INTERCONNECTION FACILITIES STUDY REPORT

GEN-2020-021

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
June 5, 2025	SPP	Initial draft report issued.
June 23, 2025	SPP	Final report issued.

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2020-021 is for a 235 MW generating facility located in Sioux County, ND. The Interconnection Request was studied in the DISIS-2020-001 Impact Study for NRIS. The Interconnection Customer's requested in-service date is 12/31/2026.

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 sixty (60) Vestas V150 WTG - 150m Rotors wind turbines for a total generating nameplate capacity of 235 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 345 kV transformation substation with associated 34.5 kV and 345 kV switchgear;
- One 345 kV/34.5 kV 100/133/167 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 14.5 mile overhead 345 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 345 kV bus at existing Transmission Owner substation ("LeLand Olds-Chapelle Creek 345kV line") 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 LeLand Olds-Chapelle Creek 345kV line GEN-2020-021 Interconnection (TOIF) (UID156923): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2020-021 (235/Wind), into the Point of Interconnection (POI) at LeLand Olds-Chapelle Creek 345kV line. Estimated Lead Time: 60 Months	$4,272,447	100.00%	$4,272,447
Total	**$4,272,447**		**$4,272,447**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's LeLand Olds-Chapelle Creek 345kV line GEN-2020-021 Interconnection (UID156922): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2020-021 (235/Wind), into the Point of Interconnection (POI) at LeLand Olds-Chapelle Creek 345kV line. Estimated Lead Time: 60 Months	Ineligible	$28,072,797	100.00%	$28,072,797
WAPA's Build the FTTHOMP3 to FTTHOMP4 345kV Transformer 3 (UID 170610): Build a new FTTHOMP3 to FTTHOMP4 345-230 kV transformer 3 with a rating of 250/313 MVA. Estimated Lead Time: 80 Months	Eligible	$44,600,000	100.00%	$44,600,000
Total		**$72,672,797**		**$72,672,797**

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
NA	**$0**	

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
MPC ASA DISIS-2020-001: Structure Raise Jamestown - Center 345 kV	$11,500,000	38.21%	$4,394,660
MPC ASA DISIS-2020-001: Structure Raise Bison - Buffalo 345 kV	$1,000,000	39.91%	$399,097
MPC ASA DISIS-2020-001: Structure Raise Buffalo - New Sub 345 kV	$2,000,000	39.87%	$797,359
Total	**$14,500,000**		**$5,591,116**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 235 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)	$4,272,447
Non-Shared Network Upgrade(s)	$72,672,797
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$5,591,116
Total	**$82,536,360**

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).

Network Upgrade Interconnection Facilities Study Report

Southwest Power Pool, Inc. (SPP)

Fort Thompson 345-kV

3rd Transformer Addition

(DISIS-2020-001)

Western Area Power Administration

Upper Great Plains Region (WAPA-UGP)

June 2025

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1.0 Background:

Western Area Power Administration Upper Great Plains Region (WAPA-UGP[1]) received a request for an Interconnection Facilities Study in accordance with the Southwest Power Pool Inc. (SPP) Open Access Transmission Tariff (OATT). Generator Interconnection Request, GEN-2020-021, represents a 235 MW request with a Point of Interconnection (POI) on Basin Electric Power Cooperative's (BEPC) Leland Olds-Chapelle Creek 345-kV Line. GEN-2020-021 was included in the SPP Definitive Interconnection System Impact Study (DISIS) 2020-001 which identified the need for a 3rd 345-kV/230-kV transformer at WAPA-UGP's Fort Thompson 2 Substation. WAPA-UGP is not the Transmission Owner of the POI. The work required to accommodate the addition of the 3rd 345-kV/230-kV transformer at WAPA-UGP's Fort Thompson 2 Substation is considered a Network Upgrade constructed by another transmission owning entity and will require a Notification to Construct (NTC) from SPP.

The Network Upgrade to install a 3rd 345/230-kV transformer at WAPA-UGP's Fort Thompson 2 Substation has been 100% allocated to SPP Generator Interconnection Request, GEN-2020-021. BEPC is the Host Transmission Owner for GEN-2020-021.

This Interconnection Facilities Study does not address Transmission Service or any delivery component of Transmission Service, only the interconnection requirements and operating impacts of the interconnection service component of the Network Upgrade.

