12 Mar 2020

AEMO
By email isp@aemo.com.au

Proposal for QNI Medium non- network option / Bonshaw BESS Project

Dear Officer,

Following the notice of consultation for non-network option published on Dec 2019, GAIA Australia ("**GAIA AU**") is pleased to provide this proposal for a 200MW battery which is capable to charge and discharge for up to 30 minutes at Dumaresq switchyard as part of Bonshaw solar farm.

GAIA AU has been developing renewable energy projects in NSW and Bonshaw solar farm is proposed to connect directly to Dumaresq switchyard in NSW. This connection point is critical to QLD to NSW interconnector and GAIA AU supports the idea of operating battery at this location to offer grid support services. GAIA AU is excited by the prospect of being able to offer services to NSW grid as well as AEMO by building and operating a battery storage system next to Dumaresq substation.

In order to provide the best offer to AEMO, GAIA AU is offering an option for annual fee for ten years. Also GAIA AU is able to offer similar battery project at Liddell substation at same cost if AEMO is able to lease the substation land for batteries. With this in mind, GAIA AU is hopes to tailor proposal to fit AEMO's needs and preference.

GAIA AU has prepared this proposal based on the conversation held between GAIA AU and TransGrid for QNI Upgrade Rit-t process held during the 2019 and TransGrid recommended us to send the proposal for AEMO QNI Mid term consultation process.

GAIA AU looks forward to the opportunity to receive feedback from AEMO on this high level proposal. On the basis of AEMO confirming their interest, GAIA AU would be pleased to advance into a more detailed design phase and negotiation.

Please contact Luke Kim, for any queries or questions:

Luke Kim , Managing Director
Email: luke.kim@gaiaau.com **Mobile:** +61 4 0532 2487

Proposal for Bonshaw Battery Project

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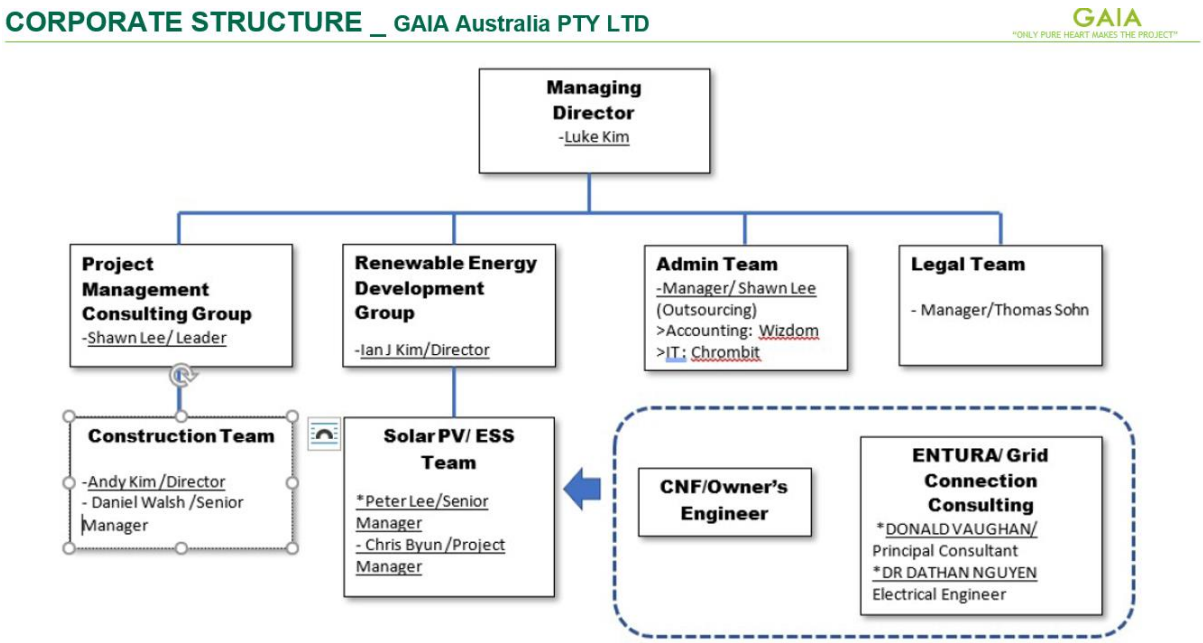
1. GAIA AUSTRALIA

GAIA Australia (GAIA AU) was established in 2015 to take the lead in renewable energy developments in Australia, with a clear target and vision to become an active large scale renewable energy project developer and operator in NSW. GAIA AU is partnered with GAIA Korea, a renowned infrastructure developer in Korea with a focus on renewable energy development sector in Australia. Current development project lists are listed in Table 1 below.

