INTERCONNECTION FACILITIES STUDY REPORT

GEN-2021-001

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.
August 29, 2025	SPP	UID 170691 added to separate scope of work.
October 1, 2025	SPP	Final report issued.
November 21, 2025	SPP	OGE Facility Study Updated and IFS updated to reflect the reallocation of costs.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2021-001 is for a 100 MW generating facility located in Bryan County, OK. The Interconnection Request was studied in the DISIS-2021-001 Impact Study for ERIS/NRIS. The Interconnection Customer's requested in-service date is 12/24/2027.

The interconnecting Transmission Owner, Oklahoma Gas & Electric (OGE), 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 twenty-four (24) Sungrow SC5000UD-MV-US inverters and two (2) Sungrow SC2500US-MV-US inverters for a total generating nameplate capacity of 100 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 67/90/112 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 1000 foot underground 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 ("138 kV Brown 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 138kV Brown Substation GEN-2021-001 Interconnection (TOIF) (UID 157000): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-001 (100/Battery/Storage), into the Point of Interconnection (POI) at 138kV Brown Substation. Estimated Lead Time: 36 Months	$3,511,024	100.00%	$3,511,024
Total	**$3,511,024**		**$3,511,024**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's 138kV Brown Substation GEN-2021-001 Interconnection (Non-shared NU) (UID 157001): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-001 (100/Battery/Storage), into the Point of Interconnection (POI) at 138kV Brown Substation. Estimated Lead Time: 36 Months	Ineligible	$10,795,297	100.00%	$10,795,297

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Build new 138 kV second CKT from SBROWN4 TO BROWN4 & move COLBRTP4 138kV f/ SBROWN4 to BROWN4 (OGE) (UID 170691): Move COLBRTP4 138 kV from SBROWN4 to BROWN4. Add new 138 kV second circuit from BROWN4 to SBROWN4. Estimated Lead Time: 36 Months	Eligible	$3,350,000	100.00%	$3,350,000
Transmission Owner's Reconfigure Little City to Brown 138 kV Line (Non-Shared NU) (UID 170658): Move Little City to Brown 138 kV Substation from Brown Tap 138 kV Substation. Estimated Lead Time: 24 Months	Eligible	$375,000	100.00%	$375,000
Total		**$14,520,297**		**$14,520,297**

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA				
Total		**$0**		**$0**

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
Transmission Owner's SPA Brown to Brown 138 kV Equipment Upgrade (UID 156498): Upgrade the terminal equipment at Brown SPA to achieve a minimum summer/emergency rating of 478 MVA	**$0**	36 Months (Estimated)

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 100 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)	$3,511,024
Non-Shared Network Upgrade(s)	$14,520,297
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$18,031,321**

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 STUDY

for

Generation Interconnection Request 2021-001

100 MW Battery/Storage Generating Facility
In Bryan County
Oklahoma

November 19th, 2025

Benjamin Sasu.
Senior Transmission Planning Engineer
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 Generation Interconnection request GEN-2021-001. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The interconnect of Gen-2021-001 will require OG&E to convert Brown substation to breaker and a half configuration. The requirements for interconnection will consist of expanding and adding fifteen 138kV breakers, moving transmission lines into brown, a terminal for the Battery/Storage, associated metering, protection, and communications in Brown Substation. The total cost for OKGE to complete the necessary work is estimated at **$14,306,321**.

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Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting a Battery/Storage generating facility within the service territory of OG&E Electric Services (OKGE) in Bryan County, Oklahoma. The proposed 138kV point of interconnection is at Brown Substation near Bryan. This substation is owned by OKGE. The cost of expanding and adding a new 138kV terminal to Brown Substation, the required interconnection facility for Gen-2021-001 is estimated at **$14,306,321**.

Network Constraints in the Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Other Network Constraints in the American Electric Power West (AEPW), Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify attachment facilities. The requirements for interconnection consist of expanding and adding a new 138kV terminal at Brown substation. This 138kV addition shall be constructed and maintained by OKGE. It is assumed that obtaining all necessary right-of-way for the line into Brown substation will be performed by the interconnection customer.

The total cost for OKGE to expand add a new 138kV terminal to an existing substation, by the gen-tie facility, is estimated at **$14,306,321**. This cost does not include building the 138kV line from the Customer substation into the POI Substation. The Customer is responsible for this 138kV line up to the point of interconnection. This cost does not include the Customer's 138-34.5kV substation and the cost estimate should be determined by the Customer.