2.0 Study Requirements:

This Interconnection Facilities Study includes:

2.1 Preparing a substation layout, conducting preliminary bus design, and determining all electrical equipment requirements to accommodate the Network Upgrade; developing cost estimates for all WAPA-UGP labor, overheads, equipment additions, modifications, etc. to accommodate the Network Upgrade.

2.2 Reviewing and documenting any other interconnection and control area requirements; documenting these additional requirements (such as indication, metering, monitoring, control, relaying, etc.) and including these in the cost estimate.

2.3 Determining if an Operating Guide is needed for WAPA-UGP's Dispatch to document the conditions under which the new Generating Facility must be operated to protect against unacceptable pre- or post-contingent steady-state or transient stability performance.

2.4 Developing an overall time schedule for completion of the necessary additions and modifications.

[1] WAPA-UGP is also referred to as "Western-UGP" in the SPP OATT.

3.0 Study Results:

The following documents the analysis of the addition of the Network Upgrade to WAPA-UGP's Transmission System and fulfill the Study Requirements as outlined in Section 2.0 above:

3.1 Required Facility Upgrades by WAPA-UGP:

WAPA-UGP has determined that following additions are required to maintain a safe and reliable interconnection of the Network Upgrade to WAPA-UGP's Transmission System:

- 230-kV bay addition and bus upgrades at Fort Thompson Substation
- 345-kV transformer bay addition at Fort Thompson 2 Substation
- Tertiary reactor bay addition at Fort Thompson 2 Substation
- 345-kV ring bus to breaker and a half conversion at Fort Thompson 2 Substation
- New control building and panels at Fort Thompson 2 Substation
- Addition of a 3rd 345-kV/230-kV transformer at Fort Thompson 2 Substation
- New 230-kV tie-line between Fort Thompson Substation and Fort Thompson 2 Substation

WAPA-UGP's estimated costs for labor, overhead, equipment, construction, and other miscellaneous costs for the work required to accommodate a 3rd 345-kV/230-kV transformer at WAPA-UGP's Fort Thompson 2 Substation are outlined in Attachment A. The total cost is estimated at $44,600,000.

3.2 Contractual Agreements:

Once SPP issues an NTC, WAPA-UGP, as Transmission Owner of the Network Upgrade, will execute a Facilities Construction Agreement (FCA) with the GEN-2020-021 Interconnection Customer (IC) for the addition of the 3rd transformer at WAPA-UPG's Fort Thompson 2 Substation. The FCA will address specific funding requirements and provide an advanced payment schedule for facility additions and upgrades to address NTC requirements. Pursuant to the SPP OATT, the FCA will be developed and offered by WAPA-UGP and shared with the IC for review and signature. A payment schedule based on design, procurement, and construction activities will be included in the FCA consistent with the SPP OATT provisions. Upon completion of the work associated with the FCA WAPA-UGP will own, operate, and maintain the modifications and improvements to WAPA-UGP's Fort Thompson and Fort Thompson 2 Substations.

3.3 Schedule:

Attachment A outlines WAPA-UGP's estimated schedule for planning, design and construction of the facilities required to accommodate the IC's Generator Interconnection Request. WAPA-UGP anticipates the work required to accommodate the Network Upgrade would be completed by July 2032. This schedule is based on the FCA being executed prior to April 2026, and issuance of the NEPA Finding of No Significant Impact (FONSI) or Record of Decision (ROD) by November 2028. The schedule is also dependent on procurement schedules, personnel availability, and outage availability.

3.4 Environmental Review:

WAPA-UGP is a federal agency under the U.S. Department of Energy and is subject to the National Environmental Policy Act (NEPA), 42 U.S.C §4321, et seq., as amended. The Environmental Review for this project, as described in Attachment V, Sections 3.3.5, and 8.6.1, and any other applicable sections of the SPP OATT, will be coordinated between WAPA-UGP and the IC. The cost for WAPA-UGP to complete its Environmental Review is included as part of the estimate provided in Attachment A. The Environmental Review is performed at the IC's expense, and those costs are considered direct assigned costs and are ineligible for credits under the SPP OATT. Until the appropriate NEPA review is completed (issuance of a FONSI, ROD, or other), no construction activities relating to the Transmission Owner's Network Upgrades may commence.