Table 1- GAIA AU Australian renewable energy projects pipeline

Project	MW	Commissioning Date	Status
Bonshaw solar and battery	200MW solar + 300MW battery	2020-2021	Under development
Colinton solar and battery	100MW solar + 150MW battery	2021-2022	Under development
Micro Grid Projects	2~5MW	2022	Under Development

GAIA has a good network with investors, manufacturer & consultant in Australia & Korea to support renewable energy development. GAIA is committed to working closely with all stakeholders to ensure success in battery projects for AEMO and providing environmental and economic benefit to Australia. GAIA AU as a company is committed to the principles of social responsibility and will apply these principles through the whole process of development frityom planning to operation.



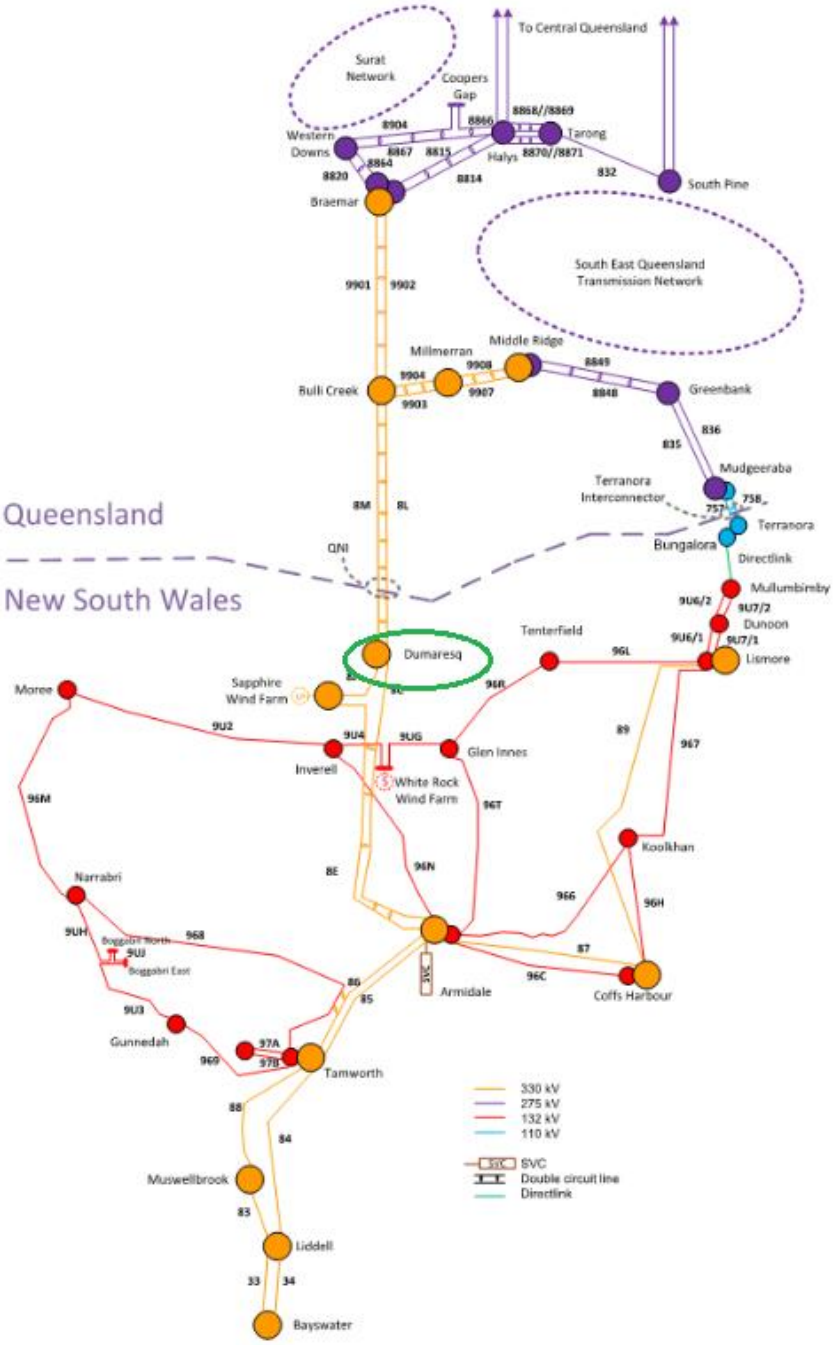
AEMO Registration

GAIA AU has been registered as a Intending Participant (AEMO ID : INT0003355) since Nov 2019 .

