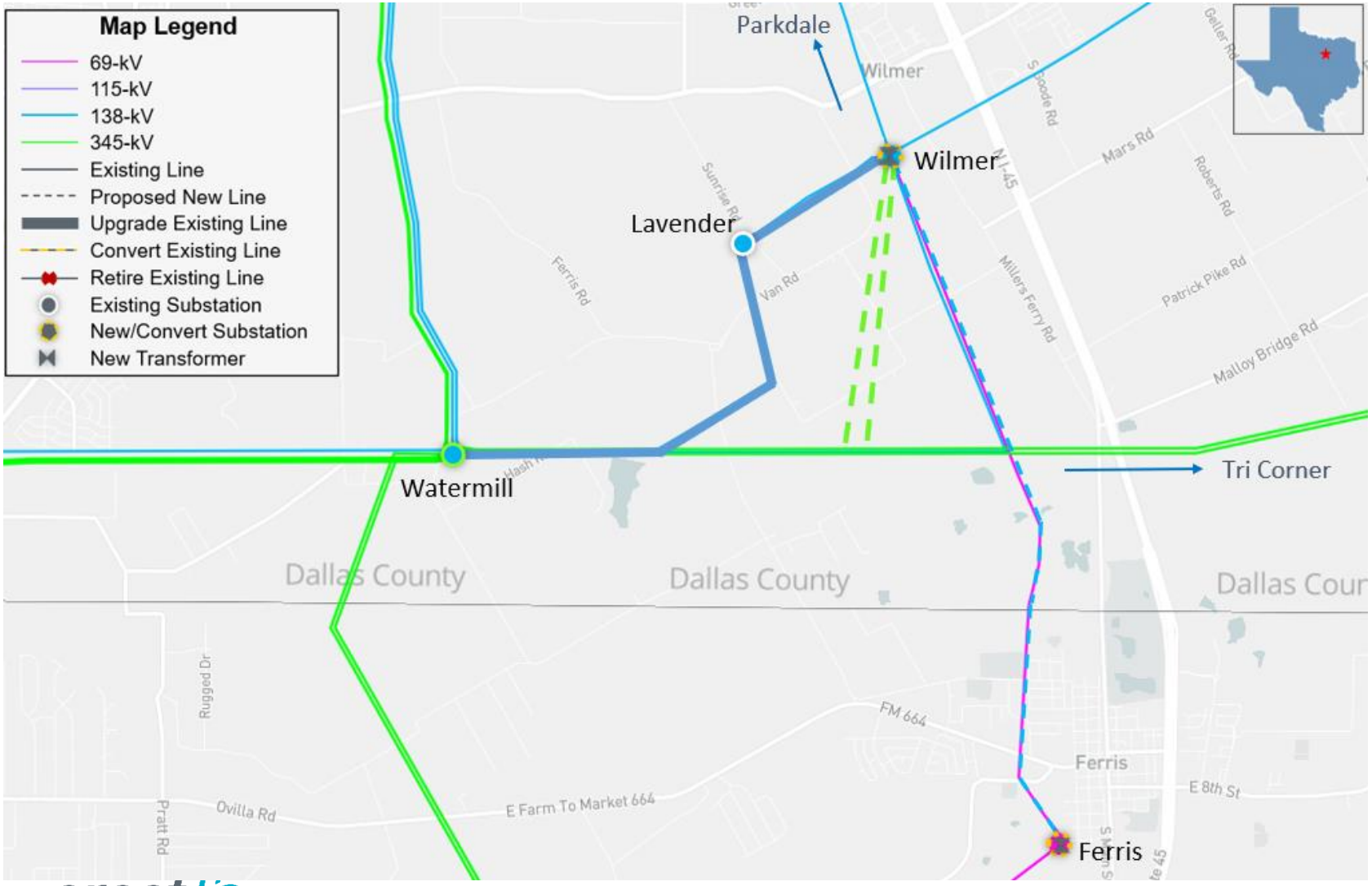
Option 1 – Oncor Proposed Project



Option 1 – Oncor Proposed Project

- Expand the existing Wilmer 138-kV substation to establish the Wilmer 345/138-kV Switchyard, install two 345/138-kV autotransformers with nameplate rating of 600 MVA each, and install two 110.4 MVAr (in three 36.8 MVAr stages) 138-kV capacitor banks
- Rebuild the 2.4-mile portion of Watermill Switch – Tri Corner Switch 345-kV double-circuit line with two separate double-circuit structures starting from Watermill Switch to structure number 102/3 using a conductor rated 2988 MVA or greater