4.0 <u>Interconnection Facilities Study Cost:</u>

WAPA-UGP will audit the Interconnection Facilities Study costs and provide a summary of costs once the study is completed or the GEN-2020-021 Generator Interconnection Request is withdrawn.

ATTACHMENT A

FT. THOMPSON 2 SUBSTATION 3rd TRANSFORMER ADDITION

PROJECT ACTIVITY	ESTIMATED START DATE	ESTIMATED COST, MILESTONE PAYMENT DUE
Preconstruction activities – planning, project management, environmental review, land acquisition, etc.	30 Calendar Days Following FCA Execution*	$500,000
Provide staff and other resources to engineer, design, and plan construction	30 Calendar Days Following FCA Execution*	$2,500,000
Procure equipment, parts, and control equipment necessary to construct	30 Calendar Days Following FCA Execution	$15,000,000
Development, Solicitation, and Award of Construction Contract(s), and WAPA-UGP Construction Administration/Supervision	December 15, 2028	$26,000,000
Commissioning and Energization	January 15, 2030	$600,000
In-Service (Estimated Completion Date)	July 31, 2032	
TOTAL ESTIMATED COSTS		$44,600,000

*Assumes Execution of FCA NLT April 2026.

Basin Electric Power Cooperative
Facility Study Report
GEN-2020-021

1. Background:

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

Upgrade Type	UID	Upgrade Name
Interconnection	156922	Leland Olds-Chapelle Creek 345kV line GEN-2020-021 Interconnection (Non-shared NU) (BEPC)
Interconnection	156923	Leland Olds-Chapelle Creek 345kV line GEN-2020-021 Interconnection (TOIF) (BEPC)

2. Study Requirements:

BEPC has performed this Facility Study report in accordance with the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11 for the Interconnection and/or Network Upgrade(s) as described in Section 1.

2.1. The Facility Study report 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 BEPC 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 Facility Study report, the Point of Change of Ownership location is defined as the take-off structure(s) at the BEPC 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. BEPC's generation metering requirements, as an SPP Transmission Owner, must be met. A list of specific needs will be provided by BEPC once design has progressed.

3. Study Results for GEN-2020-021:

3.1. The following results document the analysis of the required facilities for this Interconnection Request as outlined in Section 1 for a new 345kV 3 breaker ring bus switchyard that bisects the LOS-Chapelle Creek 345 kV line. BEPC has determined that the following additions and improvements are required to maintain a safe and reliable interconnection to BEPC's transmission system.

3.2 Substation/Switchyard

A new 345 kV 3 breaker ring bus will be constructed. This switchyard will provide 345 kV transmission terminals for the LOS, Chapelle Creek, and GEN-2020-021 interconnections. The construction schedule listed below considers the current lead times of all major equipment that is limited to high voltage circuit breaker availability. Reference Figures A1 and A2. All protection and control schemes will follow BEPC's internal design standards

3.3 Transmission

The project cost estimate assumes two new additional 345kV single circuit deadend structures will be needed with drilled pier concrete foundations and associated 345kV deadend hardware. The facility study assumes the substation property will be adjacent to the existing transmission ROW and no additional ROW acquisition will be reauired. Depending on final site selection and substation orientation, existing deadends may be available for the circuit cut-in structures.

3.4 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.

3.5 Cost Estimate

GEN-2020-021 Estimated Costs NSNU	Current Year $
Line Costs	
Engineering Labor	$50,000
Construction Labor	$600,000
Reactive Compensation (Labor & Materials)	$0
Material	$850,000
Right of Way	$0
Line Sub Total	**$1,500,000**
Station Costs	
Engineering Labor	$1,126,000
Construction Labor	$7,657,374
Site Property Rights	$0
Reactive Compensation	$0
Material	$8,441,083
Right of Way	$500,000
Station Sub Total	**$17,224,457**
AFUDC	$0
Contingency	$8,848,340
GEN-2022-021 NSNU Total Costs	**$28,072,797**

GEN-2020-021 Estimated Costs TOIF 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	$225,000
Construction Labor	$1,079,673
Site Property Rights	$0
Reactive Compensation	$0
Material	$1,620,288
Right of Way	$0
Station Sub Total	**$2,924,961**
AFUDC	$0
Contingency	$1,347,486
GEN-2022-0021 TOIF Total Costs	**$4,272,447**

