INTERCONNECTION FACILITIES STUDY REPORT

GEN-2017-214

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
04/13/2023	SPP	Initial draft report issued.
12/20/2023	SPP	Cost updates due to withdrawal of GEN-2017-216, GEN-2017-235, and GEN-2017-236
07/02/2024	SPP	Upgrades revised to reflect latest study.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request is for a 100 MW generating facility located in Ward County, ND. The Interconnection Request was studied in the DISIS-2017-002 Impact Study for ERIS. The Interconnection Customer's requested in-service date is December 30, 2026.

The interconnecting Transmission Owner, Basin Electric Power Cooperative (BEPC), 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 (50) General Electric 2.0 wind turbines 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 230 kV transformation substation with associated 34.5 kV and 230 kV switchgear;
- One 230/34.5 kV 69/92/115 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- Approx. 35 miles 230 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 230 kV bus at existing Transmission Owner substation ("Logan 230kV 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** lists 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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
Logan 230kV GEN-2017-214, GEN-2017-215 Interconnection (TOIF) (BEPC) (143507): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-214 (100 MW/Wind), into the Point of Interconnection (POI) at Logan 230kV	$937,785	50%	$468,892	15 Months
Total	**$937,785**		**$468,862**	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
N/A	N/A	N/A	N/A	N/A	N/A
Total		**N/A**		**N/A**	

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
Logan 230kV GEN-2017-214 Interconnection (BEPC) (143506): Facilitate the interconnection of GEN-2017-214 and GEN-2017-215	Ineligible	$1,317,063	50%	$638,532	15 Months
Total		**$1,317,063**		**$638,532**	

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	**NA**	**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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
MISO; Build new 2.5 mile Xcel 115kV line from Magic City to Mallard subs	$5,000,000	21.7%	$1,085,889
Total	**$5,000,000**		**$1,085,889**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 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)	$468,862
Non-Shared Network Upgrade(s)	$0
Shared Network Upgrade(s)	$638,532
Affected System Upgrade(s)	$1,085,889
Total	**$2,193,283**

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).

Basin Electric Power Cooperative
Interconnection Facilities Study
GEN-2017-214/GEN-2017-215/GEN-2017-216
GEN-2017-235/GEN-2017-036

1. Background:

1.1 Per SPP Generation Interconnection Process[1], Basin Electric Power Cooperative (Basin Electric) received a request to perform an Interconnection Facility Study Analysis for the following Interconnection Requests:

Upgrade Type	UID	Upgrade Name
Interconnection	143506	Logan 230kV Interconnection Expansion (DISIS-2017-002)
Interconnection	143507	Logan 230kV GEN-2017-214 Interconnection (TOIF) (BEPC)
Interconnection	143509	Logan 230kV GEN-2017-215 Interconnection (TOIF) (BEPC)
Interconnection	143511	Logan 230kV GEN-2017-216 Interconnection (TOIF) (BEPC)
Interconnection	143547	Logan 230kV GEN-2017-235 Interconnection (TOIF) (BEPC)
Interconnection	143549	Logan 230kV GEN-2017-236 Interconnection (TOIF) (BEPC)

[1] SPP Tariff Attachment V Generator Interconnection Procedures (GIP) Section 8.11

2. Study Requirements:

Basin Electric has performed this Interconnection Facility Study Analysis in accordance with SPP Tariff Attachment V, Generator Interconnection Procedures (GIP) Section 8.11 for the Interconnection Request(s) as described in Section 1.

2.1. The Interconnection Facility Study Analysis includes an evaluation of the following:

2.1.1. Perform/develop a substation layout, perform a preliminary bus design, determine all electrical equipment requirements, and if required determine a suitable site location to accommodate the Request. Develop/compile cost estimates for all Basin Electric labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

2.1.2. Develop an overall construction schedule for completion of the necessary additions and/or modifications.

2.1.3. Point Of Change of Ownership. For the purposes of this Study Analysis, the Point of Change of Ownership location is defined as the take-off structure(s) at the Basin Electric Substation/Switching Station where the Interconnection Customer's

transmission line(s) connects to the take-off structure(s). Interconnection Customer will furnish and install the conductor jumper and insulator assembly to the take-off structure(s).

2.1.4. Other Interconnection/Metering Requirements. Basic indication, metering, monitoring, control, and relaying requirements due to a generator interconnection are included in the cost estimate. Basin Electric's generation metering requirements, as an SPP Transmission Owner, must be met. A list of specific needs will be provided by Basin Electric once design has progressed.

3. Study Results for GEN-2017-214:

3.1. The following results document the analysis of the required facilities for this Interconnection Request as outlined in Section 1 for a new 230 kV line terminal at the Logan 230/115 kV Substation. Basin Electric has determined that the following additions and improvements are required to maintain a safe and reliable interconnection to Basin Electric's transmission system.