2. NON NETWORK OPTION /BESS BENEFIT ANALYSIS

In TransGrid PADR issued at 30 Sep 2019, non-network option (5B) shows very promising result in all scenario applied during the NPV analysis. We informed that having BESS at Liddell or Calvale is most promising option from previous discussion with TransGrid and considering the location of Bonshaw solar Farm in the QNI context, having a BESS at Dumaresq substation area also would be a considerable option for consultation purpose.
Liddell & Calvale BESS option is also mentioned in our proposal.

Figure 25 – Specific transmission lines in northern New South Wales and southern Queensland

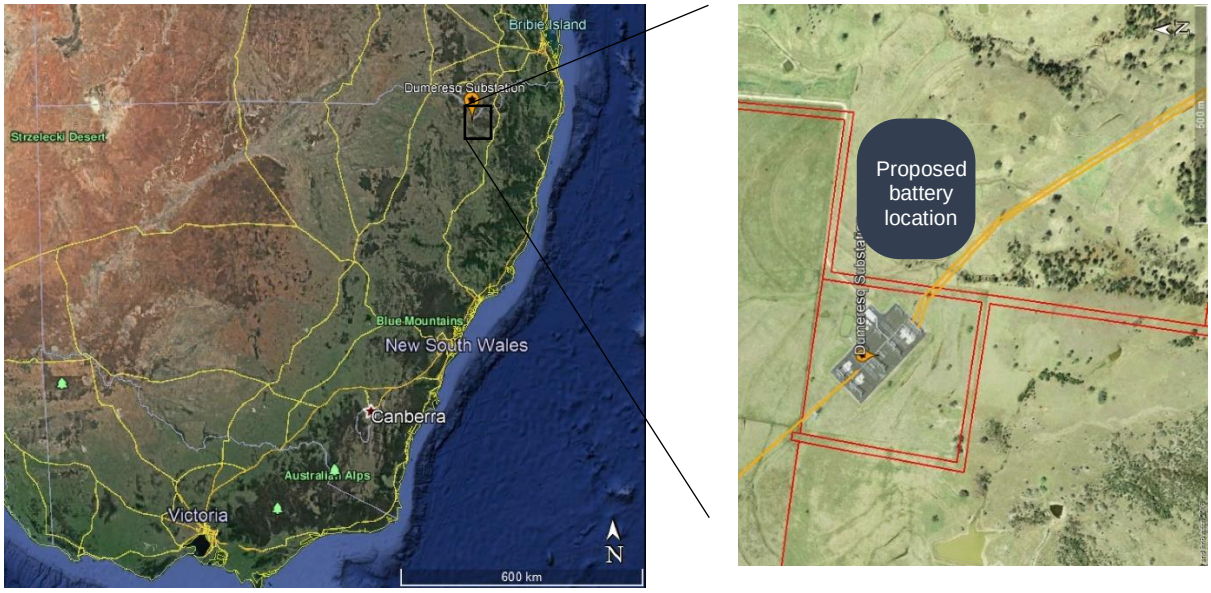


3. BONSHAW SOLAR PV & ESS/BATTERY PROJECT

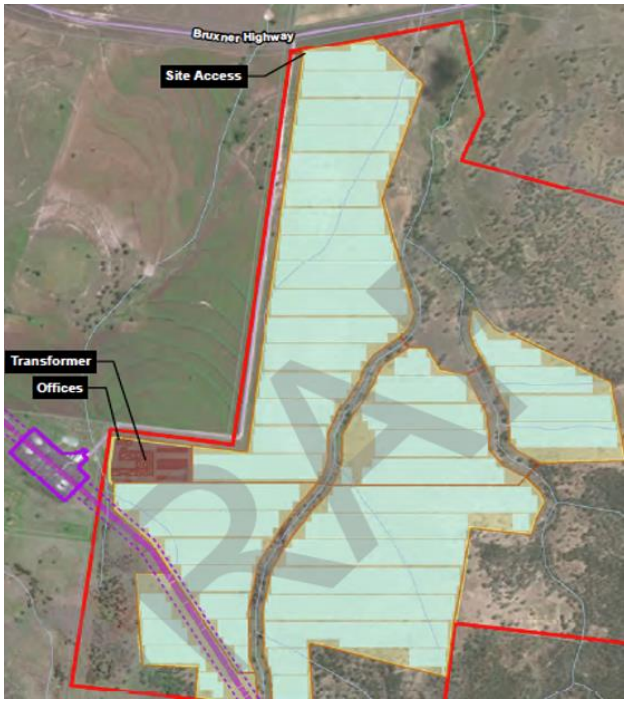
3.1 Site Description

The proposed Project site is located next to Dumaresq switchyard in NSW. An illustrative site layout for battery energy storage system is shown below, noting that the final design would depend on the planning approval of the Bonshaw project. Bonshaw project is undergoing planning approval process and DA is expected to be submitted before end of May 2019.

