



## Oncor – Temple Area Project ERCOT Independent Review Status Update

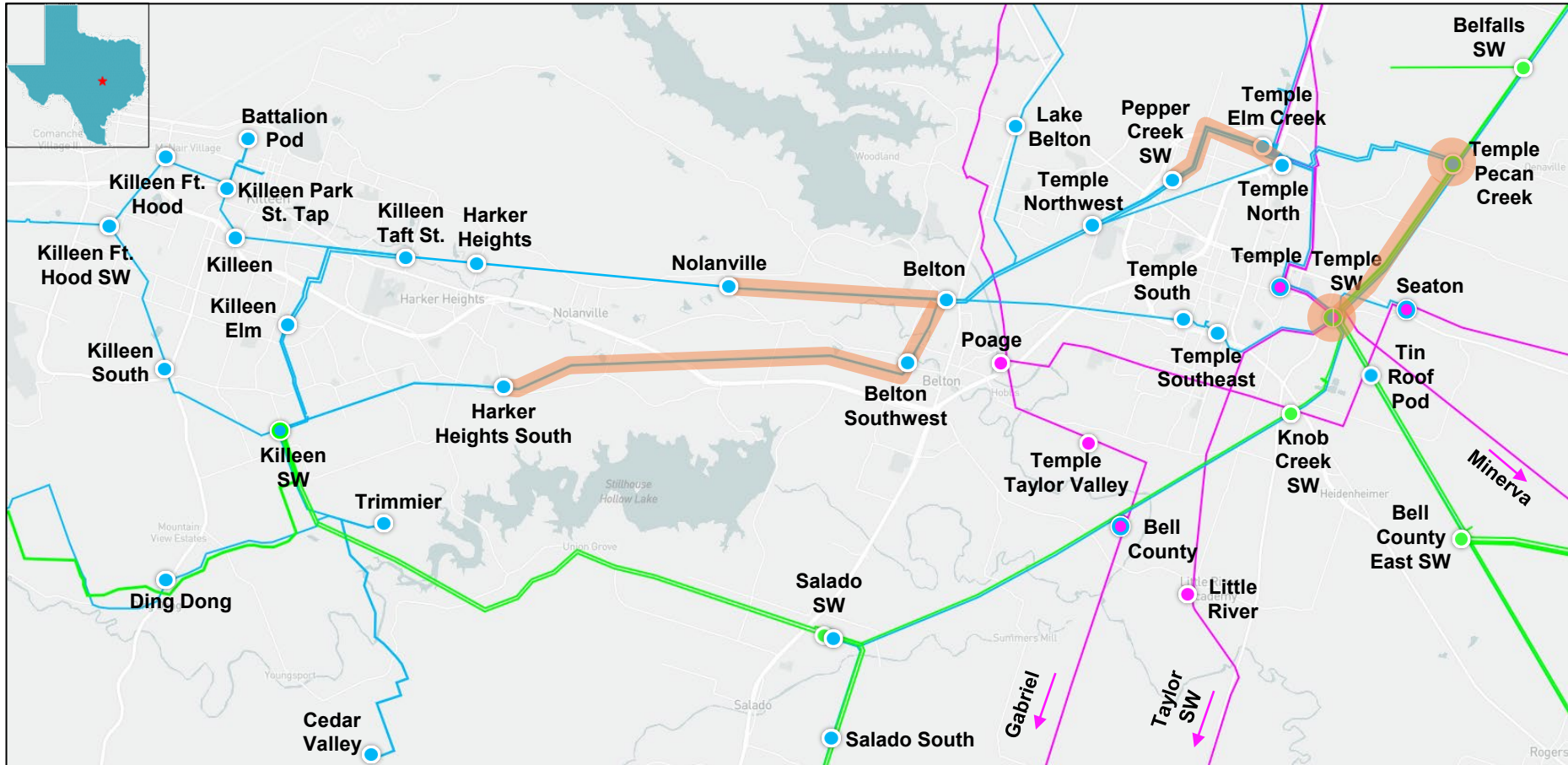
Tanzila Ahmed

RPG Meeting  
June 11, 2024

# Recap – Introduction

- Oncor submitted the Temple Area Project for Regional Planning Group (RPG) review in January 2024
  - This Tier 1 project is estimated to cost \$120.7 million, and filing of Certificate of Convenience and Necessity (CCN) is not required
  - Estimated In-Service Date (ISD) is May 2026
  - This project addresses identified thermal violations seen in the Temple area in Bell County due to load grown in the area
- Oncor presented project overview and ERCOT presented study scope for this ERCOT Independent Review (EIR) at the February RPG meeting
  - <https://www.ercot.com/calendar/02122024-RPG-Meeting>
- ERCOT provided status update at the March and April RPG meeting
  - [https://www.ercot.com/calendar/03182024-RPG-Meeting- -Webex](https://www.ercot.com/calendar/03182024-RPG-Meeting--Webex)
  - <https://www.ercot.com/calendar/05142024-RPG-Meeting>