- Install two 3.8-mile 345-kV circuits from Watermill Switch to Wilmer Switch on each of the existing Watermill Switch – Tri Corner Switch 345-kV double-circuit structures using a conductor rated 2988 MVA or greater
- Terminate the Lavender Switch – Parkdale Switch 138-kV line to Wilmer 138-kV Switch
- Rebuild the 3.1-mile Watermill Switch – Lavender Switch 138-kV line using a conductor rated 764 MVA or greater
- Rebuild the 1.2-mile Lavender Switch – Wilmer Switch 138-kV line using a conductor rated 764 MVA or greater
- Convert the 4.0-mile Wilmer Switch – Ferris Switch 69-kV line to 138-kV operation
- Relocate the existing Wilmer 138/69-kV autotransformer to Ferris 69-kV Switch

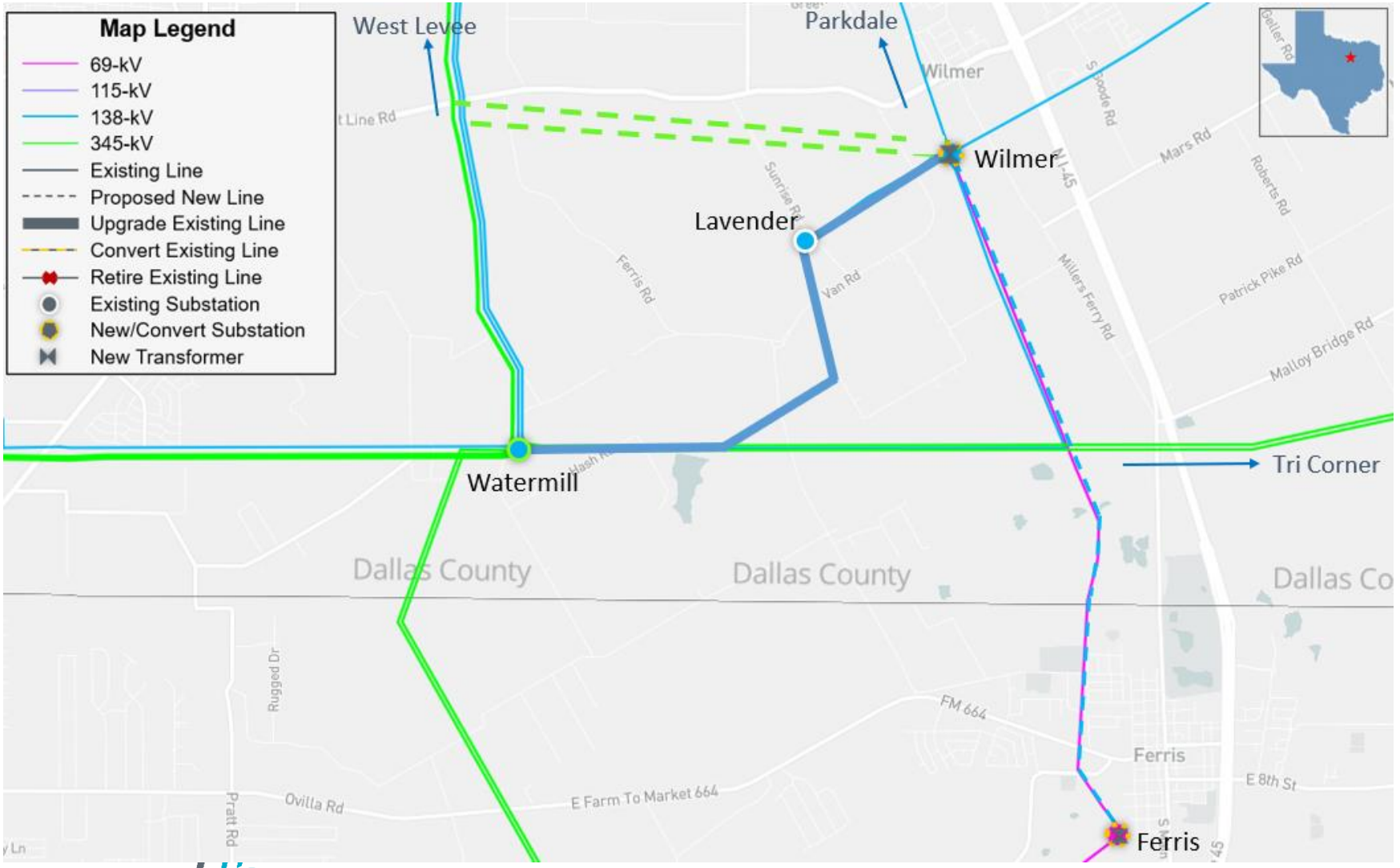
Option 2 – Loop Watermill – Tri Corner 345-kV North Circuit into Wilmer



