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Appendix C

# Australian Energy Market Operator letter

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5 June 2020

Maoneng Australia Pty Ltd  
 Satya Bhasale  
 5 Talavera Road,  
 North Ryde NSW 2113

Via email

Dear Satya

### Response to Connection Enquiry Tyabb Battery Energy Storage System

Thank you for your recent Connection Enquiry dated 24 April 2020 for the proposed connection of the Tyabb Battery Energy Storage System. The connection information provided is detailed below:

Project Name	Tyabb Battery Energy Storage System
Connection Type:	Battery Energy Storage System
Number of Generating Units:	100 x PCS
Capacity of each Generating Unit:	2.9MW
Total Generating Capacity:	Aggregated 240MW /480MWh BESS
Expected Energy Production	14400.00 MWh
Connection Point Location:	Tyabb Terminal Station
Connection Point Voltage:	220 kV
Connecting Network Service Provider:	AEMO
Nearest Transmission Line/Substation:	Tyabb Terminal Station
Proposed Commissioning Date:	November 2021
Special Requirements:	Approximately 3MW auxiliary power required at construction and commissioning stage.

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For battery connection proposals, we would encourage you to access the [Interim arrangements for utility scale battery technology](#), describing interim arrangements, registration, metering and SCADA requirements.

### **Confidentiality**

Please note that all information provided by you will be treated as confidential and will only be shared with any Network Service Provider who may be involved in the provision of the proposed connection services, as required by clause 5.3.8 of the National Electricity Rules. Given the volume of connection proposals currently being received, we may request your permission to share basic project information with other parties. The information we may seek to share is as follows:

- Project name
- Type of plant
- Installed capacity
- Location of your terminal station
- Switching arrangement of your terminal station
- Details of any relevant protection schemes

The information to be shared will need to be treated as strictly confidential between the applicants and not used to any applicants' detriment. AEMO will only provide the information on this basis.

### **Involvement of other Network Service Providers**

As you would be aware, connection to the Victorian Declared Shared Network will require engagement with AusNet Services, being the owner of transmission assets nearest to the location of your proposed connection. You will ultimately be required to enter into a connection agreement with AusNet Services as well as AEMO, should your connection proceed.

### **Land Use**

Your proposed connection is a brownfield development at Tyabb Terminal Station (220kV). This will require review and approval of the land use by AEMO to facilitate the installation of transmission network assets in a manner consistent with the future expansion arrangement of the station.

Please provide us with details of any land access arrangements you have made, or are proposing to make for these purposes.

### **Contestability**

Based on the information contained in your Connection Enquiry, an augmentation to the Victorian Declared Shared Network will be required. It is possible that the augmentation will be contestable under clause 8.11.6 of the National Electricity Rules however we will be in a better position to assess this once further information is provided.

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## Preliminary Program

We provide a Preliminary Program in **Attachment 1** showing proposed milestones in the connection process. The program contains an indication of typical milestones you should expect. These milestones tend to change over time as further information becomes available. Importantly, if a system strength assessment is required, it may have a material impact on the assessment timeframe and if applicable, the timeframe for procurement of any system strength remediation works required prior to commissioning, as well as any necessary upgrades to cater for increases in local fault levels.

We will be reviewing and amending this Preliminary Program with you from time to time based on project progress (noting that the program is indicative, and a number of activities are outside AEMO's control).

We note that the target commissioning date for the project is November 2021.

Please note this is an indicative schedule only. Timing is dependent on the specific aspects of the Connection Application, and a more targeted program will be developed once a Connection Application has been submitted.

## Connection Options

We note that your proposed connection point is Tyabb Terminal Station (220kV). While the proposed connection to the 220 kV line may be feasible, your connection may also be required to install additional plant to address system strength requirements, subject to the outcome of the system strength assessment.

It is possible that future generation and/or transmission developments in Victoria or interstate may change congestion risks that could limit your generation output.

## Connection Application

The next formal stage in the connection process is for you to submit a Connection Application. Prior to the submission of a complete application, the project will be considered to be in the Connection Enquiry phase.

The [Connection Application checklist](#) provides a list of the information required to be submitted for a Connection Application to be considered as complete. This checklist also includes links to useful supporting guidelines, information and templates. Once AEMO has received a complete application, only then will we commence the due diligence assessment of your application. Due to the current volume of connection proposals, it is not practicable for AEMO to assess part-submissions or incomplete information. Also to assess your Connection Application we require PSS/E models to be submitted in currently supported versions:

- PSS/E version 34.2
- PSS/E version 34.5.

Our web portal's section devoted to the [Application Stage](#) explains the process in detail. The submission of an application will need to be accompanied by technical data which will generally be in the nature of the information set out in Schedule 5.5 of the National Electricity Rules.

## Contracts

Once AEMO has received a complete application, we can commence the preparation of an offer to connect. The contracts for a new connection are likely to be a Use of System Agreement, Network Services Agreements, and a Project Construction and Coordination Deed. Further details of the contract structures can be found on the AEMO website under [Contract Stage](#).