# Recap – Study Area Map with Violations Seen by ERCOT



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer

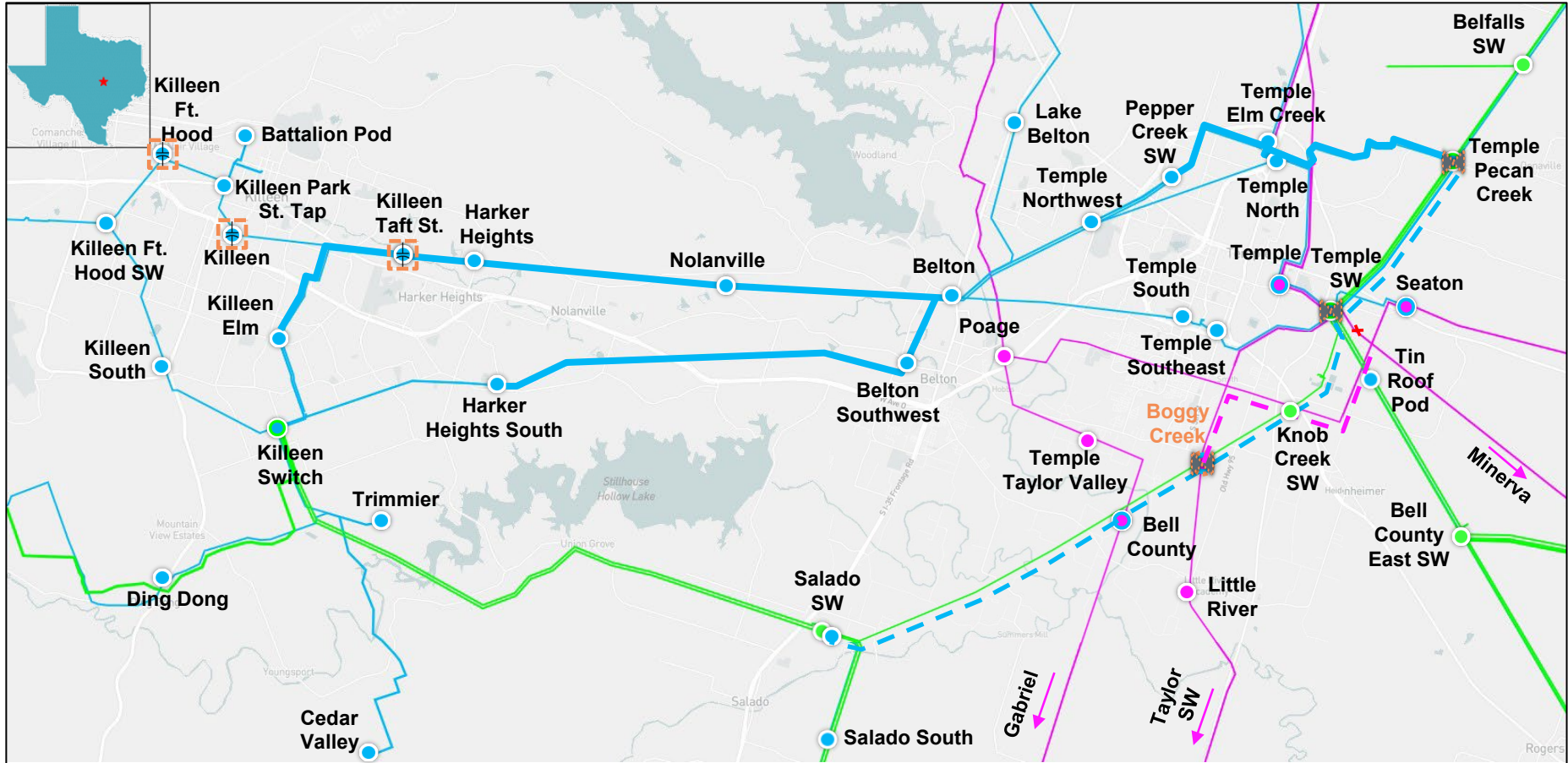


# Recap – Preliminary Results of Reliability Assessment – Options

Option	N-1		G-1 + N-1		X-1 + N-1	
	Therma Violations	Voltage Violations	Therma Violations	Voltage Violations	Therma Violations	Voltage Violations
Base case	None	None	None	None	7	31
1	None	None	None	None	6	19
2	2	None	None	None	2	None
3	3	None	None	None	None	None
3 with 345-kV DCKT	2	None	1	None	None	None
4	None	None	None	None	None	None
5	None	None	None	None	None	None
6	1	None	1	None	None	None
7	None	None	None	None	None	None

- Options 4, 5, and 7 were selected for further evaluations

# Recap – Short-Listed Option 4 Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

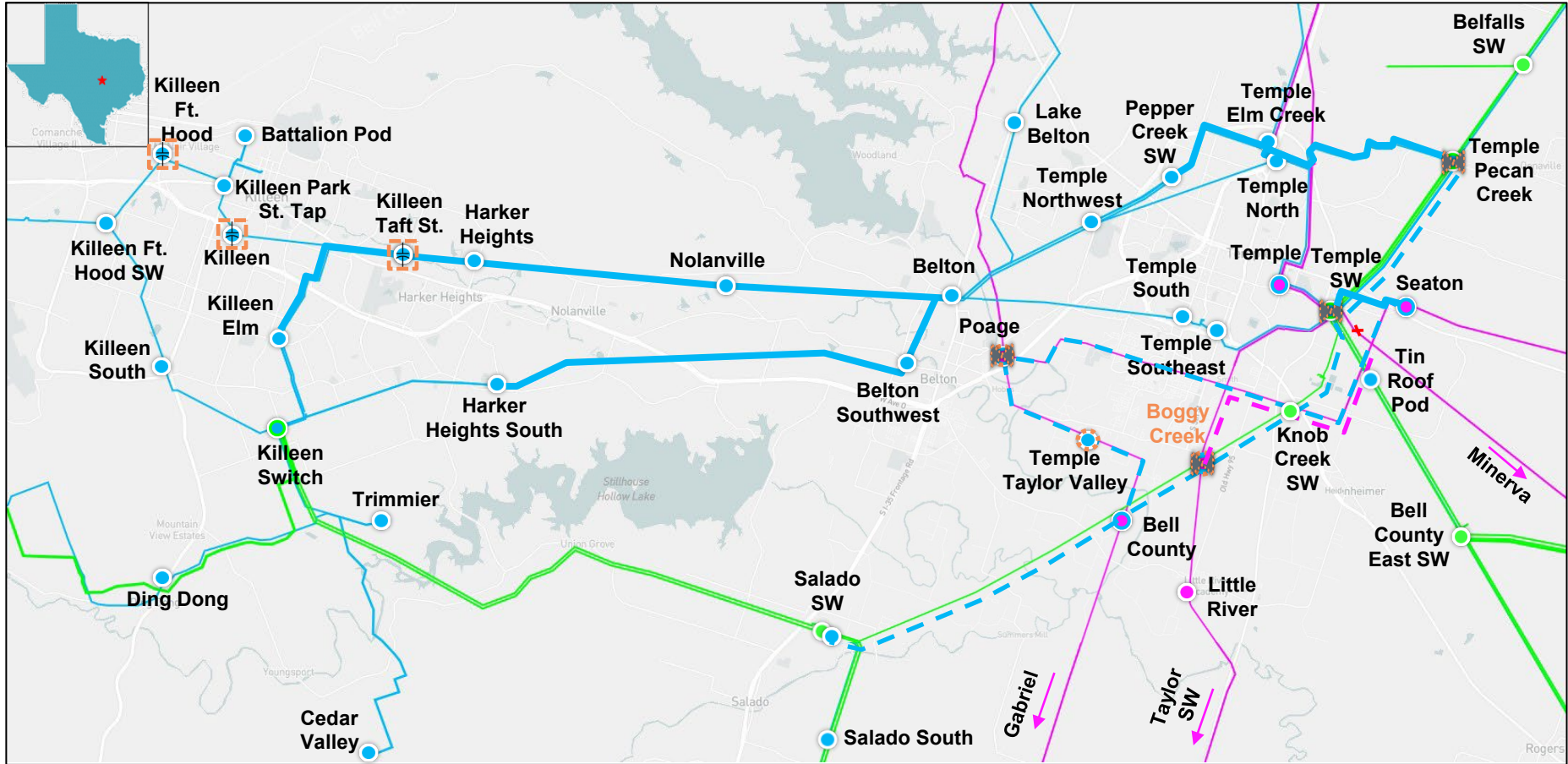
Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer





# Recap – Short-Listed Option 5 Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

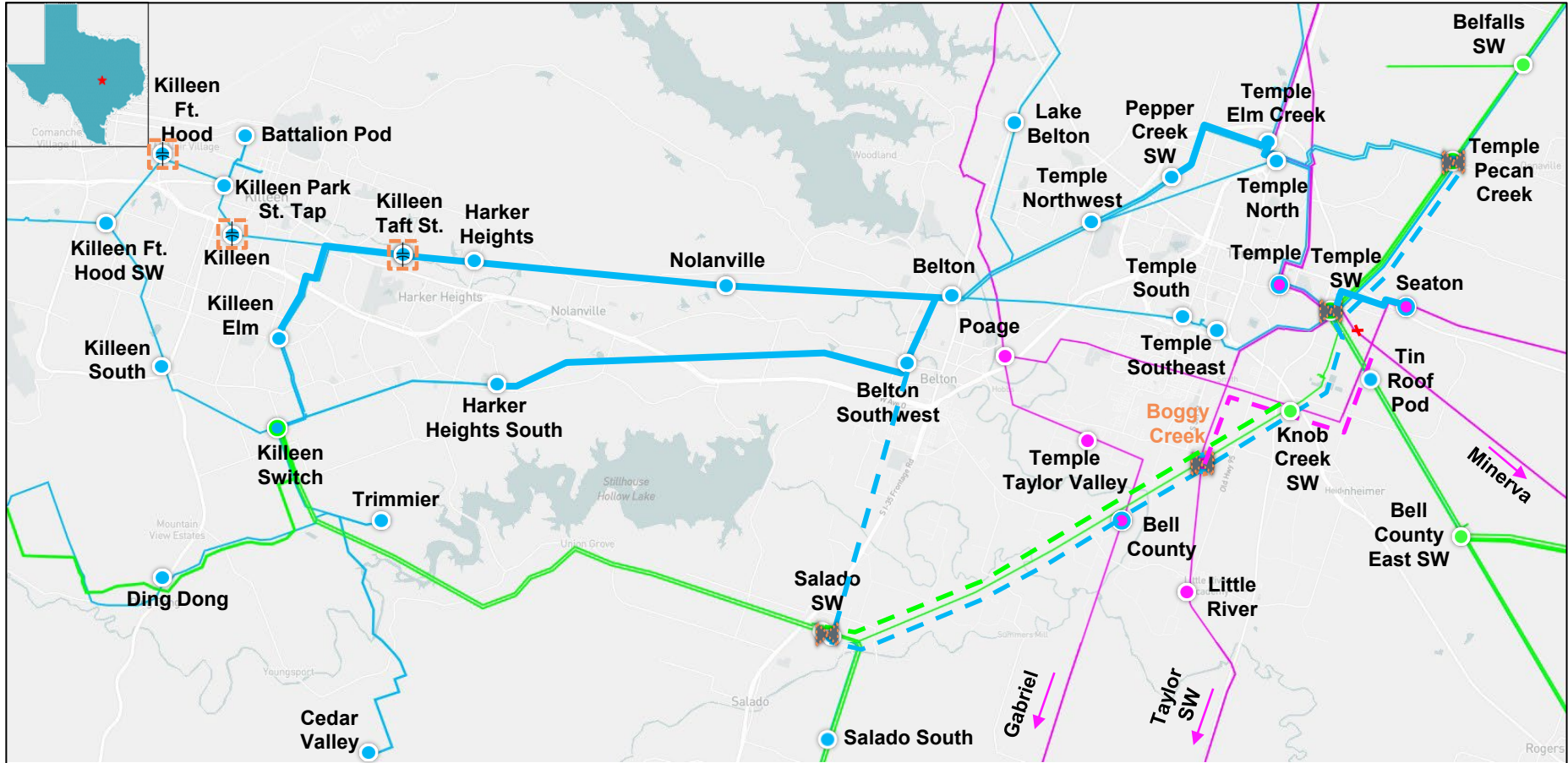
Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer



# Recap – Short-Listed Option 7 Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer

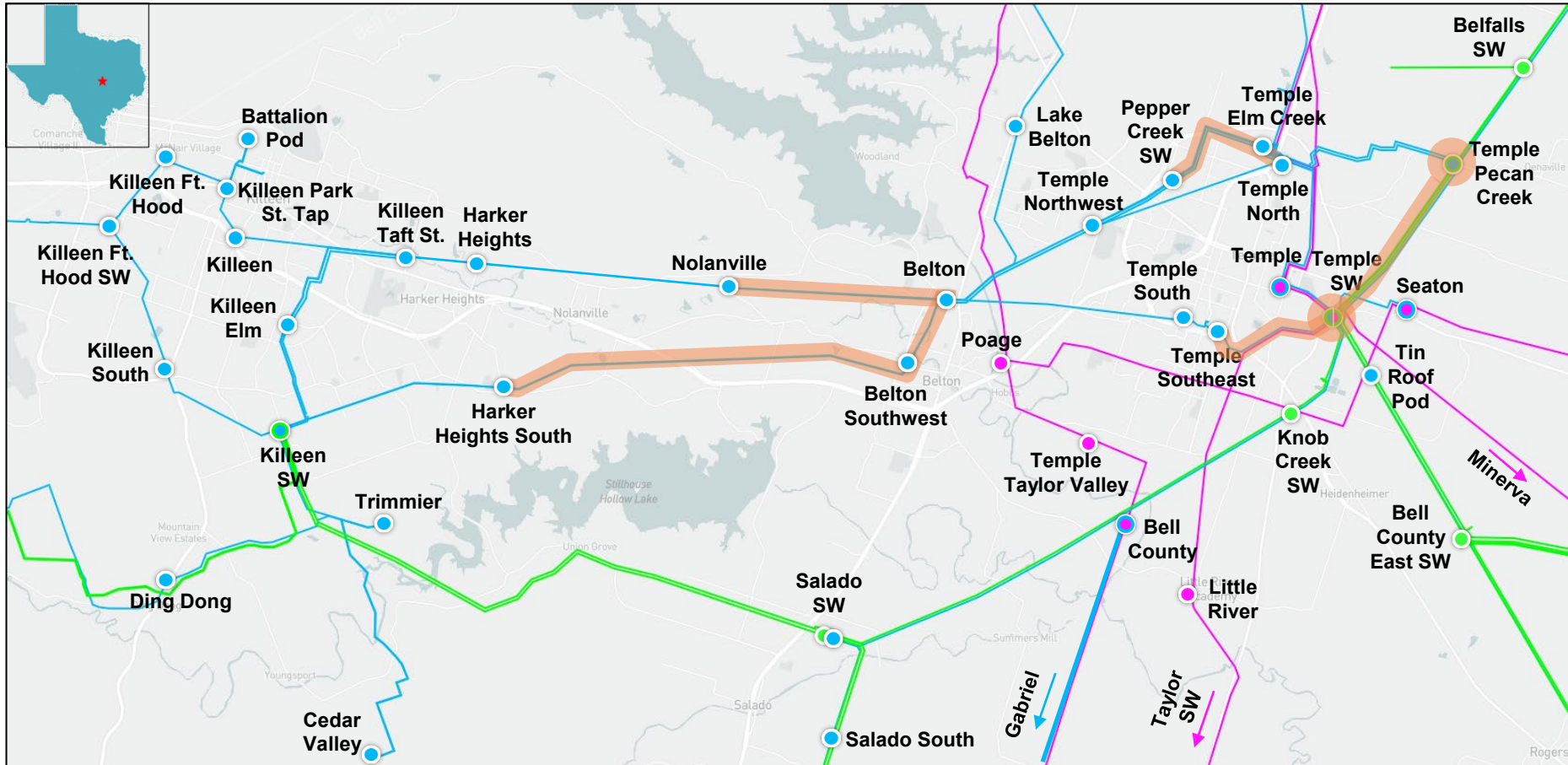


# Status Update

- Based on TSP feedback following upgrades were applied
  - Base case transmission update
    - Newly added the Tier 4 TPIT # 75524, converting the existing Bell County to Gabriel 69-kV line to 138-kV operational with in-service date of November 2026
  - Additional components added to all short-listed options
    - Construct the new Watercrest 138-kV Switch substation near Killeen Ft. Hood Switch in a 4-breaker ring bus arrangement and install one capacitor bank consisting of three 36.8 Mvar stages
    - Upgrade the Watercrest – Killeen Taft 138-kV line with a minimum ratings of 614 MVA, approximately 7.8-mile
    - Upgrade the Watercrest – Killeen 138-kV line with a minimum ratings of 493 MVA, approximately 7.5-mile
    - Establish Salado 138-kV Switch, install two 600 MVA 345/138-kV Autotransformers at the existing Salado Switch and connect the 138-kV and 345-kV at Salado Switch



# Study Area Map with Violations Seen by ERCOT



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

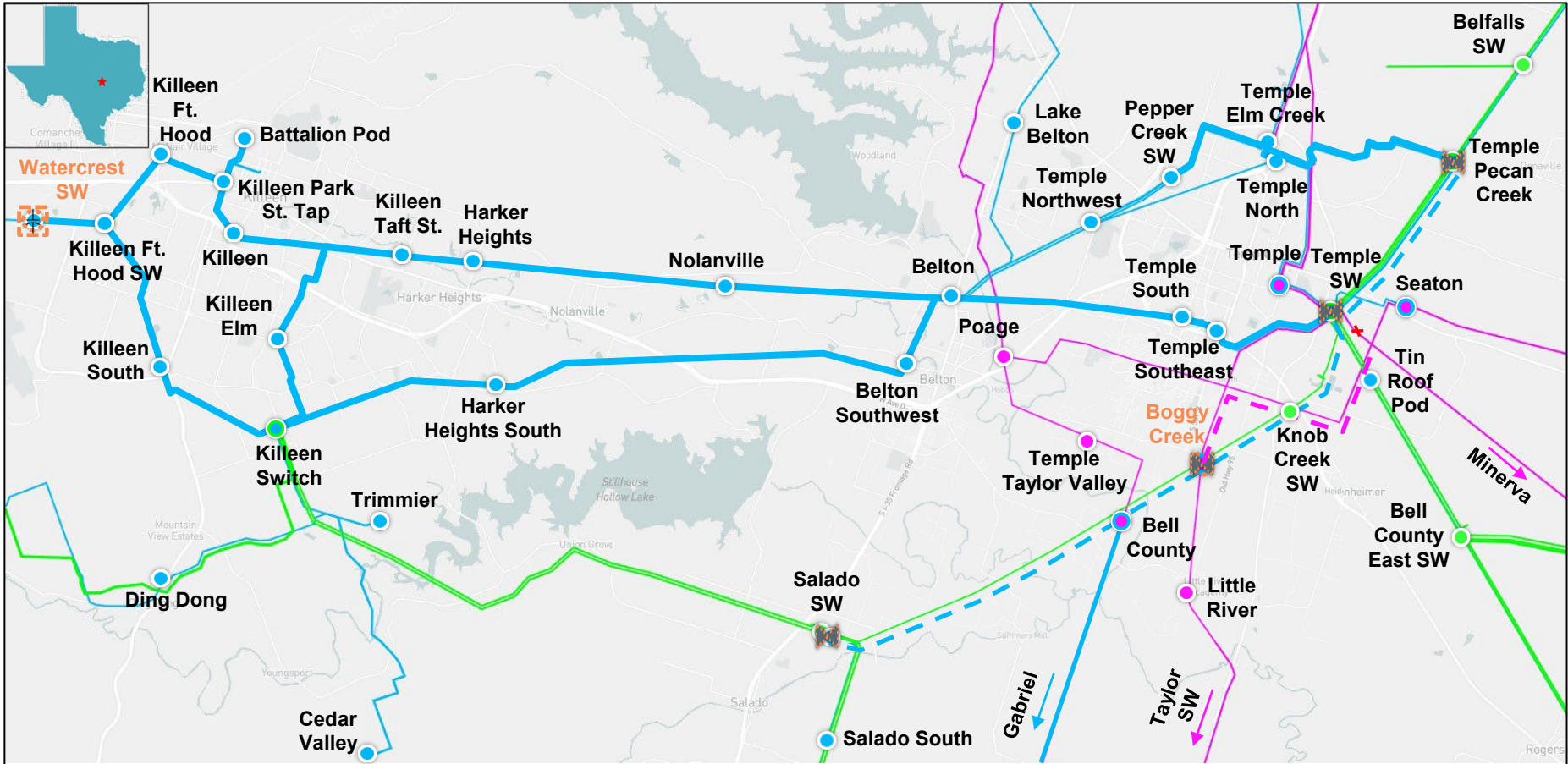
Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer



# Option 4-Modified Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

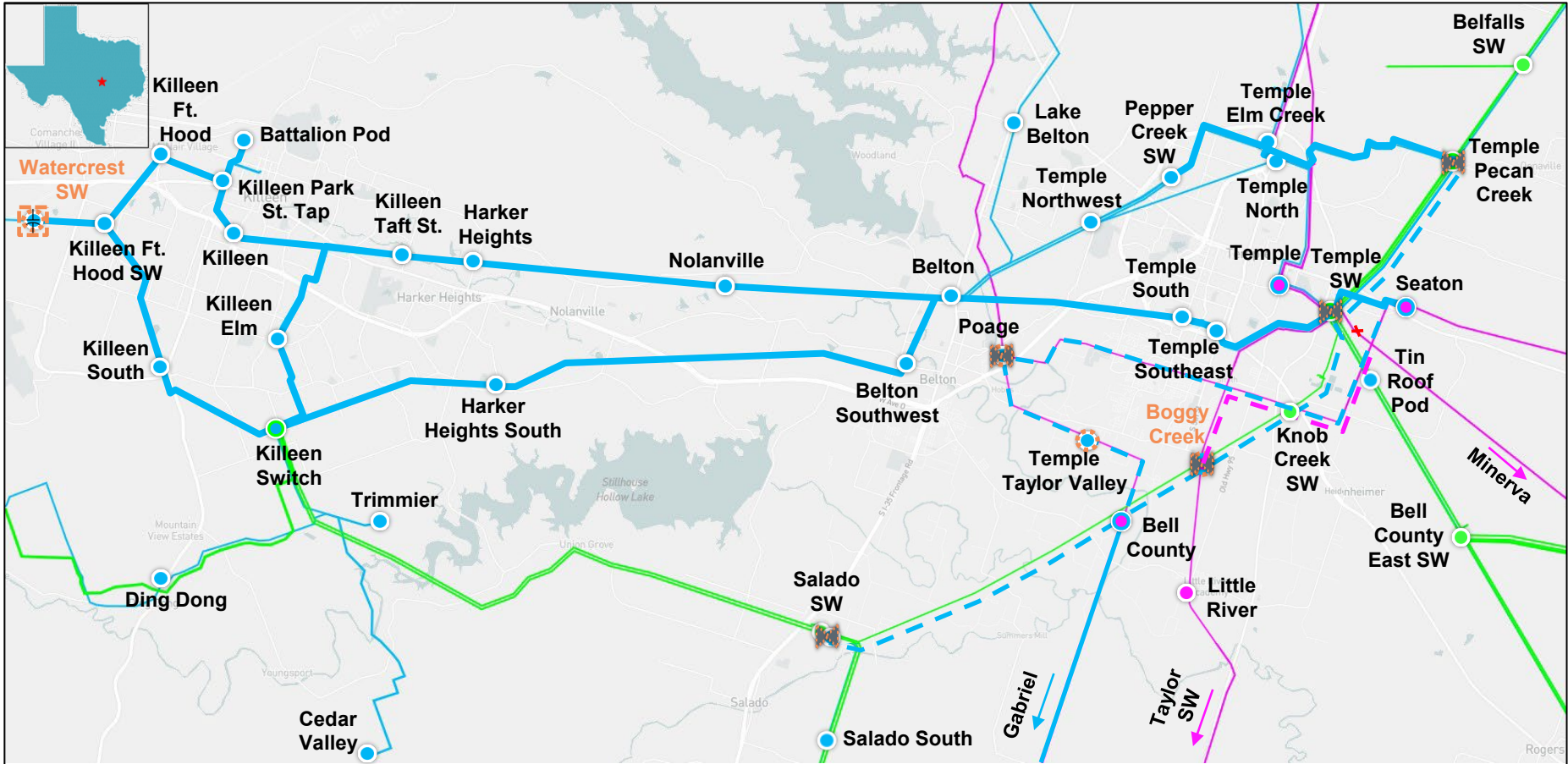
Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer



# Option 5-Modified Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

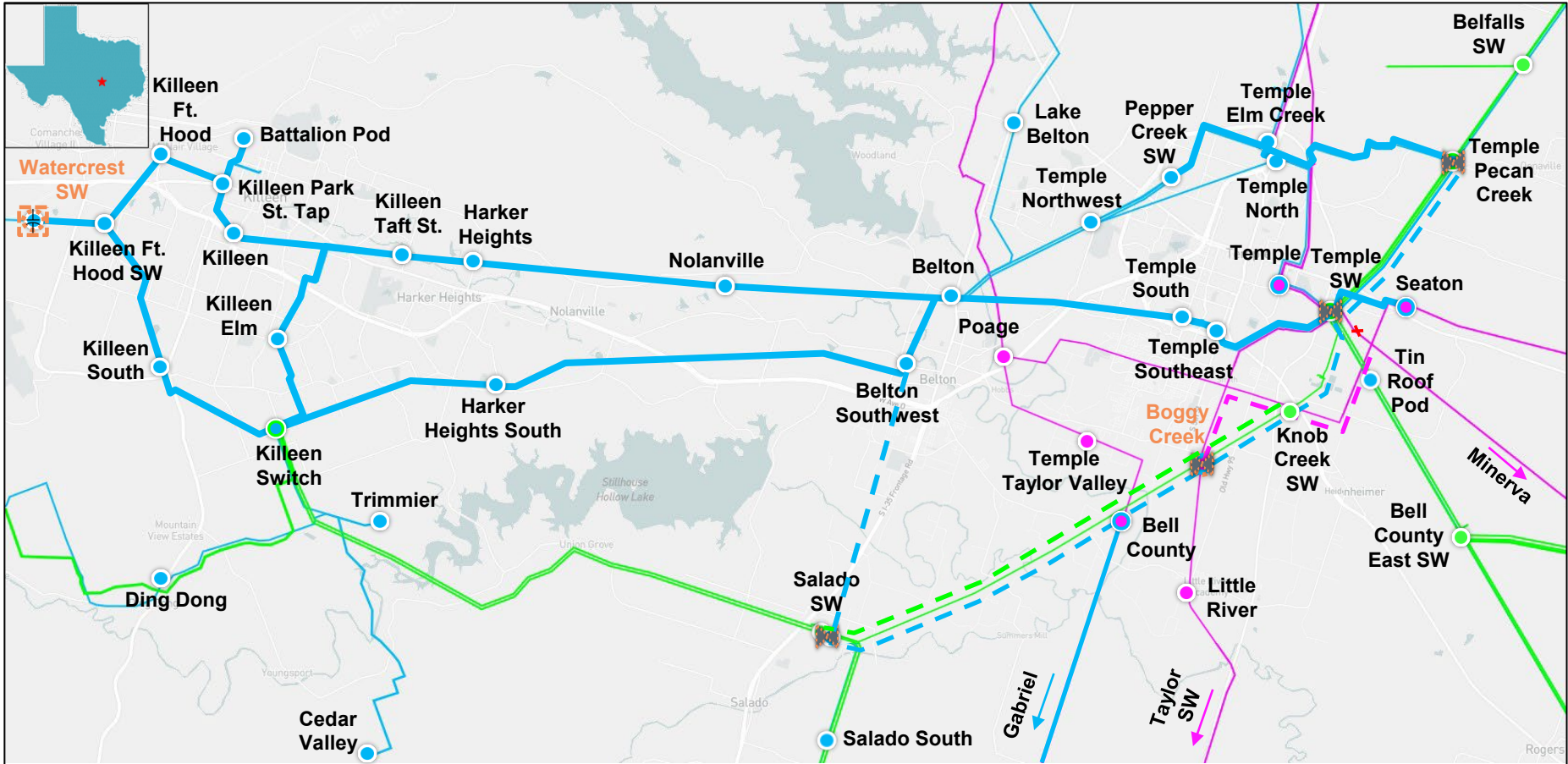
Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer





# Option 7-Modified Map



Project Need Seen by ERCOT	
	Thermal Violation
	Aging Infrastructures
	TSP Criteria Violation

Voltage Legend	
	69-kV
	115-kV
	138-kV
	345-kV

Line Legend	
	Existing Line
	Proposed New Line
	Upgrade Existing Line
	Convert Existing Line
	Retire Existing Line

Substation Legend	
	Existing Substation
	New/Convert Substation
	New Transformer



# Preliminary Results of Reliability Assessment – Updated Short-listed Options

Option	N-1		G-1 + N-1		X-1 + N-1	
	Therma Violations	Voltage Violations	Therma Violations	Voltage Violations	Therma Violations	Voltage Violations
Base case	None	None	None	None	8	31
4	None	None	None	None	1	None
5	None	None	None	None	None	None
7	None	None	None	None	None	None



# Preliminary Results of Planned Maintenance Outage Evaluation – Short-listed Options

- ERCOT conducted planned maintenance outage evaluation on the base case to identify project need
  - Load level in the North-Central and South-Central Weather Zones were scaled down to 81.3% and 89.1% respectively of the summer peak load in the study base case based on ERCOT load forecast and historical load, in order to mimic the non-summer peak load condition
  - N-2 contingencies were tested as a proxy for N-1-1. Any applicable violating contingencies were further tested with system adjustments
  - The transmission elements in the Bell County were monitored in the maintenance outage evaluation
- Planned maintenance outage analysis results

Option	Voltage Violations	Thermal Overloads	Unsolved Power Flow
4	None	None	None
5	None	None	None
7	None	None	None

# Long-Term Load Serving Capability Evaluation

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

Option	Incremental Load Serving Capability (~MW)
4	415
5	417
7	519

# Preliminary - Cost Estimate and Feasibility Assessment – Updated Short-listed Options

- Transmission Service Providers (TSPs) performed feasibility assessments and provided preliminary cost estimates for the three short-listed options

Option	Cost Estimates* (\$M)	CCN Required (Miles)	Feasibility	Estimated ISD
4	~257.6	Yes (15.4)	Feasible	TBD
5	~272.6	Yes (15.4)	Feasible	TBD
7	~297.3	Yes (~22.8)	N/A	N/A

\* Cost estimates, CCN milage, and ISD will be updated based on the final cost estimate and feasibility assessment from TSPs

- Based on feedback from Oncor, Option 7 will require additional land to upgrade the existing substation to connect the proposed new 138-kV line and longer time for project completion

# Next Steps and Tentative Timeline

- ERCOT will continue to evaluate the short-listed options and provide status updates at the future RPG meetings
  - Final cost estimates and feasibility assessment
- ERCOT to perform the following assessment on the preferred Option
  - Congestion analysis
  - 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
  - Status update at future RPG meeting
  - Final recommendation in Q3 2024

*Thank you!*



Stakeholder comments also welcomed through:

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# Option 4 Modified Version

- Install a second 345/138-kV autotransformer at the existing Temple Pecan Creek substation with 600 MVA rating and loop in the existing Temple SW – Bellfalls 345-kV transmission line into Temple Pecan Creek substation
- Install a second 345/138-kV autotransformer at the existing Temple SW substation with 600 MVA rating, and rebuild the existing Temple SW substation with 11 345-kV and 16 138-kV breakers in breaker-and-a-half arrangements, and remove the 138/69-kV autotransformer
- Construct a second circuit to the existing Temple Pecan Creek – Temple SW 138-kV transmission line with a minimum ratings of 486 MVA, 4.4-mile
- Construct a new Boggy Creek 138/69-kV substation approximately 3.58-mile south of the existing Temple 138-kV substation. Relocated the existing 138/69-kV autotransformer from Temple SW to the new Boggy Creek substation, install seven 138-kV breakers in breaker-and-a-half arrangement, and install two 69-kV breakers in single bus arrangement
- Loop in the existing Bell County SW – Temple SW 138-kV transmission line into the new Boggy Creek substation and loop in the existing Taylor SW – Temple SW 138-kV transmission line into the new Boggy Creek substation
- Construct a new Boggy Creek – Minerva 69-kV transmission line with a minimum ratings of 197, approximately 5.0-mile
  - From the Bobby Creek on the vacant sides of the existing double circuit capable structures of Taylor SW – Temple SW and Poage – Seaton 69-kV transmission lines and connecting the existing Minerva at STR 3/5. Disconnecting the existing Temple SW – Minerva 69-kV transmission line at STR 3/5. Establish the new Boggy Creek SW – Temple 138-kV transmission line by converting the 69-kV line between Boggy Creek SW and Temple to 138-kV operation. Establish a normally open disconnect switch at Temple on the newly established Boggy Creek SW – Temple 138-kV transmission line
- Replace nine of the existing 40 kA, 138-kV circuit breakers at Temple Elm Creek Switch with 63 kA circuit breakers
- Upgrade the existing Temple Elm Creek Switch – Temple Pecan Creek Switch 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 5.0-mile per-circuit

# Option 4 Modified Version (Continued)

- Upgrade the existing Temple Elm Creek – Temple North 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 0.61-mile per-circuit
- Upgrade the existing Temple North – Pepper Creek 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 2.2-mile per-circuit
- Upgrade the existing Temple SW – Temple Southeast – Scott White – Temple – Belton 138-kV transmission line with a minimum ratings of 486 MVA, 12.44-mile
- Upgrade the existing Belton – Belton Southwest – Harker Heights South – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 17.2-mile
- Upgrade the existing Belton – Nolanville - Harker Heights – Killeen Taft – Killeen Elms Rd – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 19.9-mile
- Keep the existing 345-kV double-circuit and the existing 345-kV line from Salado SW - Knob Creek - Temple but remove the existing 138-kV circuits from the existing 345-kV structures. Construct a new Bell County - Boggy Creek - Temple SW 138-kV transmission lines on new double-circuit structure with one circuit in place, utilizing the existing ROW, with a minimum ratings of 614 MVA, 7.7-mile
- Construct the new Watercrest 138-kV Switch substation near Killeen Ft. Hood Switch in a 4-breaker ring bus arrangement and install one capacitor bank consisting of three 36.8 Mvar stages
- Upgrade the Watercrest – Killeen Taft 138-kV line with a minimum ratings of 614 MVA, 7.8-mile
- Upgrade the Watercrest – Killeen SW 138-kV line with a minimum ratings of 493 MVA, 7.5-mile
- Install two 600 MVA 345/138-kV Autotransformers at the existing Salado SW and connect the 138-kV and 345-kV at Salado SW

# Option 5 Modified Version – Option 4 with 69-kV to 138-kV Conversion

- Install a second 345/138-kV autotransformer at the existing Temple Pecan Creek substation with 600 MVA rating and loop in the existing Temple SW – Bellfalls 345-kV transmission line into Temple Pecan Creek substation
- Install a second 345/138-kV autotransformer at the existing Temple SW substation with 600 MVA rating, and rebuild the existing Temple SW substation with 11 345-kV and 16 138-kV breakers in breaker-and-a-half arrangements, and remove the 138/69-kV autotransformer
- Construct a second circuit to the existing Temple Pecan Creek – Temple SW 138-kV transmission line with a minimum ratings of 486 MVA, 4.4-mile
- Construct a new Boggy Creek 138/69-kV substation approximately 3.58-mile south of the existing Temple 138-kV substation. Relocated the existing 138/69-kV autotransformer from Temple SW to the new Boggy Creek substation, install seven 138-kV breakers in breaker-and-a-half arrangement, and install two 69-kV breakers in single bus arrangement
- Loop in the existing Bell County SW – Temple SW 138-kV transmission line into the new Boggy Creek substation and loop in the existing Taylor SW – Temple SW 138-kV transmission line into the new Boggy Creek substation
- Construct a new Boggy Creek – Minerva 69-kV transmission line with a minimum ratings of 197, approximately 5.0-mile
  - From the Bobby Creek on the vacant sides of the existing double circuit capable structures of Taylor SW – Temple SW and Poage – Seaton 69-kV transmission lines and connecting the existing Minerva at STR 3/5. Disconnecting the existing Temple SW – Minerva 69-kV transmission line at STR 3/5. Establish the new Boggy Creek SW – Temple 138-kV transmission line by converting the 69-kV line between Boggy Creek SW and Temple to 138-kV operation. Establish a normally open disconnect switch at Temple on the newly established Boggy Creek SW – Temple 138-kV transmission line
- Replace nine of the existing 40 kA, 138-kV circuit breakers at Temple Elm Creek Switch with 63 kA circuit breakers
- Upgrade the existing Temple Elm Creek Switch – Temple Pecan Creek Switch 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 5.0-mile per-circuit