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.

OKGE has not included the costs of any additional land or transmission easements as it is OKGE's expectation that new land for substation expansion or transmission easements necessary to route lines into expanded and reconfigured substation will be provided by Interconnection Customer as this work would not be necessary except for to accommodate the interconnection of their facilities.

The costs of interconnecting the facility to the OKGE transmission system are 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 generator interconnection, no breakers were found to exceed their interrupting capability after the addition of the Customer's 100MW generation and related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with the GEN-2021-001 interconnection.

Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2025 DOLLARS)
Lead Time	36 months
OKGE – **Interconnection Facilities**- Add a single 138kV line terminal to Brown Substation, 2-138kV 3000A breakers. Dead end structure, line switch, line relaying, revenue metering including CTs and PTs	$3,511,024
OKGE – **Network Upgrades** at Brown Sub, Expand and install 13-138kV 3000A breakers, line relaying, disconnect switches, and associated equipment.	$10,795,297
OKGE - Right-of-Way for 138kV terminal addition	No Additional ROW
Total	**$14,306,321**

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November 19th, 2025

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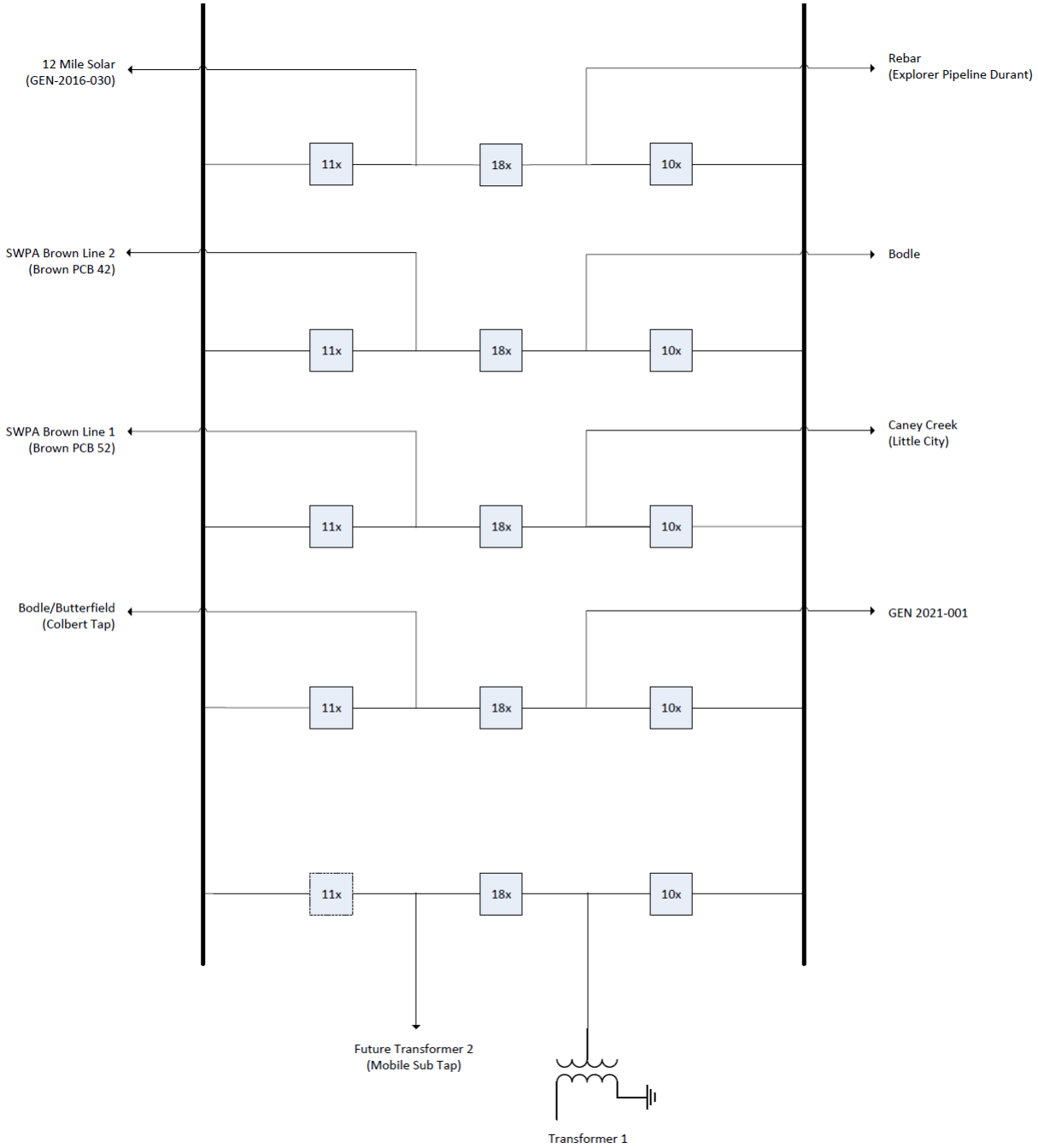
November 19th, 2025

