INTERCONNECTION FACILITIES STUDY REPORT

GEN-2021-025

Published August 2025

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
August 18, 2025	SPP	Initial draft report issued.
September 4, 2025	SPP	Tables 2 & 3 revised to reflect allocation percentages as posted in the Phase 2 DISIS Report.
September 12, 2025	SPP	Final report issued.

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2021-025 is for a 203.04 MW generating facility located in Woodward County, OK. The Interconnection Request was studied in the DISIS-2021-001 Impact Study for ERIS. The Interconnection Customer's requested in-service date is 12/1/2026.

The interconnecting Transmission Owner, Western Farmer's Electric Coop. (WFEC), performed a detailed IFS at the request of SPP. The full report is included in Appendix A. SPP has determined that full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities (TOIF), Non-Shared Network Upgrades, Shared Network Upgrades, Contingent Network Upgrades, and Affected System Upgrades that are required for full interconnection service are completed.

The primary objective of the IFS is to identify necessary Transmission Owner Interconnection Facilities, Network Upgrades, other direct assigned upgrades, cost estimates, and associated upgrade lead times needed to grant the requested Interconnection Service.

PHASE(S) OF INTERCONNECTION SERVICE

It is not expected that Interconnection Service will occur in phases. However, full Interconnection Service will not be available until all Interconnection Facilities and Network Upgrade(s) can be placed in service.

COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)

FERC Order ER20-1687-000 eliminated the use of Attachment Z2 revenue crediting as an option for compensation. The Incremental Long Term Congestion Right (ILTCR) process will be the sole process to compensate upgrade sponsors as of July 1st, 2020.

INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of seventy-two (72) 2.82 MW GE 2.82 turbines for a total generating nameplate capacity of 203.04 MW.

The Interconnection Customer's Interconnection Facilities to be designed, procured, constructed, installed, maintained, and owned by the Interconnection Customer at its sole expense include:

- 34.5 kV underground cable collection circuits;
- 34.5 kV to 138 kV transformation substation with associated 34.5 kV and 138 kV switchgear;
- One 138 kV/34.5 kV 230/230/230 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 2 mile overhead 138 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 138 kV bus at existing Transmission Owner substation ("Western Farmers 138kV Mooreland Substation") that is owned and maintained by Transmission Owner;
- All transmission facilities required to connect the Interconnection Customer's substation to the POI;
- Equipment at the Interconnection Customer's substation necessary to maintain a composite power delivery at continuous rated power output at the high-side of the generator substation at a power factor within the range of 95% lagging and 95% leading in accordance with Federal Energy Regulatory Commission (FERC) Order 827. The Interconnection Customer may use inverter manufacturing options for providing reactive power under no/reduced generation conditions. The Interconnection Customer will be required to provide documentation and design specifications demonstrating how the requirements are met; and,
- All necessary relay, protection, control and communication systems required to protect Interconnection Customer's Interconnection Facilities and Generating Facilities and coordinate with Transmission Owner's relay, protection, control and communication systems.

TRANSMISSION OWNER INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADE(S)

To facilitate interconnection, the interconnecting Transmission Owner will perform work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities.

Table 1 and **Table 2** list the Interconnection Customer's estimated cost responsibility for Transmission Owner Interconnection Facilities (TOIF) and Non-Shared Network Upgrade(s) and provides an estimated lead time for completion of construction. The estimated lead time begins when the Generator Interconnection Agreement has been fully executed.

Table 1: Transmission Owner Interconnection Facilities (TOIF)

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Western Farmers 138kV Mooreland Substation GEN-2021-025 Interconnection (TOIF) (UID 157159): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-025 (203.04/Wind), into the Point of Interconnection (POI) at Western Farmers 138kV Mooreland Substation. Estimated Lead Time: 36 Months	$700,000	100.00%	$700,000
Total	**$700,000**		**$700,000**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Western Farmers 138kV Mooreland Substation GEN-2021-025 Interconnection Expansion (UID 157158): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-025 (203.04/Wind), into the Point of Interconnection (POI) at Western Farmers 138kV Mooreland Substation. Estimated Lead Time: 36 Months	Ineligible	$500,000	100.00%	$500,000
Total		**$500,000**		**$500,000**

SHARED NETWORK UPGRADE(S)

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in **Table 3** below.