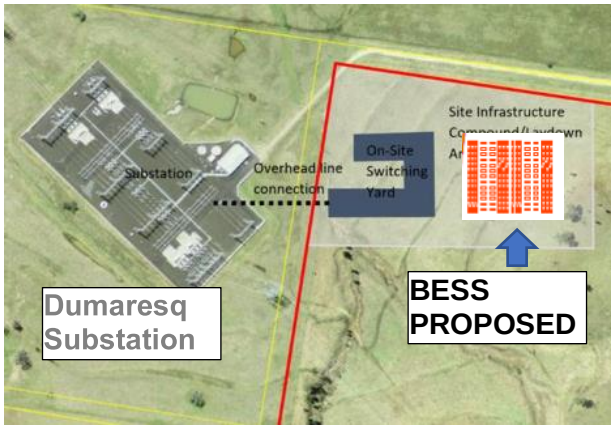
Figure 1- Bonshaw project site location and layout



Project Layout



Connection Diagram to Dumaresq substation



3.2 Process to completion

The proposed battery energy storage system on the site connects to Dumaresq switchyard.

Approval
GAIA AU has engaged highly experienced planning consultant to assist in getting planning approval for the project at Bonshaw. EIS has lodged and accepted by DPIE NSW and Development Approval application has been lodged to NSW Department of Planning and Environment and Development Approval to be received by Q1 2020.

Grid connection
Dumaresq switchyard is part of TransGrid asset and Preliminary connection enquiry for the solar farm has been submitted to TransGrid and feedback received is very positive with more than 500MW able to connect to Dumaresq switchyard. Grid connection process started in Q4 2019. In response to interests from AEMO regarding grid support battery at Dumaresq switchyard, GAIA AU is looking to have a separate connection for 200MW battery and Bonshaw solar farm in order to have flexibility in contracts as well as management of both projects. Grid connection agreement for Battery storage system is expected to be in a position to execute by end of Q3 2020.

Construction
The Construction of the ESS Project is relatively straightforward and construction works at the Project site are expected to be limited to less than 6 months. The main construction works at the Project site will include creating the access road by compacting or using gravel, civil works for battery storage, building for the battery storage systems.

Technology
Determining specification of the energy storage system is the key to the project. GAIA AU has already engaged leading technology providers who has carried out similar utility scale battery solution for grid support purposes in Australia. This will ensure fast start of the project which will lead to early operation of the battery for service. Please find project program below in figure 2.

Below is a summary of the key Technology providers and specifications:

Table 3- Technology Providers

	Technology provider
Battery	Samsung SDI, ITP & Fluence
Inverter	SMA, Fluence and ABB
EPC	Fluence and CPP

Table 4- Technology Specification

	Site	Description
Battery	Battery type	Lithium ion battery
	C-rate	2C
	Battery sizing	100MWh
	Project life	10 years
	Duration of discharge & recharge	30 minutes

	Number of cycles per day	1
Inverter	Inverter sizing	200MW

BESS Optimization using AI Technology

GAIA has been in cooperation with ENCORED who is well established solution provider for Energy & ESS control system. Encored is based on US and have speciality in developing optimized solution for ESS & Renewable integrated system. For BESS control system, ENCORED will participate as a solution provider to improve the efficiency of ESS by way of applying optimization using AI technology proven.

ENCORED has a lot of global research experiences in ESS control system and applying their ESS control algorithm solution will help to improve the efficiency of system include the “Peak Load Reduction” & “Energy Storage to smooth the output of surplus variable renewable energy”.