Total Interconnection Cost	**$32,345,244**

3.6 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	12 Months	Month 1	Month 13
Equipment Procurement	54 Months	Month 1	Month 55
Advertise and Award Construction Contracts	4 Months	Month 39	Month 43
Construction	12 Months	Month 47	Month 59
Energize and In-Service Date	1 Month	Month 59	Month 60

Figure A1: Proposed Switching Diagram

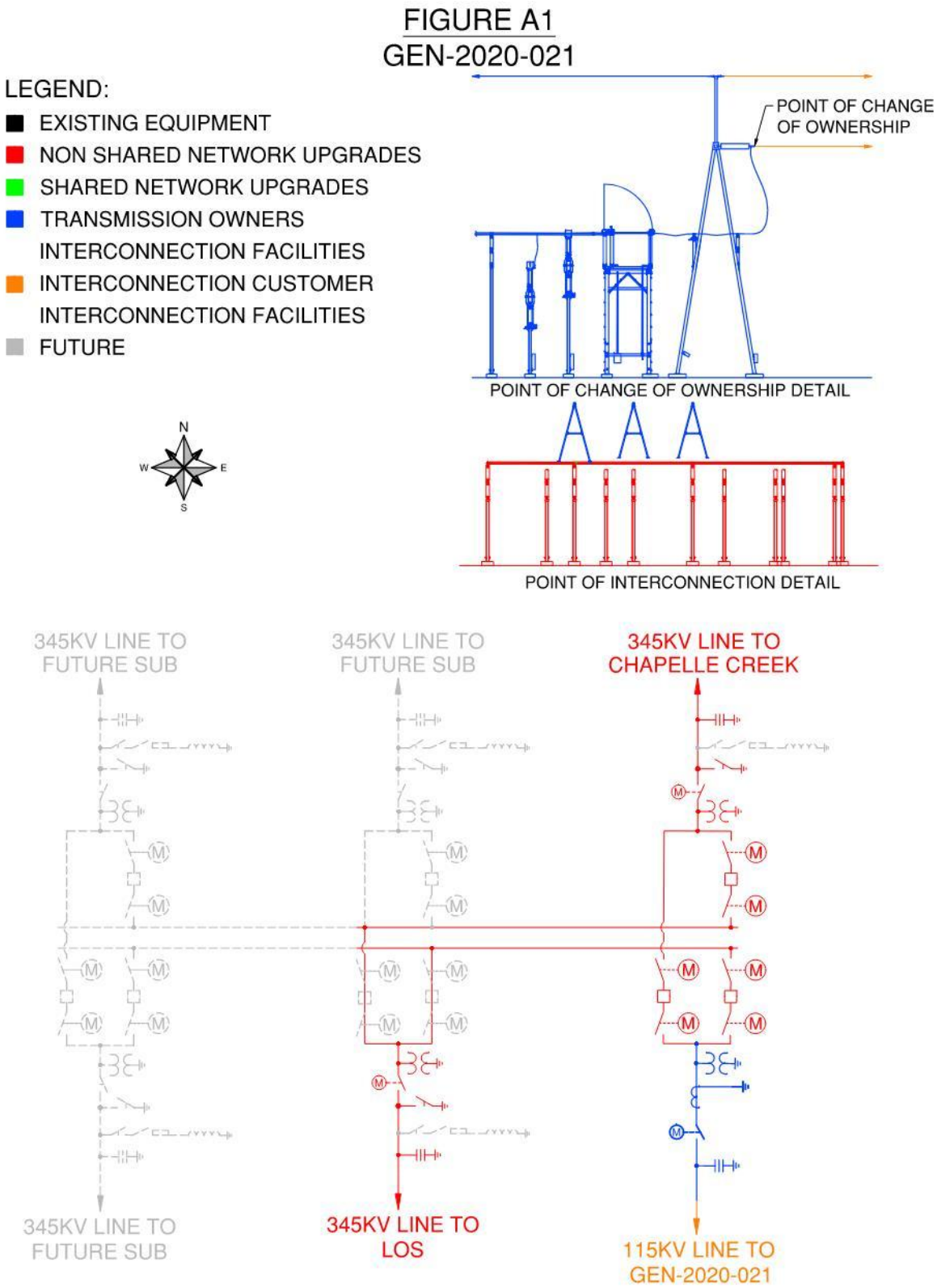

Figure A2: Proposed General Arrangement