INTERCONNECTION FACILITIES STUDY REPORT

GEN-2019-002

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
February 7, 2025	SPP	Initial draft report issued.
February 13, 2025	SPP	Final report posted.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2019-002 is for a 100 MW generating facility located in Mayes, OK. The Interconnection Request was studied in the DISIS-2018-002/DISIS-2019-001 Impact Study for ER. The Interconnection Customer's requested in-service date is January 23, 2027.

The interconnecting Transmission Owner, Grand River Dam Authority (GRDA), 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 thirty-five (35) Power Electronics FP3510M (REGCA1) 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 161 kV transformation substation with associated 34.5 kV and 161 kV switchgear;
- One 161/34.5 kV 81/107/135 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 3 mile overhead 161 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 161 kV bus at existing Transmission Owner substation ("Maid 161kV 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 Maid 161kV GEN-2019-002 Interconnection (TOIF) (GRDA) (UID 156744): Facilitate the interconnection of GEN-2019-002 Estimated Lead Time: 18 Months	$1,786,611	100.00%	$1,786,611
Total	**$1,786,611**		**$1,786,611**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Maid 161kV GEN-2019-002 Interconnection (Non-shared NU) (GRDA) (UID 156745): Facilitate the interconnection of GEN-2019-002 Estimated Lead Time: 18 Months	Ineligible	$962,021	100%	$962,021
Total		**$962,021**		**$962,021**

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		

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)	$1,786,611
Non-Shared Network Upgrade(s)	$962,021
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$2,748,632**

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).

GRDA

Generation Interconnection Facilities Study Report for GEN-2019-002 MAID BESS 161kV Project

T&D Engineering Department| Transmission Planning

2-5-2025

(Original)

1. Facilities Study Summary

Grand River Dam Authority (GRDA) Transmission Planning performed the Cost Analysis for the following study at the request of the Southwest Power Pool (SPP) for SPP Generation Interconnection request study results for GEN-2019-002. Per the SPP Generator Interconnection Procedures (GIP), SPP requested that GRDA perform an Interconnection Facilities Studies (IFS) for Network Upgrade(s) in accordance with Section 8.11 for the following Interconnection and/or Network Upgrade(s):

1.1. Project Description

GEN-2019-002 requests to add a 100.0 MW utility scale battery storage facility (Neosho Grid Project) at the 161 kV MAID Interconnect POI GRDA station (Figure 1) located in Mayes County, Oklahoma (Coordinates: 36.214450, -95.276933).

1.2. GRDA's Scope of Work to Facilitate Interconnection

- Transmission owner interconnection facility additions required by GRDA consist of interconnect metering CTs and PTs, disconnect switch, protective relays, structures, foundations, conductors, insulators, and all other associated work and materials or terminal equipment needed to interconnect the customer's resource tie-line into GRDA's MAID Interconnect substation.
- GRDA reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- It is understood that the Interconnection Customer (IC) is responsible for the connection costs associated with facilitating the GEN-2019-002 to the GRDA transmission system. The IC will be responsible to acquire right-of-way (including line crossings) to terminate the resource's 161kV tie-line into the terminal at the GRDA MAID substation.

1.3. Short Circuit Evaluation

- It is standard practice for GRDA to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its nameplate interrupting rating with recloser de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.
- In the GRDA system, no breakers were found to exceed their interrupting capability in the results of the DISIS-2018-002/2019-001 results after the addition of the generation and related facilities. Therefore, there are no additional short circuit upgrade costs associated with the GEN-2019-002 interconnection request.

1.4. Stability Evaluation

- Based on reviewing the results of the SPP DISIS-2018-002/2019-001 short circuit and stability report, GRDA is not aware of any instances where the system does not meet TPL-001 stability performance requirements for the planning events and generation dispatch conditions that were considered in this DISIS study.

1.5. Interconnection Cost of Facilities Included in the Facilities Study

Table 1

Description	Cost (USD)
Network Upgrades (GRDA): at an existing substation; 2-161kV breakers, bus extension, disconnect switches, control panel, conductor, foundations, insulators, relaying and all other associated work and materials.	$962,021.00
Interconnection Facilities (GRDA TOIF): Add a new 161kV line terminal to an existing 161kV Substation. Dead end structure, line relaying, CCVTs, arrestors, bus support, interconnect metering including CTs and PTs, communications, and all other associated equipment to terminate the line from interconnect customer's generator facility.	$1,786,611.00
GRDA ROW for 161kV Gen-tie line	$0.00
Total	**$2,748,632.00**

1.6. Project Lead Time

- Specific construction schedule and milestones will be determined during the Generator Interconnection Agreement negotiations.
- GRDA is estimating an engineering and construction schedule for this project as approximately 18 months after the issuance of authorization from the interconnection customer.

- Other factors associated with clearances, equipment procurement delays and work schedules could cause additional delays.
- This is applicable after all required agreements have been signed and internal approvals are granted.