Table 3: Interconnection Customer Shared Network Upgrade(s)

Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Rebuild NOELSW4 to ROSEVLY4 138 kV line 1 (UID 170667): Rebuild the NOELSW4 to ROSEVALY4 138 kV line CKT1 (8.15 miles) to a minimum rating of 200 MVA. Estimated Lead Time: 60 Months	Eligible	$7,335,000	72.85%	$5,343,788
Transmission Owner's Rebuild ROSEVLY4 to MOORLND4 138 kV line 1 (UID 170668): Rebuild the ROSEVLY4 to MOORLND4 138 kV line CKT1 (37.25) miles to a minimum rating of 205 MVA. Estimated Lead Time: 60 Months	Eligible	$33,525,000	72.85%	$24,424,064
OGE's Rebuild SOUTHRD4 to ROMNOSE4 138 kV line 1 (UID 170656): Rebuild the SOUTHRD4 to ROMNOSE4 138 kV line CKT1 (17.28 miles) to a standard rating of 478 MVA. Estimated Lead Time: 24 Months	Eligible	$20,736,000	24.67%	$5,116,151
Total		**$61,596,000**		**$34,884,003**

All studies have been conducted assuming that higher-queued Interconnection Request(s) and the associated Network Upgrade(s) will be placed into service. If higher-queued Interconnection Request(s) withdraw from the queue, suspend or terminate service, the Interconnection Customer's share of costs may be revised. Restudies, conducted at the customer's expense, will determine the Interconnection Customer's revised allocation of Shared Network Upgrades.

CONTINGENT NETWORK UPGRADE(S)

Certain Contingent Network Upgrades are **currently not the cost responsibility** of the Interconnection Customer but will be required for full Interconnection Service.

Table 4: Interconnection Customer Contingent Network Upgrade(s)

Contingent Network Upgrade(s) Description	Current Cost Assignment	Estimated In-Service Date
NA		

Depending upon the status of higher- or equally-queued customers, the Interconnection Request's in-service date is at risk of being delayed or Interconnection Service is at risk of being reduced until the in-service date of these Contingent Network Upgrades.

AFFECTED SYSTEM UPGRADE(S)

To facilitate interconnection, the Affected System Transmission Owner will be required to perform the facilities study work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities. **Table 5** displays the current impact study costs provided by either MISO or AECI as part of the Affected System Impact review. The Affected System facilities study could provide revised costs and will provide each Interconnection Customer's allocation responsibilities for the upgrades.

Table 5: Interconnection Customer Affected System Upgrade(s)

Affected System Upgrades Description	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA			
Total	**$0**		**$0**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 203.04 MW can be granted. Full Interconnection Service will be delayed until the TOIF, Non-Shared NU, Shared NU, Contingent NU, Affected System Upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities Upgrade(s)	$700,000
Non-Shared Network Upgrade(s)	$500,000
Shared Network Upgrade(s)	$34,884,003
Affected System Upgrade(s)	$0
Total	**$36,084,003**

Use the following link for Quarterly Updates on upgrades from this report: https://spp.org/spp-documents-filings/?id=18641

A draft Generator Interconnection Agreement will be provided to the Interconnection Customer consistent with the final results of this IFS report. The Transmission Owner and Interconnection Customer will have 60 days to negotiate the terms of the GIA consistent with the SPP Open Access Transmission Tariff (OATT).

APPENDICES

A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT AND NETWORK UPGRADES REPORT(S)

See next page for the Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).

FACILITY RESTUDY

for

DISIS-2021-001 Network Upgrade Request UID: 170656

Line Rebuild from SOUTHRD4 to ROMNOSE4 138kV
Blaine County
Oklahoma

August 7, 2025

Benjamin Sasu
Senior Engineer
Transmission Planning
OG&E Electric Services

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer for SPP DISIS-2021-001 UID 170656. The request for this study was placed with SPP in accordance with SPP's Open Access Transmission Tariff. The requirements for rebuilding the 17.3 mile line between Roman Nose 138kV and Southard to a minimum of 478MVA to be established by UID 170656. The total cost for OKGE to complete these network upgrades on the Roman Nose to Southard line is estimated at **$20,763,000.**