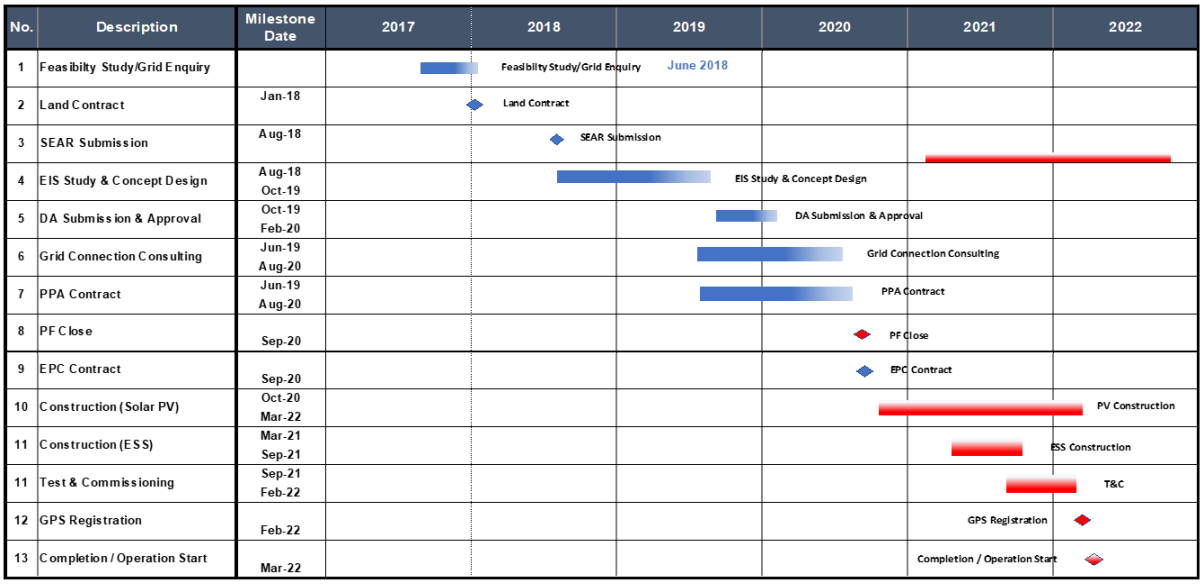
Below are the more clarification of Technology to be applied for BESS project.

- BESS will have the minimum capacity of 200MW/100MWh/2C.
- 200MW/100MWh capacity will be reserved at all time. If merchant option is allowed by using additional existing ESS in the Solar Farm, GAIA will be happy to negotiate for less cost implication case
- Proposed operation scenario will be applied for BESS at Liddell & Calvale if requested.
- Our cost includes all the battery equipment, control system(i.e. BMS) & lower level switchgear including step up transformer up to 33kv(TBC).
- HV Transformer(33 to 330kv) & switch bay provision cost is not fully included as we assume this scope of work will be performed by TransGrid
- The land size required for 200MW/100MWh is approximately 1.0ha/10,000 m2 include LV switch gear area.

Project Time Line

Construction of BESS will take 6 month after Financial Close. GAIA expect to complete the BESS by 1Q 2022 on the assumption that GAIA can secure the agreement by 3Q 2020.

Figure 2- Bonshaw project program/PV + ESS



- ESS completion & operation may start from 1Q 2022 .
- Agreement with AEMO is preferred to be placed by late 2020 to commence Grid connection consulting to meet the time line

4. ECONOMIC ANALYSIS / 10 YEAR CONTACT BASE

CAPEX & OPEX SUMMARY

Total Development Cost of BESS is estimated around 123M AUD including Grid connection and average annual OPEX cost is estimated around 3M. Both CAPEX & OPEX cost estimation could be lower than suggested one when Bonshaw Solar Farm established at 2022.

Lease Contract option Proposed

GAIA AU believe the one of the strength of GAIA AU is ability to finance a project at very competitive rates while having very low return for investment through owning and operating a very stable project for a long term. Hence rather than providing breakdown of all the cost, GAIA AU is proposing to offer annual fee for ten years and it is listed below. CPI (i.e. 2.4%) applied for the calculation of Yr. 2 to 10.

This analysis is based on 10yr contract reflecting the average life of Li-ion battery on the current market. Extension option can be discussed further. (15yr Lease Option can be offered if requested)

Annual fee	AUD
Year 1	
Year 2	
Year 3	
Year 4	
Year 5	
Year 6	
Year 7	
Year 8	
Year 9	
Year 10	

**Information hidden*

GAIA AU is aware that similar sized battery is required at Liddell substation to strengthen QLD to NSW interconnector. High level investigation of the site shows that the substation land is large enough for 200MW battery storage. The ownership of the substation land belongs to TransGrid and GAIA AU is keen to developing, building and operating another 200MW battery which is able to charge/discharge for 30 minutes at the same price as above if TransGrid allows GAIA AU to lease the portion of land where battery can be built.

5. RESPONSIBILITY AND LIABILITY

For the Responsibility and liability arising directly or indirectly from the operation or failure of the non-network solution. GAIA AU would accept all contingent liabilities arising directly or indirectly from the operation or failure of the non-network solution, agree to indemnify TransGrid and Powerlink against any such liabilities as well as for any damage the non-network solution causes the TransGrid and Powerlink network.

Below Diagram is the Insurance concept to support risk management of the BESS project.

INSURANCE PROJECT LIFECYCLE