2. Appendices

Figure 1: Point of Interconnection (POI INFORMATION) One-Line Diagram

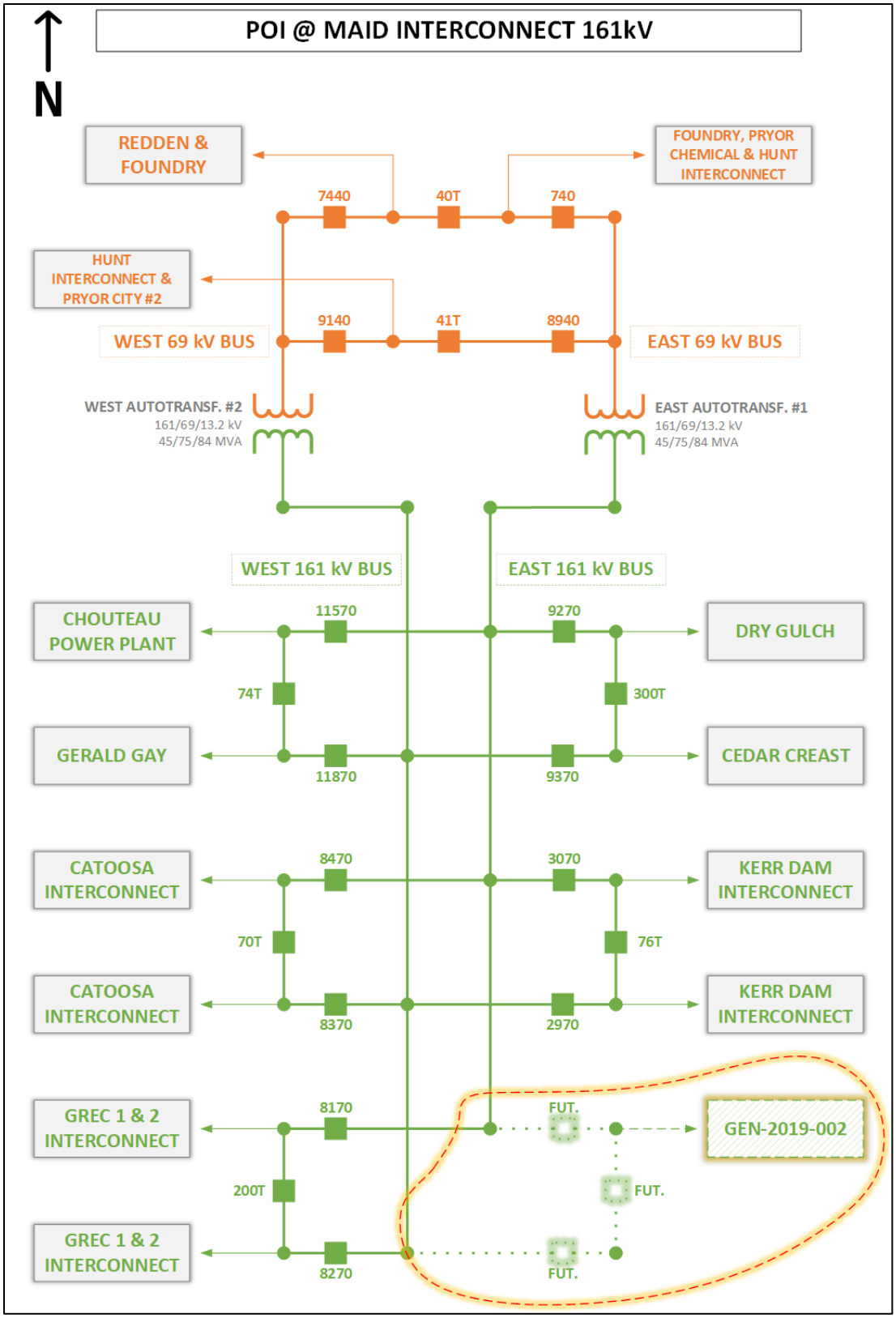
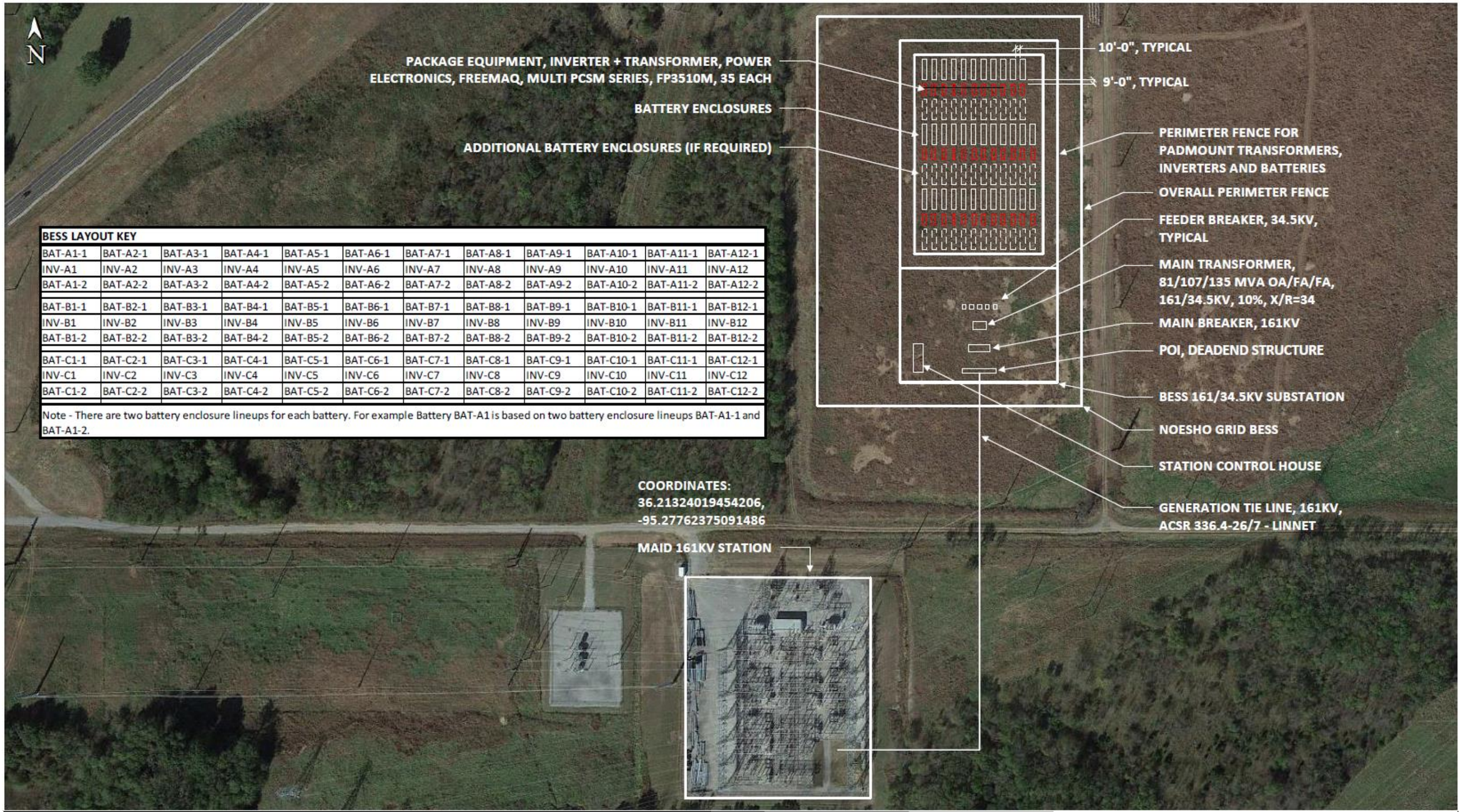