Table of Contents

Introduction

The Southwest Power Pool has requested a Facility Restudy for the purpose of rebuilding the 138kV transmission line between Roman Nose and Southard Substations within the service territory of OG&E Electric Services (OKGE) in Blaine County Oklahoma. This 138kV line is owned by OKGE. The cost for rebuilding the line, and associated equipment Roman Nose Substation and Southard Substation is estimated at **$20,736,000.**

Interconnection Facilities

The primary objective of this study is to identify attachment facilities. The requirements for rebuilding the 138kV line consists of replacing existing transmission poles and installing 17.3 miles of transmission conductor. This 138kV rebuild shall be constructed and maintained by OKGE.

The total cost for OKGE to complete the work is estimated at **$20,736,000**.

This Facility Study does not guarantee the availability of transmission service necessary to deliver the additional generation to any specific point inside or outside the Southwest Power Pool (SPP) transmission system. The transmission network facilities may not be adequate to deliver the additional generation output to the transmission system. If the customer requests firm transmission service under the SPP Open Access Transmission Tariff at a future date, Network Upgrades or other new construction may be required to provide the service requested under the SPP OATT.

The cost of rebuilding the 17.3 mile, 138kV line of the OKGE transmission system is listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with re-closer de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this line rebuild, no breakers were found to exceed their interrupting capability after the addition of the new equipment. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with UID 170656 interconnection.

Table 1: Required Interconnection Network Upgrade Facilities

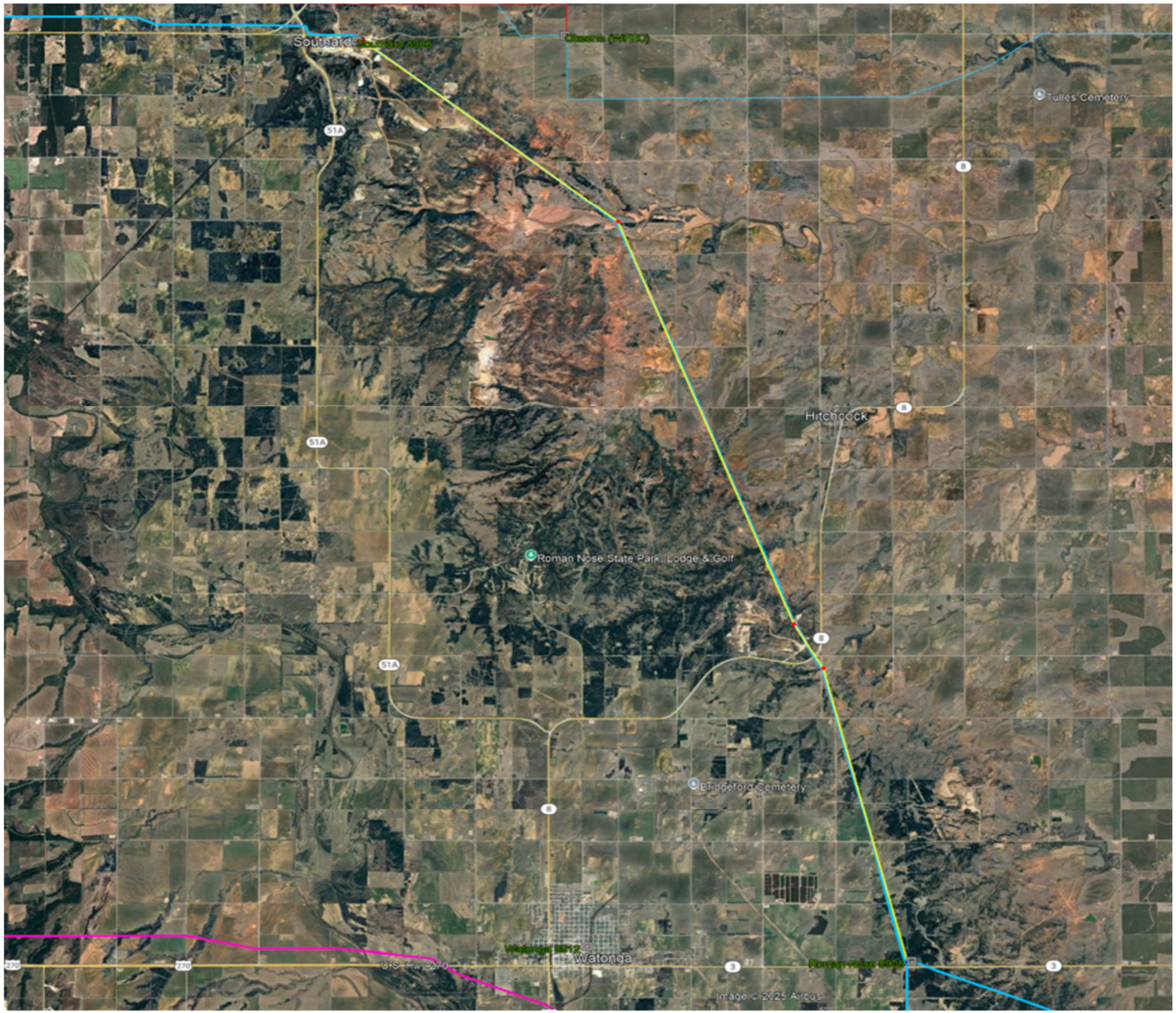
Facility	ESTIMATED COST (2025 DOLLARS)
Lead time	24 months
OKGE – **Interconnection Facilities**- No upgrades to interconnection facilities needed	**$0**
OKGE – **Network Upgrades** rebuild 17.3 miles of 138kV transmission line from Roman Nose Substation to Southard Substation	**$20,736,000**
OKGE – **Land or ROW** – no new land or ROW required	**$0**
Total	**$20,736,000**