Option 2 – Loop Watermill – Tri Corner 345-kV North Circuit into Wilmer

- Expand the existing Wilmer 138-kV substation to establish the Wilmer 345/138-kV Switchyard, install two 345/138-kV autotransformers with nameplate rating of 600 MVA each, and install two 110.4 MVAr (in three 36.8 MVAr stages) 138-kV capacitor banks
- Loop the existing Watermill Switch – Tri Corner Switch 345-kV north circuit into Wilmer
- Terminate the Lavender Switch – Parkdale Switch 138-kV line to Wilmer 138-kV Switch
- Rebuild the 3.1-mile Watermill Switch – Lavender Switch 138-kV line using a conductor rated 764 MVA or greater
- Rebuild the 1.2-mile Lavender Switch – Wilmer Switch 138-kV line using a conductor rated 764 MVA or greater
- Convert the 4.0-mile Wilmer Switch – Ferris Switch 69-kV line to 138-kV operation
- Relocate the existing Wilmer 138/69-kV autotransformer to Ferris 69-kV Switch

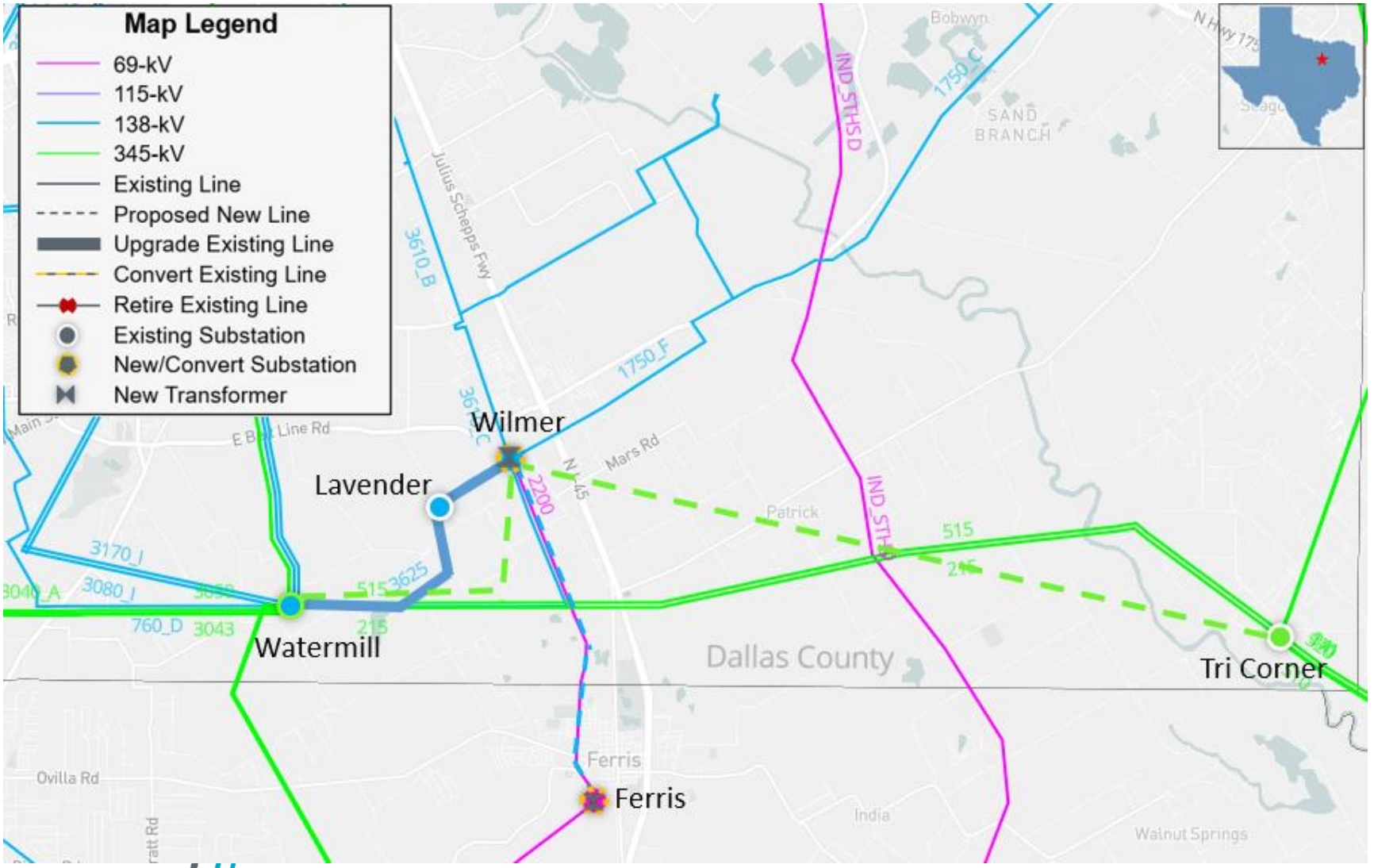
Option 3 – Loop Watermill – West Levee 345-kV line into Wilmer