Figure 2: Point of Interconnection Map



BESS LAYOUT KEY												
BAT-A1-1	BAT-A2-1	BAT-A3-1	BAT-A4-1	BAT-A5-1	BAT-A6-1	BAT-A7-1	BAT-A8-1	BAT-A9-1	BAT-A10-1	BAT-A11-1	BAT-A12-1
INV-A1	INV-A2	INV-A3	INV-A4	INV-A5	INV-A6	INV-A7	INV-A8	INV-A9	INV-A10	INV-A11	INV-A12
BAT-A1-2	BAT-A2-2	BAT-A3-2	BAT-A4-2	BAT-A5-2	BAT-A6-2	BAT-A7-2	BAT-A8-2	BAT-A9-2	BAT-A10-2	BAT-A11-2	BAT-A12-2
BAT-B1-1	BAT-B2-1	BAT-B3-1	BAT-B4-1	BAT-B5-1	BAT-B6-1	BAT-B7-1	BAT-B8-1	BAT-B9-1	BAT-B10-1	BAT-B11-1	BAT-B12-1
INV-B1	INV-B2	INV-B3	INV-B4	INV-B5	INV-B6	INV-B7	INV-B8	INV-B9	INV-B10	INV-B11	INV-B12
BAT-B1-2	BAT-B2-2	BAT-B3-2	BAT-B4-2	BAT-B5-2	BAT-B6-2	BAT-B7-2	BAT-B8-2	BAT-B9-2	BAT-B10-2	BAT-B11-2	BAT-B12-2
BAT-C1-1	BAT-C2-1	BAT-C3-1	BAT-C4-1	BAT-C5-1	BAT-C6-1	BAT-C7-1	BAT-C8-1	BAT-C9-1	BAT-C10-1	BAT-C11-1	BAT-C12-1
INV-C1	INV-C2	INV-C3	INV-C4	INV-C5	INV-C6	INV-C7	INV-C8	INV-C9	INV-C10	INV-C11	INV-C12
BAT-C1-2	BAT-C2-2	BAT-C3-2	BAT-C4-2	BAT-C5-2	BAT-C6-2	BAT-C7-2	BAT-C8-2	BAT-C9-2	BAT-C10-2	BAT-C11-2	BAT-C12-2

Note - There are two battery enclosure lineups for each battery. For example Battery BAT-A1 is based on two battery enclosure lineups BAT-A1-1 and BAT-A1-2.