Prepared by Benjamin Sasu
Senior Engineer, Transmission Planning
OG&E Electric Services

August 7, 2025

Reviewed by:
Adam Snap, P.E.
Manager, Transmission Planning

ROMAN NOSE TO SOUTHARD LINE



wfec
western farmers
electric cooperative
A Touchstone Energy® Cooperative

INTERCONNECTION FACILITY STUDY

for

Generation Interconnection Request GEN 2021-025

203MW Wind Generation Interconnection
in Woodward County, OK.

August 2025

SUMMARY

Pursuant to Attachment V of the tariff and at the request of the Southwest Power Pool (SPP), Western Farmers Electric Cooperative (WFEC) performed the following facility Study to satisfy the Facility Study agreement executed by the requesting customer for SPP Generation Interconnection request GEN-2021-025. The request for interconnection was placed with SPP in accordance with SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The requirements for interconnection consist of equipping a new 138kV terminal at the WFEC Mooreland 138kV Switch Station. The total interconnection cost for WFEC to accommodate the interconnection request at the 138kV POI is $1,200,000.

This facility study also includes the shared network upgrade of the 138kV line rebuild from Mooreland to Noel for $40,860,000.

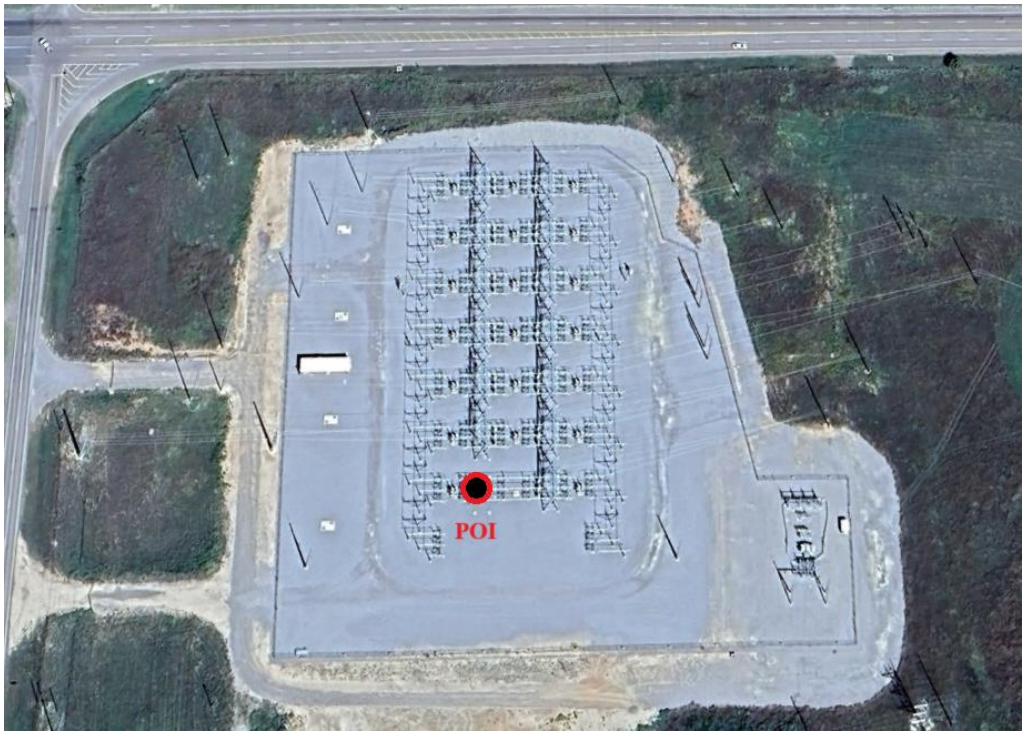


Table of Contents

Introduction

The Southwest Power Pool has requested a facility Study for the purpose of interconnecting 203 MW of Wind Generation within the service territory of WFEC in Woodward County, Oklahoma. The proposed 138kV interconnection is to a new terminal at the WFEC Mooreland 138kV Switch Station (36°26'0.75"N, 99°13'36.11"W).

The cost for adding a new 138kV terminal at the POI is estimated at $1,200,000. The estimated cost for rebuilding 45 miles of line from Mooreland to Noel is $40,860,000.

Network constraints within WFEC may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify WFEC interconnection facilities. Figure 1 below shows the proposed interconnection of GEN-2025-025.