# Option 5 Modified Version (Continued)

- Upgrade the existing Temple Elm Creek – Temple North 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 0.61-mile per-circuit
- Upgrade the existing Temple North – Pepper Creek 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 2.2-mile per-circuit
- Upgrade the existing Temple SW – Temple Southeast – Scott White – Temple – Belton 138-kV transmission line with a minimum ratings of 486 MVA, 12.44-mile
- Upgrade the existing Belton – Belton Southwest – Harker Heights South – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 17.2-mile
- Upgrade the existing Belton – Nolanville - Harker Heights – Killeen Taft – Killeen Elms Rd – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 19.9-mile
- Keep the existing 345-kV double-circuit and the existing 345-kV line from Salado SW - Knob Creek - Temple but remove the existing 138-kV circuits from the existing 345-kV structures. Construct a new Bell County - Boggy Creek - Temple SW 138-kV transmission lines on new double-circuit structure with one circuit in place, utilizing the existing ROW, with a minimum ratings of 614 MVA, 7.7-mile
- Construct the new Watercrest 138-kV Switch substation near Killeen Ft. Hood Switch in a 4-breaker ring bus arrangement and install one capacitor bank consisting of three 36.8 Mvar stages
- Upgrade the Watercrest – Killeen Taft 138-kV line with a minimum ratings of 614 MVA, 7.8-mile
- Upgrade the Watercrest – Killeen SW 138-kV line with a minimum ratings of 493 MVA, 7.5-mile
- Install two 600 MVA 345/138-kV Autotransformers at the existing Salado SW and connect the 138-kV and 345-kV at Salado SW

# Option 5 Modified Version (New Components not in Option 4)

- Upgrade the existing Temple SW – Seaton 138-kV transmission line with a minimum ratings of 486 MVA, 2.7-mile
- Convert the existing Poage 69-kV substation to 138/69-kV substation by installing a new 100 MVA 138/69-kV
- Convert the existing Temple Taylor Valley 69-kV substation to 138-kV operational
- Convert the existing Seaton – Poage – Temple Taylor Valley – Bell County 69-kV transmission lines to 138-kV operational with a minimum ratings of 214 MVA, 17.73-mile



# Option 7 Modified Version – Option 4 with New 138-kV and 345-kV lines

- Install a second 345/138-kV autotransformer at the existing Temple Pecan Creek substation with 600 MVA rating and loop in the existing Temple SW – Bellfalls 345-kV transmission line into Temple Pecan Creek substation
- Install a second 345/138-kV autotransformer at the existing Temple SW substation with 600 MVA rating, and rebuild the existing Temple SW substation with 11 345-kV and 16 138-kV breakers in breaker-and-a-half arrangements, and remove the 138/69-kV autotransformer
- Construct a second circuit to the existing Temple Pecan Creek – Temple SW 138-kV transmission line with a minimum ratings of 486 MVA, 4.4-mile
- Construct a new Boggy Creek 138/69-kV substation approximately 3.58-mile south of the existing Temple 138-kV substation. Relocated the existing 138/69-kV autotransformer from Temple SW to the new Boggy Creek substation, install seven 138-kV breakers in breaker-and-a-half arrangement, and install two 69-kV breakers in single bus arrangement
- Loop in the existing Bell County SW – Temple SW 138-kV transmission line into the new Boggy Creek substation and loop in the existing Taylor SW – Temple SW 138-kV transmission line into the new Boggy Creek substation
- Construct a new Boggy Creek – Minerva 69-kV transmission line with a minimum ratings of 197, approximately 5.0-mile
  - From the Bobby Creek on the vacant sides of the existing double circuit capable structures of Taylor SW – Temple SW and Poage – Seaton 69-kV transmission lines and connecting the existing Minerva at STR 3/5. Disconnecting the existing Temple SW – Minerva 69-kV transmission line at STR 3/5. Establish the new Boggy Creek SW – Temple 138-kV transmission line by converting the 69-kV line between Boggy Creek SW and Temple to 138-kV operation. Establish a normally open disconnect switch at Temple on the newly established Boggy Creek SW – Temple 138-kV transmission line
- Replace nine of the existing 40 kA, 138-kV circuit breakers at Temple Elm Creek Switch with 63 kA circuit breakers
- Upgrade the existing Temple Elm Creek Switch – Temple Pecan Creek Switch 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 5.0-mile per-circuit

# Option 7 Modified Version (Continued)

- Upgrade the existing Temple Elm Creek – Temple North 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 0.61-mile per-circuit
- Upgrade the existing Temple North – Pepper Creek 138-kV double-circuit transmission line with a minimum ratings of 486 MVA, 2.2-mile per-circuit
- Upgrade the existing Temple SW – Temple Southeast – Scott White – Temple – Belton 138-kV transmission line with a minimum ratings of 486 MVA, 12.44-mile
- Upgrade the existing Belton – Belton Southwest – Harker Heights South – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 17.2-mile
- Upgrade the existing Belton – Nolanville - Harker Heights – Killeen Taft – Killeen Elms Rd – Killeen SW 138-kV transmission lines with a minimum ratings of 486 MVA, 19.9-mile
- Keep the existing 345-kV double-circuit and the existing 345-kV line from Salado SW - Knob Creek - Temple but remove the existing 138-kV circuits from the existing 345-kV structures. Construct a new Bell County - Boggy Creek - Temple SW 138-kV transmission lines on new double-circuit structure with one circuit in place, utilizing the existing ROW, with a minimum ratings of 614 MVA, 7.7-mile
- Construct the new Watercrest 138-kV Switch substation near Killeen Ft. Hood Switch in a 4-breaker ring bus arrangement and install one capacitor bank consisting of three 36.8 Mvar stages
- Upgrade the Watercrest – Killeen Taft 138-kV line with a minimum ratings of 614 MVA, 7.8-mile
- Upgrade the Watercrest – Killeen SW 138-kV line with a minimum ratings of 493 MVA, 7.5-mile
- Install two 600 MVA 345/138-kV Autotransformers at the existing Salado SW and connect the 138-kV and 345-kV at Salado SW

# Option 7 Modified Version (New Components not in Option 4)

- Upgrade the existing Temple SW – Seaton 138-kV transmission line with a minimum ratings of 486 MVA, 2.7-mile
- Construct a new Salado SW – Belton Southwest 138-kV transmission line with a minimum ratings of 486 MVA, approximately 7.4-mile
- Rebuild the existing Knob Creek – Salado SW 345-kV transmission line including double-circuit structures and install a second 345-kV circuit with a minimum ratings of 1912 MVA, 13.8-mile