In order to assist in achieving efficient management of contract drafting and execution, we provide the following guidelines;

- AEMO's preference is to hold the pen on all drafting
- Prior to AEMO signing, we request the following;
  - Where there is a need for drafting by others, final drafts must be submitted for review at least 1 month prior.
  - AEMO will only schedule a date for signing once a final pdf version of all documents has been issued to all parties.
  - All signed documents must be returned to AEMO 5 working days prior to AEMO signing.
  - Documents must be signed by all parties on the same hard copies.
- AEMO will to be the last party to sign and execute the documents.
- The proposed signing date for AEMO will be rescheduled if all documents are not in line with the above.

## Costs

The costs associated with processing a Connection Application may be found at the following link: [Schedule of Fees and Charges for Generation Connections](#). Each application must be accompanied by payment of an application fee of \$15,000 prior to AEMO commencing its work.

## Proposed Performance Standards

In **Attachment 2**, we provide a list of the relevant technical requirements in Schedule S5.2 of the Rules.

Once we have reviewed your response to each of these requirements, received a complete Connection Application and received the \$15,000 fee, we will commence our negotiation of the performance standards that will apply to your generating system in accordance with Clause 5.3.4A of the Rules. Depending upon the outcome of the system strength assessment (if applicable), system strength remediation and a 5.3.4B response may also be required in conjunction with the 5.3.4A response, to ensure appropriate performance standards can be established.

You will note that the technical requirements provide for automatic, negotiated and minimum access standards. You may accept the automatic access standard applicable to any of the

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technical requirements in Schedule 5.2.5. In the event that you believe your plant is unable to meet the automatic access standard you may propose a negotiated access standard. You will need to provide evidence and sufficient documentation to demonstrate that any proposed negotiated standard is consistent with the NER and compliance with the proposed standard, whether automatic or negotiated. Consistent with the NER, AEMO seeks to ensure that any variation from the automatic access standards is minimal. It is unlikely that a minimum standard would be appropriate as it could compromise AEMO's ability to meet system standards.

We will inform you of our response to each proposed standard as required by clause 5.3.4A. Importantly, please note that our 5.3.4A (and 5.3.4B) response is not considered to have been provided until a formal 5.3.4 letter is issued.

Additional information on potential constraints and the role of the Short Circuit Ratio can be found on AEMO's web site at the [Interactive Map](#) and [Fact-Sheet System Strength](#) links, and in the [2018 Victorian Annual Planning Report](#).

AEMO will typically undertake detailed due diligence assessment of your ability to meet the agreed performance standards as part of our review upon submission of your application. Further due diligence will be required at a time closer to registration, when equipment selection, detailed design and computer models have been finalised. You should allow sufficient time for registration activities, including confirming the ability to meet agreed standards and approval of commissioning procedures. In AEMO's experience this may take several months.

### **System Strength Assessment**

AEMO has conducted a Preliminary system strength Impact Assessment (PIA) in accordance with clause 5.3.3(b5) of the Rules. The objectives of and methodology for undertaking the PIA are described in Section 5.1 of AEMO's [System Strength Impact Assessment Guidelines](#) on our website. For the PIA, AEMO used the Available Fault Level (AFL) methodology.

In our PIA, we only identify the potential for any adverse impact of your proposed connection on the stability of the power system, the stability of other generators, and the ability of existing generators to continue to meet their generator performance standards.

In the event that the preliminary assessment identifies potential system strength issues, a more detailed Full Impact assessment (FIA) will be required. This analysis will occur following your submission of a complete connection application. For the FIA, AEMO will integrate the Tyabb BESS model into AEMO's regional PSCAD model.

It should be noted that if the analysis does not identify a system strength shortfall, it should not be considered to guarantee that an adverse impact will not be identified later when detailed dynamic modelling and analysis is undertaken. There may also be subsequent changes to the analysis in the event that additional generator projects become committed.

AEMO has calculated the existing Available Fault Level in the vicinity of the proposed connection point of Tyabb Terminal Station 220kV, taking into account the following:

- Existing and contracted Victorian generation.

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- A worst case single transmission contingency expected to have the greatest impact on system strength in the vicinity of the Tyabb Terminal Station 220kV. This contingency is an outage of the 220kV line from Tyabb Terminal Station to Cranbourne Terminal Station.

AEMO has assumed a minimum fault level requirement of 3 x 240 MVA for the Tyabb BESS (MSCR of 3).

	System Normal	N-1
Three Phase Fault Level (MVA)	3929	3143
Available Fault Level (MVA)	2980	2539
Short Circuit Ratio	12.4	10.5
X/R	5.89	6.29

The Available Fault Level at Tyabb 220 kV exceeds 3\*240 MVA. A detailed system strength assessment is therefore not necessary at this time. A full system strength study may be required if changes occur on the network that reduce the Available Fault Level. Such changes may include retirement of synchronous generation, connection of new asynchronous generation or reconfiguration of the transmission network.