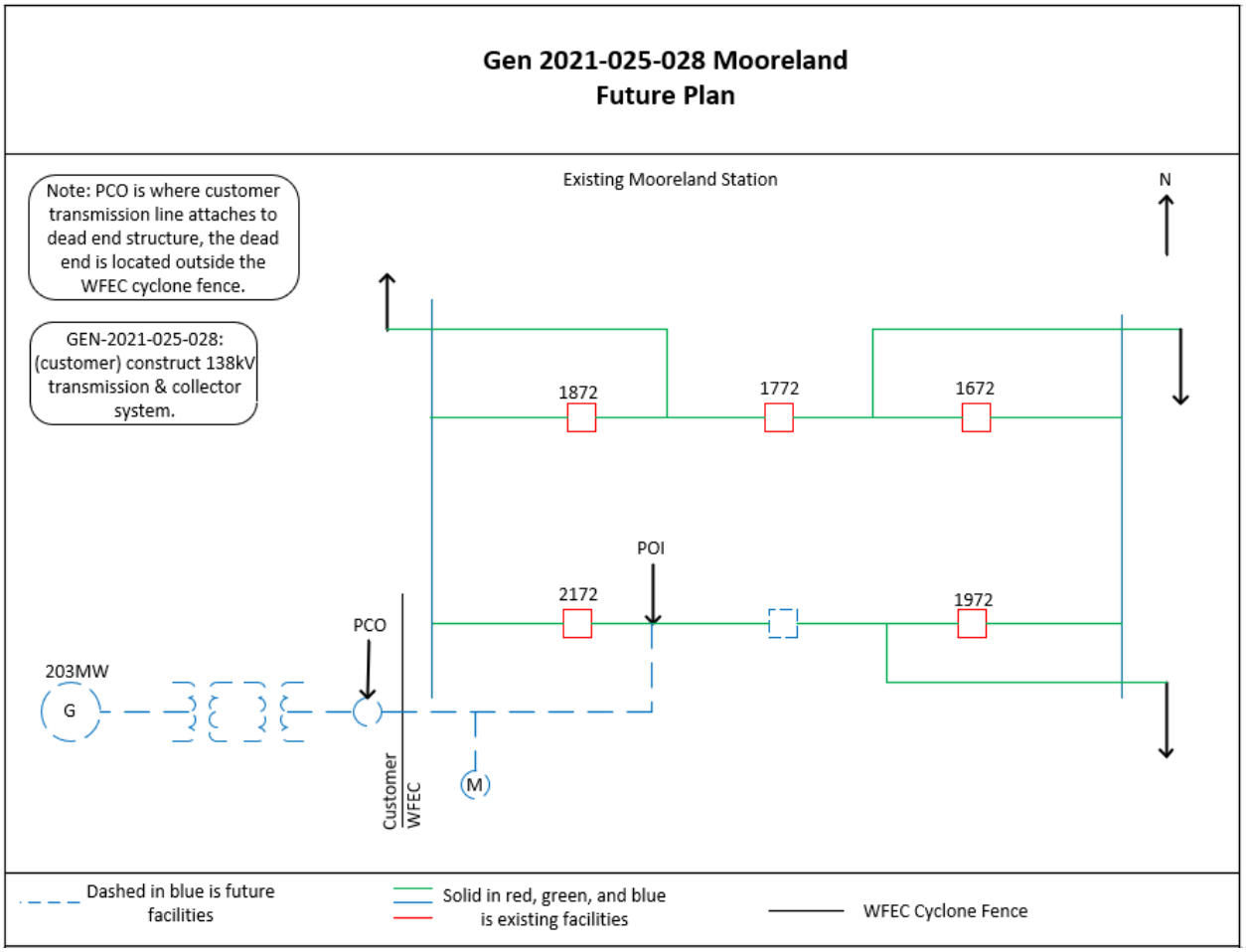


Figure 1: One-line Diagram Facilities for GEN-2021-025

To accommodate an interconnection for GEN 2021-025 WFEC will equip a new terminal by adding a breaker and expanding the buswork at the existing Mooreland Switch Station. The customer will construct a new 138kV transmission line from their collector sub to the point of demarcation. WFEC will

require the customer to install OPGW for communications from Customer's collector sub to WFEC's switch station.

The total cost for the interconnection facilities at POI is estimated at $1,200,000. This cost does not include the construction of the 138kV line from the customer substation to the point of demarcation at the edge of WFEC's property. The customer is responsible for this 138kV line up to the point of interconnection.

This facility study does not guarantee the availability of transmission service necessary to deliver additional generation to any specific point inside or outside of the SPP transmission system. The transmission network facilities may not be adequate to deliver any additional generation output to the system. If the customer requests firm transmission service under the SPP open access transmission tariff at a future date, Network Upgrades or other new construction may be required to provide the service requested under the SPP OATT.

Short Circuit Fault Duty Evaluation:

It is standard practice for WFEC to recommend replacing a circuit breaker when the current through the breaker for a potential fault exceeds 100% of its interrupting rating, as determined by the ANSI/IEEE standard C37-010-2016 breaker rating methods. Existing levels of available fault current at Mooreland Switch Station are shown below.

