4 October 2022
TM244-02F01 Addendum Report (r2).docx

Blind Creek Solar Farm Pty Ltd
Ms Emily Walker
emily.walker@octopusinvestments.com

From: William Chan [William.Chan@renzotonin.com.au]

Blind Creek Solar Farm - Addendum Noise Assessment

1 Introduction

Renzo Tonin & Associates was engaged to undertake an addendum noise assessment of the proposed Blind Creek Solar Farm, to determine whether alternative plant and equipment selections would result in noise impacts different to those presented in the Environmental Impact Statement's (EIS) Noise Assessment (ref: TM244-01F02 Construction & Operational Noise & Vibration Assessment [r4], dated 22 February 2022).

2 Amendment Operational Noise Sources

In this addendum noise assessment, the plant and equipment selection that have changed are the inverters and batteries, as follows:

- **EIS:** 85 inverters (SMA MV Power Station 4600 S2 or equivalent)
  Alternative Option: 93 inverters (SMA Sunny Central 4200 UP or 4400 UP)
- **EIS:** 170 batteries in array inclusion zone (Tesla Megapack or equivalent [1927.2kW])
  Alternative Option: 435 batteries in array inclusion zone (Wartsila Gridsolv Quantum [745kW])
- **EIS:** 200 batteries in battery storage system area (Tesla Megapack or equivalent [1927.2kW])
  Alternative Option: 512 batteries in array inclusion zone (Wartsila Gridsolv Quantum [745kW])

All other plant and equipment from the EIS remain the same.

The plant and equipment and corresponding sound power levels used in this assessment are presented in the table below.

Table 2.1 – Typical Operational Plant and Equipment & Sound Power Levels

Plant Item	Plant Description	L_{Aeq} Sound Power Levels, dB(A) re. 1pW
EIS		
1	Tracker motor (2,400 in total)	81 (each)[1]
2	Inverters (85 in total)	91 (each)[1]
3	Batteries (array inclusion zone) (170 in total)	86 (each)[1]
4	Converters (1020 in total)	92 (each)[1]
5	Batteries (battery storage system area) (200 in total)	86 (each)[1]
6	150 MVA Transformers (3 in total)	95 (each)[1]
7	Light vehicle (5 in total)	88 (each)[1]
Amendment		
1	Tracker motor (2,400 in total)	81 (each)[1]
2	**Inverters (93 in total)**	**91 (each)[2]**
3	**Batteries (array inclusion zone) (435 in total)**	**73 (each)[2]**
4	Converters (1020 in total)	92 (each)[1]
5	**Batteries (battery storage system area) (512 in total)**	**73 (each)[2]**
6	150 MVA Transformers (3 in total)	95 (each)[1]
7	Light vehicle (5 in total)	88 (each)[1]

Notes:
1. Based on sound power level data from manufacturer's data, past projects and/or RT&A's acoustic database
2. Based on sound power level data from manufacturer's data for new plant selection
3. **Bold** denotes a change from the EIS selection

3 Addendum Operational Noise Assessment

The CadnaA noise model developed for the EIS Noise Assessment was updated for the addendum plant and equipment selection. The predicted noise impacts are compared to the predicted EIS noise impacts and presented in the table below

Table 3.1 – Predicted $L_{Aeq,15min}$ Operational Noise Levels at Receiver Locations, dB(A)