BROWN SUBSTATION



FACILITY RESTUDY

for

DISIS-2021-001 Network Upgrade Request UID: 170658

Reconfigure Little City to Brown 138kV
Bryan 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 170658. The request for this study was placed with SPP in accordance with SPP's Open Access Transmission Tariff. The requirement for reconfiguring the line little city to Brown Substation to a minimum of 478MVA to be established by UID 170658. The total cost for OKGE to complete these network upgrades on the little city line to brown sub is estimated at **$375,000.**

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Introduction

The Southwest Power Pool has requested a Facility Restudy for the purpose of reconfiguring the 138kV transmission line Little City to Brown Substations within the service territory of OG&E Electric Services (OKGE) in Bryan County Oklahoma. This 138kV line is owned by OKGE. The cost for reconfiguring the line and associated equipment Brown Substation is estimated at **$375,000.**

Interconnection Facilities

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

The total cost for OKGE to complete the work is estimated at **$375,000**.

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.

OKGE has not included the costs of any additional land or transmission easements as it is OKGE's expectation that new land for transmission easements necessary to route lines into expanded and reconfigured substation will be provided by Interconnection Customer as this work would not be necessary except for to accommodate the interconnection of their facilities.

The cost of reconfiguring the 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 reconfiguration, 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 170658 interconnection.

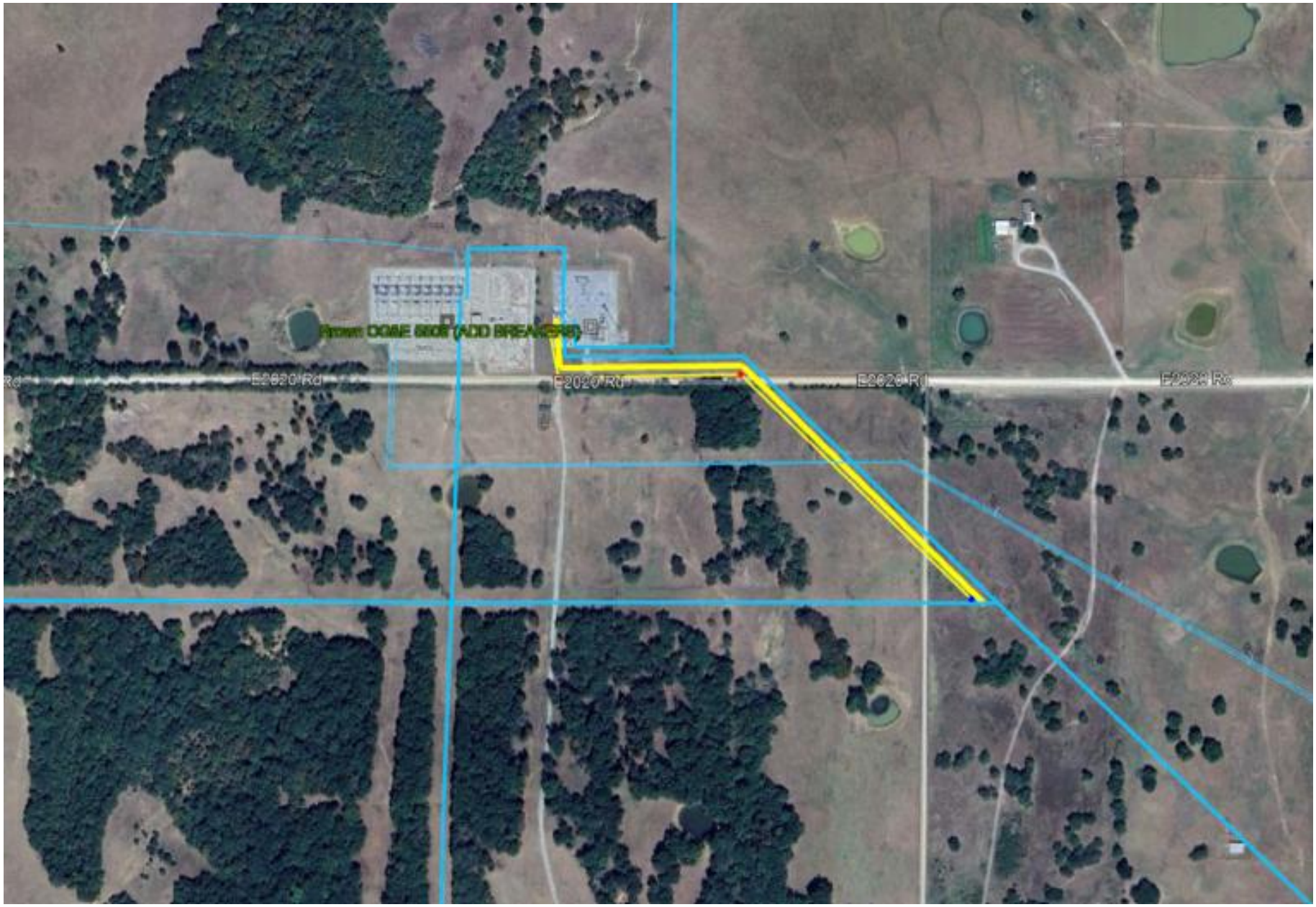
Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2025 DOLLARS)
Lead time	36 months
OKGE – **Interconnection Facilities**- No upgrades to interconnection facilities needed	**$0**
OKGE – **Network Upgrades** Reconfigure .36 miles of Little City to Brown Line, and associated equipment	**$375,000**
OKGE – **Land or ROW** – no new land or ROW required	**$0**
Total	**$375,000**