Notwithstanding this, detailed EMT modelling will be required to assess potential sub-synchronous resonance as noted earlier.

### Resourcing

It is recommended that you engage a reputable engineering consultant and project manager familiar with the NER and NEM access arrangements to assist with developing your connection application and progressing through the connection process.

### Operational requirements

Please ensure you familiarise yourself with operational requirements. AEMO provides the following [fact sheet](#) for your reference.

### Further Queries

Please keep us up to date regarding the timing of your connection application submission, which should be submitted to AEMO at [connections@aemo.com.au](mailto:connections@aemo.com.au).

We look forward to working with you to progress this project.

Yours sincerely,





**Margarida Pimentel**

**Manager Victorian Connections**

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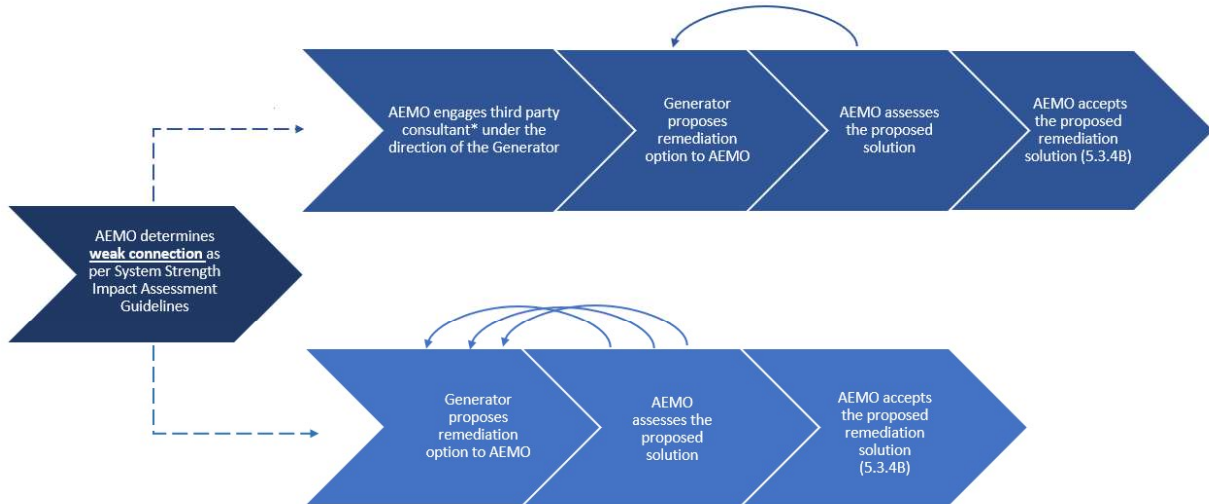
## Attachment 1: Preliminary Program

Task / Stages	Start	Finish	Approximate Duration (*)
Enquiry (complete information)	24/04/2020	05/06/2020	30 days
Application*	05/06/2020	18/12/2020	140 days
Contracts	18/12/2020	04/06/2020	120 days
Construction	04/06/2021	03/06/2022	300 days
Completion (Commissioning and Registration)	03/06/2022	18/11/2022	120 days

\* Please note the following:

- These timeframes are estimates only. The connection process is mainly driven by information provided by the applicant and the National Electricity Rules mandated timeframes, as well as investigation of system augmentation requirements (if applicable). The Preliminary Program assumes that the commencement of each stage coincides with the completion of the previous stage. The timeframe is also highly dependent on the timeliness and quality of information provided.
- Once you have submitted a complete application and we progress this further, the program will be updated with more detailed information provided by you.
- Days refers to business days.

The figure below provides a high level view of the connection process resourcing options if your connection requires system strength remediation. In the case that AEMO engages a consultant on your behalf to assist with assessment of system strength remediation options all data and results would be vetted by AEMO.



- Select consultants on AEMO Master Consultancy Agreement panel only.
- AEMO will pass on consultant fees to Generator.

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## Attachment 2: Access standards

NER Reference	Access Standard
S5.2.5.1	Reactive power capability
S5.2.5.2	Quality of electricity generated
S5.2.5.3	Generating unit response to frequency disturbances
S5.2.5.4	Generating system response to voltage disturbances
S5.2.5.5	Generating system response to disturbances following contingency events
S5.2.5.6	Quality of electricity generated and continuous uninterrupted operation
S5.2.5.7	Partial load rejection
S5.2.5.8	Protection of generating systems from power system disturbances
S5.2.5.9	Protection systems that impact on power system security
S5.2.5.10	Protection to trip plant for unstable operation
S5.2.5.11	Frequency control
S5.2.5.12	Impact on network capability
S5.2.5.13	Voltage and reactive power control
S5.2.5.14	Active power control
S5.2.6.1	Remote Monitoring
S5.2.6.2	Communications equipment
S5.2.7	Power station auxiliary supplies
S5.2.8	Fault current

\* **Please Note:** additional requirements may apply relating to the Customer Performance Standards, as specified in Schedule 5.3 of NER.

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