3.2 Substation/Switchyard

A 230 kV terminal addition will be built to accommodate the new generation resource interconnection. This terminal will be added to the existing ring bus substation. Reference Figures A1 and A2. All equipment will follow Basin Electric's internal design standards for minimum BIL, ampacity, and fault capabilities.

The associated work for the new 230 kV line terminal includes the following major additions:

- (1) 230 kV Line Take-Off Structures
- (1) 230 kV Breaker
- (2) 230 kV Breaker Disconnect Switches
- (1) Set of Line Potential Transformers
- (1) Set of Current Transformers
- (1) Set of Line Surge Arrestors

There are costs estimated for protective relay setting and revenue metering review to support the following interconnections:

- GEN-2017-215
- GEN-2017-216
- GEN-2017-235
- GEN-2017-236

3.3 Environmental Requirements

Compliance with all applicable federal, state and local regulations will be strictly adhered to. Additionally, all applicable and required permits and approvals will be obtained prior to construction. For the purposes of this Study, it is anticipated that this new 230 kV line terminal will require incidental minor local permitting.

3.4 Cost Estimate

GEN-2017-214 Estimated Costs UID 143506 Non Shared Network Upgrades	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$280,720
Construction Labor	$482,360
Site Property Rights	$0
Reactive Compensation	$0
Material	$229,750
Right of Way	$0
Station Sub Total	**$992,830**
AFUDC	$0
Contingency	$324,233
Non - Shared Network Upgrades total	**$1,317,063**

GEN-2017-214 UID 143507 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$100,000
Construction Labor	$294,095
Site Property Rights	$0
Reactive Compensation	$0
Material	$312,827
Right of Way	$0
Station Sub Total	**$706,922**
AFUDC	$0
Contingency	$230,863
TOIF Subtotal	**$937,785**

Total Interconnection Cost	**$2,254,848**

GEN-2017-215 UID 143509 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$100,000
Construction Labor	$0
Site Property Rights	$0
Reactive Compensation	$0
Material	$0
Right of Way	$0
Station Sub Total	**$100,000**
AFUDC	$0
Contingency	$0
TOIF Subtotal	**$100,000**

Total Interconnection Cost	**$100,000**

GEN-2017-216 UID 143511 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$100,000
Construction Labor	$0
Site Property Rights	$0
Reactive Compensation	$0
Material	$0
Right of Way	$0
Station Sub Total	**$100,000**
AFUDC	$0
Contingency	$0
TOIF Subtotal	**$100,000**

Total Interconnection Cost	**$100,000**

GEN-2017-235 UID 143547 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$100,000
Construction Labor	$0
Site Property Rights	$0
Reactive Compensation	$0
Material	$0
Right of Way	$0
Station Sub Total	**$100,000**
AFUDC	$0
Contingency	$0
TOIF Subtotal	**$100,000**

Total Interconnection Cost	**$100,000**

GEN-2017-236 UID 143549 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$100,000
Construction Labor	$0
Site Property Rights	$0
Reactive Compensation	$0
Material	$0
Right of Way	$0
Station Sub Total	**$100,000**
AFUDC	$0
Contingency	$0
TOIF Subtotal	**$100,000**

Total Interconnection Cost	**$100,000**

3.5 Construction Schedule

The preliminary project schedule provided is for planning level purposes only and will be adjusted with additional project definition. If it is determined that NEPA and/or ROW condemnation is required, 12-18 months will be added to the In-Service date.

Activity	Duration	Estimated Start	Estimated Finish
Executed GIA-Notice To Proceed Letter	--	Month 0	--
Project Planning	1 Month	Month 0	Month 1
Engineering Design	6-8 Months	Month 1	Month 9
Equipment Procurement	8-20 Months	Month 2	Month 22
Advertise and Award Construction Contracts	2-3 Months	Month 15	Month 18
Construction	4 Months	Month 21	Month 25
Energize and In-Service Date	1 Month	Month 25	Month 26