Prepared by Benjamin Sasu August 7, 2025
Senior Engineer, Transmission Planning
OG&E Electric Services

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

RECONFIGURE LITTLE CITY TO BROWN SUBSTATION



FACILITY STUDY

for

DISIS-2021-001 Network Upgrade Request UID: 170691

Build a new 138kV second CKT from SBrown4 to Brown4 and move COLBRTP4 138kV from SBrown4 to Brown4(OKGE)
In Bryan County
Oklahoma

August 27th, 2025

Benjamin Sasu.
Senior Transmission Planning Engineer
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 170691. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff. The requirement to build a new 138kV second CKT from SBrown4 to Brown4 and move COLBRTP4 138kV from SBrown4 to Brown4(OKGE) to be established by UID 170691. The total cost for OKGE to complete the necessary work is estimated at **$3,350,000**.

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Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of building a new 138kV second CKT from SBrown4 to Brown4 and move COLBRTP4 138kV from SBrown4 to Brown4(OKGE) within the service territory of OKGE Electric services (OKGE) in Bryan County Oklahoma. The cost for this reconfiguration at Brown Substation is estimated at **$3,350,000.**

Network Constraints in the Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Other Network Constraints in the American Electric Power West (AEPW), Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify attachment facilities. The requirements for building a new 138kV second CKT from SBrown4 to Brown4 and move COLBRTP4 138kV from SBrown4 to Brown4(OKGE). This 138kV line shall be constructed and maintained by OKGE.

The total cost for OKGE to the work is estimated at **$3,350,000.**

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.

OKGE has not included the costs of any additional land or transmission easements as it is OKGE's expectation that new land for substation expansion or transmission easements necessary to route lines into expanded and reconfigured substation will be provided by Interconnection Customer as this work would not be necessary except for to accommodate the interconnection of their facilities.

The costs of expanding Brown Substation for interconnection facility are 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 generator interconnection, no breakers were found to exceed their interrupting capability after the addition of the Customer's 100MW generation and related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with UID 170691 interconnection.

Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2025 DOLLARS)
Lead Time	36 months
OKGE – **Interconnection Facilities**- Expand Substation and, line switch, line relaying, revenue metering including CTs and PTs	$0
OKGE – **Network Upgrades-** Build a new 138kV second CKT from SBrown4 to Brown4 and move COLBRTP4 138kV from SBrown4 to Brown4(OKGE)	**$3,350,000**
OKGE - Right-of-Way for 138kV terminal addition	No Additional ROW
Total	**$3,350,000**

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BROWN SUBSTATION