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Wollar Solar Farm - Modification 4

1 Introduction

Renzo Tonin & Associates was engaged to review the noise impacts for Wollar Solar Farm (the Project) with the proposed modification (the Modification) to an increased Battery Energy Storage System (BESS) within the proposed substation area.

2 Project Description

The Proponent is proposing to modify the Project to increase the BESS capacity from the approved 30MW/30MWh to approximately 280MW (2 hour storage duration).

The proposed Modification is expected to include (to be determined in detailed design):

- Approximately 13 'BESS blocks' (BESS BLOCK 1 to BESS BLOCK 13)
- Each BESS block includes approximately 6 or 7 'battery blocks' (total of 90) and a ~0.85 megavolt-amperes (MVA) auxiliary transformer. The battery blocks may be racks or containerised.
- Each battery block has a Medium Voltage Power Supply (MVPS) (inverter and transformer)
- Medium Voltage (MV) underground cables
- BESS MV switchroom
- BESS High Voltage Transformer (HV TX)
- Control room

Racks or containerised BESS are designed to be modular and scalable, making them easy to expand or contract based on the requirements of the energy storage application. The use of standard-sized containers also makes it easier to transport and install the system, reducing the time and cost of construction.

3 Review of Noise Impacts

A review of the noise impacts to identified receivers based on the proposed Modification design (ref: WBESS-SKT-0001_v1_DRAFT (002)) was undertaken. The noise output for each BESS block is based upon a TESLA Megapack or equivalent, rated at 75dB(A) @ 10m.

Predicted noise impacts to identified receivers with the Modification were compared to the predicted noise levels presented in the EIS Construction & Operational Noise & Vibration Assessment (ref: TK161-01D01 Report (r0) dated 20 February 2019).

Table 3-1 provides a comparison of the operational noise levels at residential receiver locations between the EIS design and the Modification design.

Table 3-1 – Predicted $L_{Aeq,15 \text{ min}}$ Operational Noise Levels at Residential Receiver Locations, dB(A)

Receiver Location	Project Noise Trigger Levels			Predicted Operational Noise Levels									Comply? (Yes/No)
	Day	Evening	Night	Standard Conditions			Slight to Gentle Breeze			Moderate Temperature Inversion ¹			
				EIS	Mod	Diff.	EIS	Mod	Diff.	EIS	Mod	Diff.	
R1 – Lot 1/DP755455	40	35	35	<20	21	1	24	29	5	24	29	5	Yes
R2 – Lot 65/DP755430	40	35	35	<20	<20	-	21	24	3	21	24	3	Yes
R3 – Lot 1/3/DP758054	40	35	35	<20	<20	-	<20	<20	-	<20	<20	-	Yes
R4 – Lot 94/DP755430	40	35	35	<20	<20	-	26	28	2	26	28	2	Yes

Notes: 1. Applicable for the night time period only

Predicted operational noise levels for receivers R1, R2 and R4 are predicted to increase by up to 5 dB(A) with the Modification design when compared to the EIS design. Receivers R1, R2 and R4 remain compliant with and well within the nominated criteria. For receiver R3, predicted operational noise impacts remain unchanged with the Modification design and remain compliant with the nominated criteria. Therefore, no additional mitigation and management measures are required.

Document control

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APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.

L _{Min}	The minimum sound pressure level measured over a given period.
L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The “equivalent noise level” is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L _{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.