WFEC has evaluated the potential maximum fault current in this area and no issues with short circuit duty ratings are expected on existing WFEC breakers with the proposed interconnection of 203MW of wind generation at the Mooreland 138kV Switch Station.

Table 1: Mooreland Switch Station 138kV Breaker Capacity

BUS	BREAKER	DUTY %	DUTY (A)	BKR CAPACITY (A)
Mooreland 138kV	138kV Breakers (x20) (172 – 1972, 2172)	36%	22500 (2LG)	63000

Interconnection Cost

Table 2: Transmission Owner Interconnection Facilities

Transmission Owner Interconnection Facilities (TOIF) **UID: 157159**	**Cost Estimate ($)**	**Estimated Lead Time**
WFEC Mooreland Switch Interconnection Substation: Construct one 138kV line terminal, line switches, dead end structure, one 138kV transmission line span, line relaying, communications, revenue metering, line arrestors, and all associated equipment and facilities necessary to accept transmission line from Interconnection Customer's Generating Facility.	Engineering: $100,000 ROW: $0 Material: $300,000 Construction: $300,000 **TOTAL: $700,000**	**36 Months**

Table 3: Non-Shared Network Upgrades

Non-Shared Network Upgrades Description **UID: 157158**	**Cost Estimate ($)**	**Estimated Lead Time**
WFEC Mooreland Switch Interconnection Substation: Construct breaker and bus	Engineering: $50,000 ROW: $0 Material: $350,000 Construction: $100,000 **TOTAL: $500,000**	**36 Months**