Figure A1: Proposed Switching Diagram

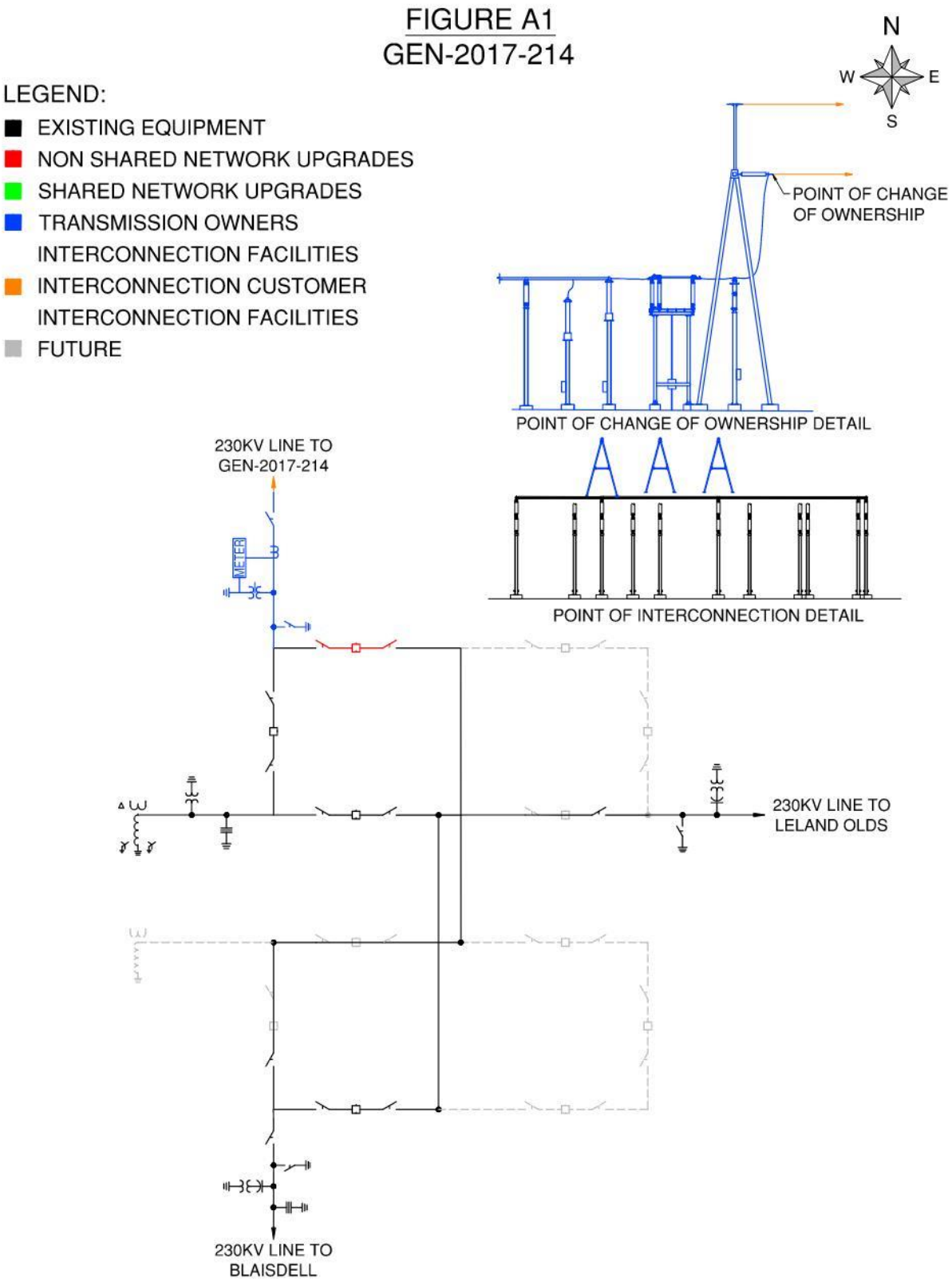
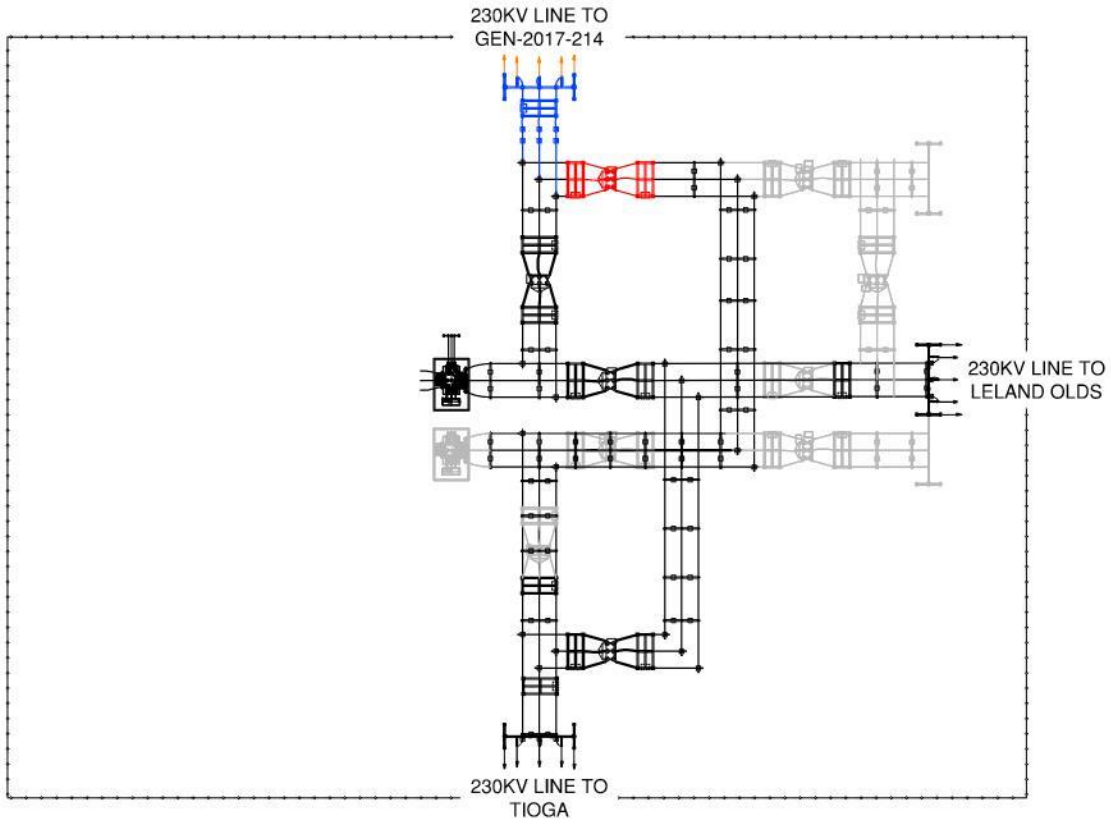