Option 3 – Loop Watermill – West Levee 345-kV line into Wilmer

- Expand the existing Wilmer 138-kV substation to establish the Wilmer 345/138-kV Switchyard, install two 345/138-kV autotransformers with nameplate rating of 600 MVA each, and install two 110.4 MVAr (in three 36.8 MVAr stages) 138-kV capacitor banks
- Loop the existing Watermill Switch – West Levee Switch 345-kV line into Wilmer
- Terminate the Lavender Switch – Parkdale Switch 138-kV line to Wilmer 138-kV Switch
- Rebuild the 3.1-mile Watermill Switch – Lavender Switch 138-kV line using a conductor rated 764 MVA or greater
- Rebuild the 1.2-mile Lavender Switch – Wilmer Switch 138-kV line using a conductor rated 764 MVA or greater
- Convert the 4.0-mile Wilmer Switch – Ferris Switch 69-kV line to 138-kV operation
- Relocate the existing Wilmer 138/69-kV autotransformer to Ferris 69-kV Switch

Option 4 – Add New Watermill – Wilmer – Tri Corner 345-kV line



Option 4 – Add New Watermill – Wilmer – Tri Corner 345-kV line

- Expand the existing Wilmer 138-kV substation to establish the Wilmer 345/138-kV Switchyard, install two 345/138-kV autotransformers with nameplate rating of 600 MVA each, and install two 110.4 MVAr (in three 36.8 MVAr stages) 138-kV capacitor banks
- Add a new Watermill Switch – Wilmer Switch – Tri Corner Switch 345-kV single-circuit line (about 15 miles)
- Terminate the Lavender Switch – Parkdale Switch 138-kV line to Wilmer 138-kV Switch
- Rebuild the 3.1-mile Watermill Switch – Lavender Switch 138-kV line using a conductor rated 764 MVA or greater
- Rebuild the 1.2-mile Lavender Switch – Wilmer Switch 138-kV line using a conductor rated 764 MVA or greater
- Convert the 4.0-mile Wilmer Switch – Ferris Switch 69-kV line to 138-kV operation
- Relocate the existing Wilmer 138/69-kV autotransformer to Ferris 69-kV Switch

