



System Impact Assessment Report

Final Report - Public

CAA ID: 2024-795

Project: GBE TOR1 Data Center

Connection Applicant: GrandBridge Energy Inc.

October 16, 2024



Acknowledgement

The IESO wishes to acknowledge the assistance of Hydro One in completing this assessment.

Disclaimer

This report has been prepared solely for the purpose of assessing whether the connection applicant's proposed connection with the IESO-controlled grid would have an adverse impact on the reliability of the integrated power system and whether the IESO should issue a notice of conditional approval or disapproval of the proposed connection under Chapter 4, section 6 of the Market Rules.

Conditional approval of the project is based on information provided to the IESO by the connection applicant and Hydro One at the time the assessment was carried out. The IESO assumes no responsibility for the accuracy or completeness of such information, including the results of studies carried out by Hydro One at the request of the IESO. Furthermore, the conditional approval is subject to further consideration due to changes to this information, or to additional information that may become available after the conditional approval has been granted.

If the connection applicant has engaged a consultant to perform connection assessment studies, the connection applicant acknowledges that the IESO will be relying on such studies in conducting its assessment and that the IESO assumes no responsibility for the accuracy or completeness of such studies including, without limitation, any changes to IESO base case models made by the consultant. The IESO reserves the right to repeat any or all connection studies performed by the consultant if necessary to meet IESO requirements.

Conditional approval of the proposed connection means that there are no significant reliability issues or concerns that would prevent connection of the proposed project to the IESO-controlled grid. However, the conditional approval does not ensure that a project will meet all connection requirements. In addition, further issues or concerns may be identified by the transmitter(s) during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with physical or equipment limitations, or with the Transmission System Code, before connection can be made.

This report has not been prepared for any other purpose and should not be used or relied upon by any person for another purpose. This report has been prepared solely for use by the connection applicant and the IESO in accordance with Chapter 4, section 6 of the Market Rules. This report does not in any way constitute an endorsement of the proposed connection for the purposes of obtaining a contract with the IESO for the procurement of supply, generation, demand response, demand management or ancillary services.

The IESO assumes no responsibility to any third party for any use, which it makes of this report. Any liability which the IESO may have to the connection applicant in respect of this report is governed by Chapter 1, section 13 of the Market Rules. In the event that the IESO provides a draft of this report to the connection applicant, the connection applicant must be aware that the IESO may revise drafts of this report at any time in its sole discretion without notice to the connection applicant. Although the IESO will use its best efforts to advise you of any such changes, it is the responsibility of the connection applicant to ensure that the most recent version of this report is being used. The IESO provides no comment, representation or opinion, express or implied, with respect to who should bear the cost of IESO requirements for connection in this report and disclaims any liability in connection therewith.

Project Description

GrandBridge Energy Inc. (GBE, the “connection applicant” and “distributor”) is proposing to connect a new embedded data center load, namely GBE TOR1 Data Center (the “project”) to their distribution systems supplied by the existing Preston TS and Energy+ MTS#1. Both existing stations are connected onto the 230 kV circuits M20D/M21D owned by Hydro One Networks Inc. (HONI, the “transmitter”).

The project will have an ultimate load of 80 MW with a power factor of 0.95 and the load profile will be flat all year around.

The project will come into service in the following three phases:

Phase 1: 20 MW of load supplied by feeder 21M26 from Preston TS.

Phase 2: 20 MW of load supplied by feeder 2510M37 from Energy+ MTS#1.

Phase 3: 40 MW of load supplied by feeder 21M27 from Preston TS and 2510M37 from Energy+ MTS#1.

The proposed in-service date for Phases 1, 2, and 3 of the project are Q4 2024, Q2 2025, and Q1 2026, respectively.

Notification of Conditional Approval

This assessment concludes that the proposed project is expected to have no material adverse impact on the reliability of the integrated power system, provided that all requirements in this report are implemented. Therefore, the assessment supports the release of the Notification of Conditional Approval for connection of the project.