Shared Network Upgrades

Table 4a: Shared Network Upgrades – Mooreland to Rose Valley 138kV

Shared Network Upgrades Description **UID: 170668**	**Cost Estimate ($)**	**Estimated Lead Time**
Mooreland to Rose Valley 138kV Line Rebuild: Rebuild 37.25 miles of 138kV transmission from Mooreland Switch Station to Rose Valley Tap.	Engineering: $ 1,676,250 ROW: $ 1,676,250 Material: $15,086,250 Construction: $ 15,086,250 **TOTAL: $33,525,000**	**60 Months**

Table 4b: Shared Network Upgrades– Rose Valley to Noel Switch 138kV

Shared Network Upgrades Description **UID: 170667**	**Cost Estimate ($)**	**Estimated Lead Time**
Noel to Rose Valley 138kV Line Rebuild: Rebuild 8.15 miles of 138kV transmission from Noel Switch Station to Rose Valley Tap.	Engineering: $336,750 ROW: $366,750 Material: $3,300,750 Construction: $3,300,750 **TOTAL: $7,335,000**	**60 Months**

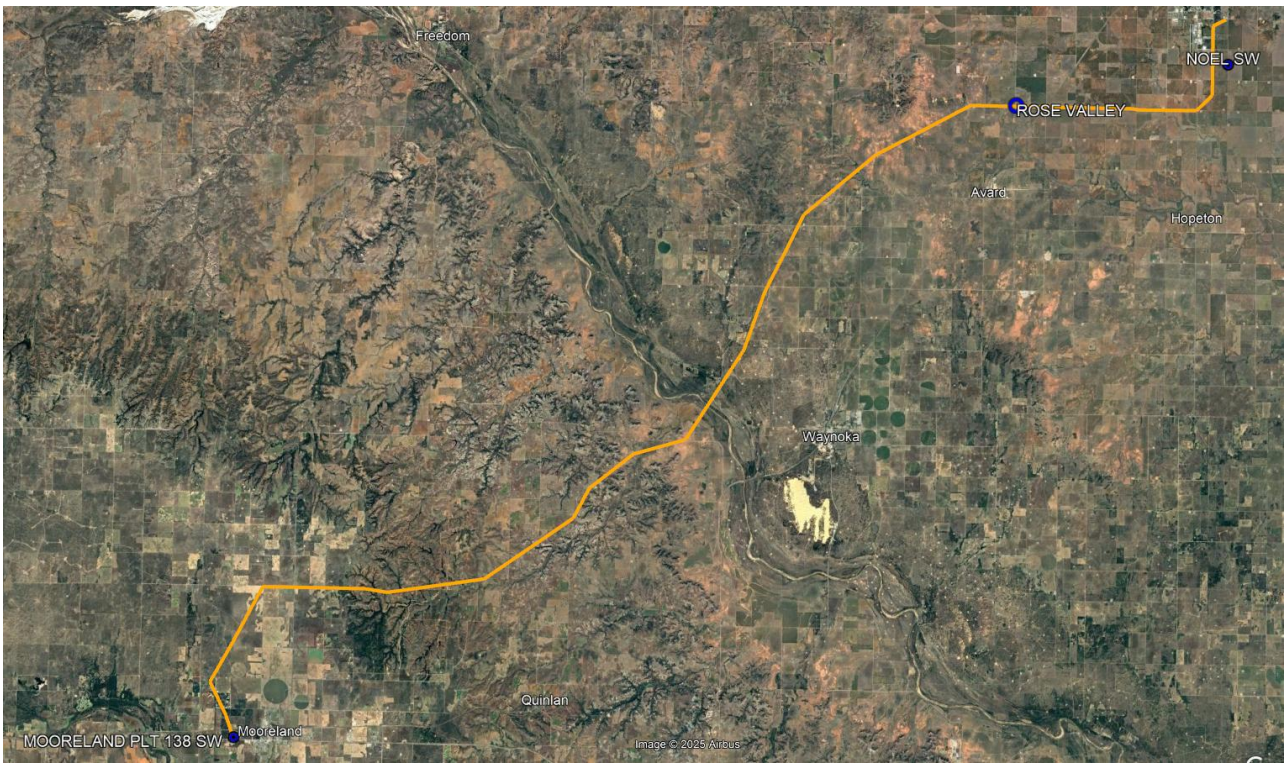


Figure 2: Mooreland – Noel 138kV Transmission Line