Receiver Location	Project Noise Trigger Levels			Predicted Operational Noise Levels									Compliant? (Yes/No)
				Calm & Isothermal Conditions			Slight to Gentle Breeze			Moderate Temperature Inversion[1]			
	Day	Even-ing	Night	EIS	Alter-native Option	Differ-ence	EIS	Alter-native Option	Differ-ence	EIS	Alter-native Option	Differ-ence	
Involved Receivers													
Receiver R2	*40*	*35*	*35*	**39**	**39**	-	**40**	**39**	**-1**	**40**	**39**	**-1**	**No**
Receiver R5	*40*	*35*	*35*	<20	<20	-	<20	<20	-	<20	<20	-	Yes
Receiver R6	*40*	*35*	*35*	20	20	-	20	20	-	20	20	-	Yes
Receiver R7	*40*	*35*	*35*	32	32	-	32	32	-	32	32	-	Yes
Receiver R41	*40*	*35*	*35*	32	32	-	32	32	-	32	32	-	Yes
Receiver R42	*40*	*35*	*35*	33	32	-1	33	32	-1	33	32	-1	Yes
Receiver R43	*40*	*35*	*35*	32	29	-	33	32	-1	33	32	-1	Yes
Receiver R48	*40*	*35*	*35*	**46**	**46**	-	**47**	**46**	-1	**47**	**46**	-1	**No**
Non-involved Receivers													
Receiver R1	*40*	*35*	*35*	24	24	-	24	24	-	24	24	-	Yes
Receiver R9	*68 (When in use)*			37	37	-	38	38	-	38	38	-	Yes
Receiver R10	*40*	*35*	*35*	25	25	-	25	25	-	25	25	-	Yes
Receiver R11	*40*	*35*	*35*	25	25	-	25	25	-	25	25	-	Yes
Receiver R12	*40*	*35*	*35*	26	25	-	26	25	-	26	25	-1	Yes
Receiver R13	*40*	*35*	*35*	26	26	-	26	26	-	26	26	-	Yes
Receiver R14	*40*	*35*	*35*	26	26	-	26	26	-	26	26	-	Yes
Receiver R15	*40*	*35*	*35*	26	26	-	26	26	-	26	26	-	Yes
Receiver R16	*40*	*35*	*35*	24	24	-	24	24	-	24	24	-	Yes
Receiver R17	*40*	*35*	*35*	27	26	-1	27	26	-1	27	26	-1	Yes
Receiver R18	*40*	*35*	*35*	26	26	-	26	26	-	26	26	-	Yes
Receiver R19	*40*	*35*	*35*	27	26	-	27	26	-1	27	26	-1	Yes
Receiver R20	*40*	*35*	*35*	27	27	-	27	27	-	27	27	-	Yes
Receiver R21	*40*	*35*	*35*	27	27	-	27	27	-	27	27	-	Yes
Receiver R22	*40*	*35*	*35*	27	27	-	27	27	-	27	27	-	Yes
Receiver R23	*40*	*35*	*35*	26	26	-	26	26	-	26	26	-	Yes
Receiver R24	*40*	*35*	*35*	27	26	-1	27	26	-1	27	26	-1	Yes
Receiver R32	*40*	*35*	*35*	22	22	-	22	22	-	22	22	-	Yes

Receiver Location	Project Noise Trigger Levels			Predicted Operational Noise Levels									Compliant? (Yes/No)
	Day	Even-ing	Night	Calm & Isothermal Conditions			Slight to Gentle Breeze			Moderate Temperature Inversion[1]			
				EIS	Alter-native Option	Differ-ence	EIS	Alter-native Option	Differ-ence	EIS	Alter-native Option	Differ-ence	
Receiver R36	*40*	*35*	*35*	30	30	-	30	30	-	30	30	-	Yes
Receiver R37	*40*	*35*	*35*	29	27	-2	29	27	-2	29	27	-2	Yes
Receiver R38	*40*	*35*	*35*	28	27	-1	28	27	-1	28	27	-1	Yes
Receiver R40	*40*	*35*	*35*	29	26	-3	30	26	-4	30	26	-4	Yes
Receiver R45	*40*	*35*	*35*	23	23	-	23	23	-	23	23	-	Yes
Receiver R46	*40*	*35*	*35*	27	26	-1	27	26	-	27	26	-1	Yes
Receiver R47	*40*	*35*	*35*	27	26	-1	27	26	-	27	26	-1	Yes
Receiver R49	*40*	*35*	*35*	22	22	-	22	22	-	22	22	-	Yes
Receiver R50	*40*	*35*	*35*	22	22	-	22	22	-	22	22	-	Yes
Receiver R51	*40*	*35*	*35*	23	23	-	23	23	-	23	23	-	Yes
Receiver R106	*68 (When in use)*			38	34	-5	39	34	-5	39	34	-5	Yes

Notes:
1. Temperature inversion applicable for the night time period only
2. Difference is EIS predicted level minus Amendment predicted level
3. **Bold** font represents exceedance of the project noise trigger level/s

From the table above, the predicted noise impacts to the identified receiver locations with the alternative plant and equipment selection are the same or lower than the predicted noise impacts presented in the EIS Noise Assessment. However, the project noise trigger levels are still exceeded at two (2) involved receiver locations and comply for all non-involved receiver locations for all time periods.

Therefore, the change in the plant and equipment listed in Section 2 would not result in increased noise impacts to the identified receiver locations (involved or non-involved) when compared to the noise impacts presented in the EIS Noise Assessment.

4 Conclusion

Renzo Tonin & Associates has completed an amendment noise assessment of the proposed Blind Creek Solar Farm. With the proposed alternative plant and equipment selection, the noise impacts were found to be the same or lower for all identified receiver locations. The noise emissions from the operational phase of the project were predicted to be within the operational noise criteria at all non-involved receiver locations.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
29.09.2022	Generate technical memo	0	1	W. Chan	W. Chan	M. Chung
04.10.2022	Final	-	2	W. Chan	W. Chan	M. Chung
File Path: R:\AssocSydProjects\TM201-TM250\TM244 mch Blind Creek Solar Farm\TASK 2\1 Docs\TM244-02F01 Addendum Report (r2).docx						

Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

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 Leq 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.