Assessment Findings

System studies were carried out to identify the impact of the project on loading of transmission facilities, system voltages, voltage stability, load security and restoration and to verify that the applicable reliability standards, the Market Rules, and the Ontario Resource and Transmission Assessment Criteria (ORTAC) are met. Based on the assessment results, we have identified the following assessment findings:

(1) After the ultimate load of the project is incorporated and under peak load conditions:

- a. From 2026, there will be post-contingency thermal violations above the Long Term Emergency (LTE) rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction, following the loss of M20D (or M21D).
- b. From 2027, there will be post-contingency thermal violations above the Short Term Emergency (STE) rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction, following the loss of M20D (or M21D).
- c. In 2029 and from 2034 and continuos thereafter, more than 600 MW will be interrupted following the double contingency of loss of M20D and M21D, violating the ORTAC load security criteria.

- d. Under planned outage to M20D (or M21D) and when the total load at Energy+ MTS#1, Preston TS, and Galt TS exceeds 400 MW, there will be pre-contingency violations above the LTE rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction.

(2) If only Phase 1 and Phase 2 of the project are incorporated,

- a. From 2027, there will be post-contingency thermal violations above the Long Term Emergency (LTE) rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction, following the loss of M20D (or M21D).
- b. From 2028, there will be post-contingency thermal violations above the Short Term Emergency (STE) rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction, following the loss of M20D (or M21D).
- c. Under planned outage to M20D (or M21D) and when the total load at Energy+ MTS#1, Preston TS, and Galt TS exceeds 400 MW, there will be pre-contingency violations above the LTE rating on the sections of M21D (or M20D) from Galt Junction to Cambridge MTS#1 Junction.

IESO Requirements for Connection

Specific Requirements:

The following specific requirements are applicable for the incorporation of the project. Specific requirements pertain to the level of reactive power compensation needed, operation restrictions, special protection system, upgrading of equipment and any project specific items not covered in the general requirements.

Requirements for the Connection Applicant

- (1) The connection applicant shall work with the IESO and the transmitter to develop an enduring option through the ongoing regional planning process to accommodate this project and future load growth in this region.
- (2) The connection applicant shall install Remedial Action Scheme (RAS) facilities to participate in the RAS identified in transmitter requirement (2) and work with the transmitter on its implementation.

The connection applicant shall ensure that the RAS facilities comply with NPCC Reliability Reference Directory #7 as per the RAS type classification which will be finalized during the Market Registration process. The new RAS is expected to be a Limited Impact RAS (formally known as Type III RAS) subject to NPCC's approval. To avoid any delay to the project, it is strongly recommended the RAS facilities be designed to meet NPCC Reliability Reference Directory #7 for NPCC Type I RAS before the RAS type classification is finalized via the NPCC RAS review process. If deemed to be a Limited Impact RAS by the review process, the connection applicant shall ensure the RAS facilities have provisions to comply with NPCC Reliability Reference Directory #7 for Type I RAS in case the RAS is re-classified as such in the future as the system evolves.

Telemetry, including but not limited to, MW, Mvar and breaker status for the feeders/equipment tripped by the RAS, as specified by the IESO at the time of registration, shall be provided.

Proposed alternative interim solutions to address these findings will be subject to the IESO's approval.

Requirements for the Transmitter

- (1) The transmitter shall work with the IESO and the connection applicant to develop an enduring option through the ongoing regional planning process to accommodate this project and future load growth in this region.
- (2) To address Findings 1(a) and 1(b) (or 2(a) and 2(b) if only Phase 1 and Phase 2 of the project are connected) before an enduring option is implemented, the transmitter shall coordinate with the connection applicant to install a new RAS, in 2026 or earlier (2027 or earlier if only Phase 1 and Phase 2 of the project are connected) before the total load at Energy+ MTS#1, Preston TS and Galt TS exceeds 400 MW, to reject loads at Energy+ MTS#1 and Preston TS, following the single contingencies below:

1. 230 kV circuit M20D
2. 230 kV circuit M21D

The RAS shall have the capability to reject adequate loads so that after the rejection, the total load at Energy+ MTS#1, Preston TS, and Galt TS does not exceed 400 MW.