Preliminary Results of Reliability Assessment – Options

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

- Option 1 and Option 4 were short-listed for further evaluations

Planned Maintenance Outage Scenario Analysis

- ERCOT conducted planned maintenance outage analysis on Option 1 and Option 4 to compare relative performance of the options
  - Load levels in the North and North Central Weather Zones were scaled down based on the historical non-summer peak data to 81.3%, in order to mimic the non-summer peak load condition
  - Based on the review of system topology of the area, ERCOT tested N-2 contingency combinations, and then tested all applicable contingency violations with system adjustments (N-1-1)
- Preliminary results* of planned maintenance outage analysis

Option	Unsolved Power Flow	Thermal Overloads	Voltage Violations
1	None	None	None
4	None	None	None

*RTP placeholder project of Waxahachie Area 69-kV and 138-kV Line Upgrades (2023-NC42) was included in the planned maintenance outage analysis. Oncor is working on addressing this issue in the Waxahachie area.

Long-Term Load-Serving Capability Assessment

- Assumptions
  - Adjusted load up in the study area (Dallas County), excluding Flexible Loads in the area
  - Adjusted conforming load down outside of the North and North Central Weather Zones to balance power
  - Based on N-1 contingency
- Preliminary Findings

Option	Incremental Load-Serving Capability (~MW)
1	831
4	627

Comparison of Short-Listed Options

	Option 1	Option 4
Meets ERCOT and NERC Reliability Criteria	Yes	Yes
Improves Long-Term Load-Serving Capability	Yes (Better)	Yes
Requires CCN (miles)	~ 5	~ 15
Expected ISD	May 2026	N/A
Cost Estimate* ($M)	~ 158.2	> 158.2
Feasible	Yes	N/A

* Cost estimates were provided by Transmission Service Providers (TSPs)

- Option 1 and Option 4 addressed reliability violations
  - Option 1 better improves long-term load-serving capability for future load growth in the area
  - Option 1 requires less amount of CCN mileage and the cost estimate is expected to be less than Option 4

Preferred Option

- Option 1 was selected as the ERCOT preferred option because it
  - Addresses the project need in the study area
  - Improves long-term load-serving capability for future load growth in the area
  - Is the least cost solution and requires the least amount of CCN mileage

Next Steps and Tentative Timeline

- Additional analyses for the Preferred Option 1
  - Congestion analysis
    - Congestion analysis will be performed using the 2023 RTP 2028 economic case
  - Generation addition and load scaling sensitivity analyses
    - Planning Guide (PG) section 3.1.3 (4)
  - Subsynchronous Resonance (SSR) Assessment
    - Nodal Protocol Section 3.22.1.3(2)
- Tentative timeline
  - Final recommendation – Q4 2024

Thank you!

Stakeholder comments also welcomed through:

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Appendix A – Transmission Projects

- List of transmission projects to be added to study base case

RPG/TPIT No	Project Name	Tier	Project ISD	From County
75628	Poetry 345 kV Switch	Tier 4	Oct-24	Kaufman
78371	Richardson East Switch – Richardson Spring Creek 138 kV Line Section	Tier 4	May-25	Dallas
78167	Add 2nd autotransformer at Trumbull	Tier 4	Nov-25	Ellis
66218B	Hillsboro - Italy 69 kV Line	Tier 4	Dec-25	Ellis
76135	Hackberry Switch – DFW D-East 2 138 kV DCKT Line Section	Tier 3	Dec-25	Dallas
78367	Montfort Switch-Shankle Switch 138 kV Line	Tier 3	Dec-25	Navarro, Ellis
81067	Balch Springs Tap – Balch Springs 138 kV Line Section	Tier 4	May-26	Dallas
23RPG017	Watermill 345/138-kV Switch Project	Tier 3	May-25	Dallas
23RPG018	Arlington Reliability Enhancement Project	Tier 2	May-26	Dallas
23RPG033	Watermill to Seagoville 138 kV Line Project	Tier 3	Dec-25	Dallas
24RPG019	Vineyard Switch to Cypress Waters 138-kV Circuit Addition Project	Tier 2	May-26	Dallas, Tarrant

Appendix B – Transmission Projects

- List of placeholder projects to be removed from the study base case

RTP Project ID	Project Name	County
2023-NC18	Tri Corner (2432) to Seagoville Switch (2433) to Forney Switch (2437) 345-kV Line Upgrade	Dallas
2023-NC38	Watermill 345/138-kV Transformer Upgrade	Dallas
2023-NC41	Watermill 138-kV Area Upgrades	Dallas
2023-NC42	Waxahachie Area 69-kV and 138-kV Line Upgrades	Dallas
2023-NC43	Wilmer 138/69-kV Transformer Upgrade	Dallas