Figure A2: Proposed General Arrangement

FIGURE A2
GEN-2017-214

LEGEND:

- EXISTING EQUIPMENT
- NON SHARED NETWORK UPGRADES
- SHARED NETWORK UPGRADES
- TRANSMISSION OWNERS INTERCONNECTION FACILITIES
- INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES
- FUTURE



ATTACHMENT A

SPP INTERCONNECTION FACILITIES STUDY REQUEST LETTER

December 29, 2022

Subject: Facilities Study Request for DISIS-2017-002

Dear Mr. Severson:

Per the Generator Interconnection Procedures (GIP), SPP requests that Basin Electric Power Cooperative (BEPC) perform facilities study in accordance with Section 8.11 for the following Interconnection and/or Network Upgrade(s):

Upgrade Type	UID	Upgrade Name	DISIS Cost Estimate	DISIS Lead Time
Current Study	156423	Groton 345-115 kV Second Transformer Build (DISIS-2017-002)	$9,435,938.00	36
Current Study	156455	Logan 230-115 kV Transformer Replacement (DISIS-2017-002)	$7,187,673.00	36
Interconnection	143484	Groton 345kV Interconnection Expansion (DISIS-2017-002)	$1,497,972.00	15
Interconnection	143506	Logan 230kV Interconnection Expansion (DISIS-2017-002)	$1,317,063.00	15
Interconnection	143507	Logan 230kV GEN-2017-214 Interconnection (TOIF) (BEPC)	$937,785.00	15
Current Study	156415	Groton BE8 to Groton South 115 kV Second Line Build (DISIS-2017-002) (BEPC)	$656,362.00	36
Interconnection	143485	Groton 345kV GEN-2017-199 Interconnection (TOIF) (BEPC)	$395,733.00	15
Interconnection	143487	Groton 345kV GEN-2017-200 Interconnection (TOIF) (BEPC)	$395,733.00	15
Interconnection	143509	Logan 230kV GEN-2017-215 Interconnection (TOIF) (BEPC)	$50,000.00	3
Interconnection	143511	Logan 230kV GEN-2017-216 Interconnection (TOIF) (BEPC)	$50,000.00	3
Interconnection	143547	Logan 230kV GEN-2017-235 Interconnection (TOIF) (BEPC)	$50,000.00	3
Interconnection	143549	Logan 230kV GEN-2017-236 Interconnection (TOIF) (BEPC)	$50,000.00	3

** If the upgrade cost studied is higher than 20% of DISIS estimates, please provide justification in the facility report.*

The scope of the Facilities Study is to determine the cost estimates of equipment, engineering, procurement, and construction as well as the associated lead times.

For the completion of this Facilities Study request, please provide a Facilities Study report to SPP within ninety (90) calendar days to include all of their Interconnection and Network Upgrade(s) listed in the

table above. Additionally, please provide an updated and completed Standardized Cost Estimate Report (SCERT) via the Transmission Reporting and Communication (TRAC) tool.

Sincerely,
SPP Generator Interconnection Department
201 Worthen Drive
Little Rock, AR 72223-4936