Any proposed alternative solutions to address these findings will be subject to the IESO's approval.

- (3) During the IESO Market Registration process, a new Facility Description Document (FDD) for the new RAS must be provided and finalized at least nine months prior to in-service. The FDD must contain the finalized RAS matrix as well as expected operating times. The actual operating times must be measured during commissioning and documented as a Performance Validation Record.

If the FDD or performance testing as per the Performance Validation Record indicates a change in design or slower than expected operating times, as compared to what was assumed in this assessment, then further analysis of the project will need to be done by the IESO. This may delay the grant of IESO final approval to place the project in-service.

The transmitter shall ensure that the RAS facilities comply with NPCC Reliability Reference Directory #7 as per the RAS type classification which will be finalized during the Market Registration process. The new RAS is expected to be a Limited Impact RAS (formally known as Type III RAS) subject to NPCC's approval. To avoid any delay to the project, it is strongly recommended the RAS facilities be designed to meet NPCC Reliability Reference Directory #7 for NPCC Type I RAS before the RAS type classification is finalized via the NPCC RAS review process. If deemed to be a Limited Impact RAS by the review process, the transmitter shall ensure the RAS facilities have provisions to comply with NPCC Reliability Reference Directory #7 for Type I RAS in case the RAS is re-classified as such in the future as the system evolves.

Telemetry, as specified by the IESO at the time of registration, shall be provided.

(4) To address Finding 1(d) or 2(c), under planned outage to one of M20D and M21D, the transmitter shall coordinate with the connection applicant to ensure the total load at Energy+ MTS#1, Preston TS, and Galt TS does not exceed 400 MW.

General Requirements:

The connection applicant shall satisfy all applicable requirements specified in the Market Rules, the Transmission System Code (TSC) and reliability standards. Some of the general requirements that are applicable to this project are presented in detail in Appendix A: General Requirements of this report.

Appendix A: General Requirements

The connection applicant shall satisfy all applicable requirements specified in the Market Rules, the Transmission System Code, the Distribution System Code and reliability standards. This section highlights some of the general requirements that are applicable to the project.

1. The connection applicant must notify the IESO at connection.assessments@ieso.ca as soon as they become aware of any changes to the project scope or data used in this assessment. The IESO will determine whether these changes require a re-assessment.
2. In accordance with Appendix 4.3 of the Market Rules, the connection applicant shall ensure that the existing transmission connected load/distribution facility, behind which the project is connected, has the capability to maintain the power factor within the range of 0.9 lagging and 0.9 leading as measured at the defined meter point after the incorporation of the project.
3. In accordance to Reference 4 of Appendix 4.3 of the Market Rules, distributors connected to the IESO-controlled grid with directly connected load facilities of aggregated rating above 20 MVA and with the capability to regulate distribution voltages under load, shall install and maintain facilities and equipment to provide voltage reduction capability. After connecting the project, the connection applicant will have directly connected load facilities of aggregated rating above 20 MVA and the project has the capability to regulate voltages under load. As such, the connection applicant shall install and maintain facilities and equipment to provide voltage reduction capability at the project. Voltage reduction capability represents the capability of reducing demand by lowering the distribution voltage by 3% and 5% within five minutes from receiving directions from the IESO. The IESO uses voltage reductions to reduce load when supply resources are limited. The voltage reduction capability can be provided using the proposed under-load tap changers (ULTC) at the project.
4. The connection applicant has a total peak load at all its owned facilities, including the project, which is greater than 25 MW. According to Section 10.4.6 of Chapter 5 of the Market Rules and Section 11.3 of the Market Manual 7.1, the connection applicant is required to participate in the automatic Under-Frequency Load Shedding (UFLS) program and must select 35% of total peak load among its owned facilities for under-frequency tripping, based on a date and time specified by the IESO that approximates system peak, according to Section 10.4 of Chapter 5 of the Market Rules.

The UFLS relay connected loads shall be set to achieve the amounts to be shed as stated in Section 11.3 of Market Manual 7.1. Table 1 summarizes UFLS relay settings as a function of the total peak load of all facilities, including the project, owned by the connection applicant.