Appendix C – New Generation Projects to Add

GINR	Project Name	Fuel	Projected COD	Capacity (~MW)	County
19INR0110	Azalea Springs Solar	SOL	05/31/2025	181.0	Angelina
20INR0203	Pine Forest Solar	SOL	12/01/2025	301.5	Hopkins
20INR0208	Signal Solar	SOL	03/15/2025	51.8	Hunt
20INR0222	Tyson Nick Solar	SOL	08/01/2025	90.5	Lamar
21INR0240	La Casa Wind	WIN	03/22/2025	148.4	Stephens
21INR0368	Eliza Solar	SOL	12/20/2024	151.7	Kaufman
21INR0379	Ash Creek Solar	SOL	01/31/2025	417.7	Hill
21INR0511	Wolf Ridge Repower	WIN	08/31/2024	9.0	Cooke
21INR0515	Roadrunner Crossing Wind II SLF	WIN	10/31/2024	126.7	Eastland
22INR0260	Eliza Storage	OTH	02/17/2025	100.4	Kaufman
22INR0526	Pine Forest BESS	OTH	10/29/2025	210.1	Hopkins
22INR0554	Platinum Storage	OTH	03/03/2025	309.5	Fannin
22INR0555	TE Smith Storage	OTH	07/15/2025	125.4	Rockwall
23INR0026	Baker Branch Solar	SOL	09/30/2024	469.4	Lamar
23INR0030	Langer Solar	SOL	03/01/2027	249.8	Bosque
23INR0070	Chillingham Solar	SOL	10/18/2024	352.4	Bell
23INR0114	True North Solar	SOL	12/05/2024	238.8	Falls
23INR0118	Blevins Solar	SOL	07/01/2025	271.6	Falls
23INR0119	Blevins Storage	OTH	07/01/2025	181.3	Falls
23INR0195	Desert Willow BESS	OTH	02/03/2025	154.4	Ellis
23INR0296	Trojan Solar SLF	SOL	02/28/2026	153.0	Cooke

Appendix C – New Generation Projects to Add (cont.)

GINR	Project Name	Fuel	Projected COD	Capacity (~MW)	County
23INR0299	Anole BESS	OTH	05/30/2025	247.1	Dallas
23INR0349	Tokio Solar	SOL	08/25/2025	170.5	McLennan
23INR0367	Fewell Solar	SOL	09/09/2025	203.5	Limestone
23INR0403	Connolly Storage	OTH	09/06/2024	125.4	Wise
23INR0469	Big Elm Storage	OTH	11/10/2025	100.8	Bell
24INR0010	Pinnington Solar	SOL	10/15/2025	666.1	Jack
24INR0015	Five Wells Solar	SOL	09/15/2024	322.8	Bell
24INR0023	Compadre Solar	SOL	12/25/2024	406.1	Hill
24INR0038	SP Jaguar Solar	SOL	06/01/2026	300.0	McLennan
24INR0039	SP Jaguar BESS	OTH	06/30/2025	314.3	McLennan
24INR0138	Midpoint Storage	OTH	08/30/2025	51.3	Hill
24INR0139	Midpoint Solar	SOL	08/30/2025	99.8	Hill
24INR0140	Gaia Storage	OTH	07/31/2025	76.8	Navarro
24INR0141	Gaia Solar	SOL	07/31/2025	152.7	Navarro
24INR0198	Two Forks BESS	OTH	07/01/2027	309.0	Cooke
24INR0295	Lucky Bluff BESS SLF	OTH	10/15/2025	100.8	Erath
24INR0312	Wigeon Whistle BESS	OTH	09/23/2024	122.9	Collin
24INR0315	Black Springs BESS SLF	OTH	10/15/2025	120.7	Palo Pinto
24INR0631	Radian Storage SLF	OTH	12/31/2024	160.3	Brown
25INR0105	Diver Solar SLF	SOL	06/30/2026	225.6	Limestone
25INR0231	Apache Hill BESS	OTH	11/15/2026	201.2	Hood