Table 1: UFLS Relay Settings

Aggregate Summer Peak Load	UFLS Stage	Frequency Threshold (Hz)	Total Nominal Operating Time (s)	Load Shed at stage as % of Connection Applicant's Load	Cumulative Load Shed at stage as % of Connection Applicant's Load
25 MW or more and less than 50 MW	1	59.5	0.3	≥ 35	≥ 35
50 MW or more and less than 100 MW	1	59.5	0.3	≥ 17	≥ 17
	2	59.1	0.3	≥ 18	≥ 35
100 MW or greater	1	59.5	0.3	7 – 9	7 – 9
	2	59.3	0.3	7 – 9	15 – 17
	3	59.1	0.3	7 – 9	23 – 25
	4	58.9	0.3	7 - 9	32 - 34
	Anti-Stall	59.5	10.0	3 – 4	35 - 37

The connection applicant, in conjunction with the transmitter, must also ensure that capacitor banks connected to the same station bus as the load are shed by UFLS facilities at 59.5 Hz with a time delay of 3 seconds.

The maximum load that can be connected to any single UFLS relay is 150 MW to ensure that the inadvertent operation of a single under-frequency relay during the transient period following a system disturbance does not lead to further system instability.

The IESO will review the requirements annually and inform the relevant market participants of their automatic UFLS obligations.

5. The connection applicant must initiate the IESO's Market Registration process at least four months prior to the commencement of any project related outages. Once the IESO's Market Registration process has been successfully completed, the IESO will provide the connection applicant with a Registration Approval Notification (RAN) document, confirming that the project is fully authorized to connect to the IESO-controlled grid. For more details about this process, the connection applicant is encouraged to contact IESO's Market Registration at market.registration@ieso.ca.

Be advised that any registration changes could have an impact on a market participant's monthly global adjustment charges. Such registration changes include but are not limited to:

- New facility registrations
- Modifications to existing facility registration
- Electrical configuration changes
- Meter installation reconfigurations
- Full or partial transfers of a facility to a separate legal entity
- Transferring a facility between the retail electricity market and the IESO-administered wholesale electricity market (IAM)

Note that any newly registered facility in the IAM will automatically be treated as a Class B facility, unless stated otherwise in Ontario Regulation 429/04. It is the sole responsibility of the market participant to declare if any such provisions of Ontario Regulation 429/04 are applicable.

Subject to compliance with all regulatory requirements, a new facility may become eligible to participate in the Industrial Conservation Initiative (ICI) program (i.e. to be treated as a Class A facility) after the facility has been registered in the IAM for the entire duration of a base period (i.e. the facility has registered withdrawals from the IESO-controlled grid from May 1 to April 30 of the following calendar year).

6. In accordance with Section 7.5 of Chapter 4 of the Market Rules, the connection applicant shall provide to the IESO the applicable telemetry data listed in Appendix 4.17 of the Market Rules on a continual basis. The data shall be provided in accordance with the performance standards set forth in Appendix 4.22, subject to Section 7.6A of Chapter 4 of the Market Rules. The whole telemetry list will be finalized during the IESO's Market Registration process.

The connection applicant must install monitoring equipment that meets the requirements set forth in Appendix 2.2 of Chapter 2 of the Market Rules. As part of the IESO's Market Registration process, the connection applicant must also complete end to end testing of all necessary telemetry points with the IESO to ensure that standards are met and that sign conventions are understood. All found anomalies must be corrected before IESO's final approval to connect any phase of the project is granted.

7. As per Market Manual 1.4: Connection Assessment and Approval, the connection applicant will be required to provide a status report of its proposed project with respect to its progress upon request of the IESO using the [project status report form](#) on the IESO website. Failure to comply with project status requirements listed in Market Manual 1.4: Connection Assessment and Approval will result in the project being withdrawn.

The connection applicant will be required to also provide updates and notifications in order for the IESO to determine if the project is "committed" as per Section 3.3 of Market Manual 1.4: Connection Assessment and Approval.



Appendix B: Study Scope of Work (Confidential)

Appendix C: Detailed Study Results (Confidential)

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