EAST PARK ENERGY

East Park Energy

EN010141

Environmental Statement

Volume 2 – Technical Appendices

Appendix 10-5: Low Frequency Noise Analysis and Sample Plant Frequency Spectra

Document Reference: EN010141/DR/6.2

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009: Regulation 5(2)(a)

September 2025

Version P01

EAST PARK ENERGY

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Environmental Statement
Volume 2 – Technical Appendices

Appendix 10-5: Low Frequency Analysis and Sample Plant Frequency Spectra

APFP Regulation Reference:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	EN010141
Application Document Number:	EN010141/DR/6.2
Author:	Noise and Vibration Consultants Ltd

Version	Date	Status
P01	September 2025	DCO Submission

CONTENTS

1.0 LOW FREQUENCY NOISE ANALYSIS & SAMPLE PLANT FREQUENCY SPECTRA

1.1 Low Frequency Noise (LFN) Analysis

1.1.1 In terms of the low frequency noise on receptors, the Site has been assessed in terms of the appropriate guidance for LFN which would be NANR45 `Proposed criteria for the assessment of low frequency noise disturbance' as produced for DEFRA via Salford University.

1.1.2 Tables 1 to 4 provide the results of the analysis for those receptors that would have the highest levels of LFN during the sensitive night-time periods (i.e. 2300 to 0500 hours) with the BESS and substation plant in operation under load. This is based on an assumed bedroom window height of 4m above ground level.

1.1.3 The analysis assumes an open window attenuation of 5dB between the LFN frequencies of 25Hz to 160Hz, which is the audible range and is considered to be a conservative assessment of impact under `worst case' noise conditions.

1.1.4 Tables 5 to 6 provide the results of the analysis for those receptors that would have the highest level of LFN during the daytime and sunrise periods (i.e. 0500 to 2300 hours). The NANR45 guidance allows for a 5dB increase for daytime periods as these hours are deemed to be less sensitive outside of typical sleep hours. The height above ground for this period is also assumed to be 4m above ground level for robustness.

Table 1: Low Frequency Noise (LFN) Analysis during night-time at Receptor R34 Rushey Farm

Predicted Noise Level from BESS & HV Transformer
Substation Transformer **RECEPTOR R34 Rushey Farm**

	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-3.0	0.8	5.6	11.4	12.6	13.0	19.5	15.1	18.8	20.3	22.7	23.8	23.3	24.7	25.0	26.1	28.4	24.6	24.2	18.8	14.2	8.6	35.2
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			41.8	40.3	40.1	41.7	38.8	35.4	38.6	31.3	32.0	31.2	31.3	30.4	28.1	27.9	26.9	26.9	28.4	24.0	23.2	17.6	12.9	7.4	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			36.8	35.3	35.1	36.7	33.8	30.4	33.6	26.3	27.0	21.2	21.3	20.4	18.1	17.9	16.9	16.9	18.4	14.0	13.2	7.6	2.9	-2.6	
A-weighted Bedroom level			-8.0	-4.2	0.6	6.4	7.6	8.0	14.5	10.1	13.8	10.3	12.7	13.8	13.3	14.7	15.0	16.1	18.4	14.6	14.2	8.8	4.2	-1.4	25.9
NANR 45 Limits			64	56	49	43	42	40	38	36	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-27.2	-20.7	-13.9	-6.3	-8.2	-9.6	-4.4	-9.7	-7.0														

Table 2: Low Frequency Noise (LFN) Analysis during night-time at Receptor R35 Moor Road

Predicted Noise Level from BESS & HV Transformer
Substation Transformer **RECEPTOR R35 Moor Road**

	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-4.1	0.0	4.8	10.0	11.8	12.9	19.0	14.5	17.9	19.7	21.8	22.9	22.6	24.0	23.9	24.8	27.0	23.6	21.2	17.3	12.7	6.3	34.1
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			40.7	39.5	39.3	40.3	38.0	35.3	38.1	30.7	31.1	30.6	30.4	29.5	27.4	27.2	25.8	25.6	27.0	23.0	20.2	16.1	11.4	5.1	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			35.7	34.5	34.3	35.3	33.0	30.3	33.1	25.7	26.1	20.6	20.4	19.5	17.4	17.2	15.8	15.6	17.0	13.0	10.2	6.1	1.4	-4.9	
A-weighted Bedroom level			-9.1	-5.0	-0.2	5.0	6.8	7.9	14.0	9.5	12.9	9.7	11.8	12.9	12.6	14.0	13.9	14.8	17.0	13.6	11.2	7.3	2.7	-3.7	24.8
NANR 45 Limits			64	56	49	43	42	40	38	36	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-28.3	-21.5	-14.7	-7.7	-9.0	-9.7	-4.9	-10.3	-7.9														

Table 3: Low Frequency Noise (LFN) Analysis during night-time at Receptor R37 Wood View

Predicted Noise Level from BESS & HV Transformer
Substation Transformer **RECEPTOR R37 Wood View**

	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-5.0	-0.2	4.8	8.8	11.6	13.6	17.9	13.3	16.5	18.8	20.4	21.8	22.2	23.9	23.0	23.9	25.6	23.7	20.7	16.1	10.3	2.5	33.3
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			39.8	39.3	39.3	39.1	37.8	36.0	37.0	29.5	29.7	29.7	29.0	28.4	27.0	27.1	24.9	24.7	25.6	23.1	19.7	14.9	9.0	1.3	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			34.8	34.3	34.3	34.1	32.8	31.0	32.0	24.5	24.7	19.7	19.0	18.4	17.0	17.1	14.9	14.7	15.6	13.1	9.7	4.9	-1.0	-8.7	
A-weighted Bedroom level			-10.0	-5.2	-0.2	3.8	6.6	8.6	12.9	8.3	11.5	8.8	10.4	11.8	12.2	13.9	13.0	13.9	15.6	13.7	10.7	6.1	0.3	-7.5	24.0
NANR 45 Limits			64	56	49	43	42	40	38	36	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-29.2	-21.7	-14.7	-8.9	-9.2	-9.0	-6.0	-11.5	-9.3														

Table 4: Low Frequency Noise (LFN) Analysis during night-time at Receptor R34 Rushey Farm

Predicted Noise Level from BESS & HV Transformer

Substation Transformer **RECEPTOR R38 The Cottage**

	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-7.8	-3.5	1.4	6.6	8.4	9.6	18.4	13.8	17.1	19.3	21.1	22.5	21.9	23.6	23.1	23.7	25.6	23.1	21.0	15.9	11.2	4.8	33.2
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			37.0	36.0	35.9	36.9	34.6	32.0	37.5	30.0	30.3	30.2	29.7	29.1	26.7	26.8	25.0	24.5	25.6	22.5	20.0	14.7	9.9	3.6	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			32.0	31.0	30.9	31.9	29.6	27.0	32.5	25.0	25.3	20.2	19.7	19.1	16.7	16.8	15.0	14.5	15.6	12.5	10.0	4.7	-0.1	-6.4	
A-weighted Bedroom level			-12.8	-8.5	-3.6	1.6	3.4	4.6	13.4	8.8	12.1	9.3	11.1	12.5	11.9	13.6	13.1	13.7	15.6	13.1	11.0	5.9	1.2	-5.2	23.9
NANR 45 Limits			64	56	49	43	42	40	38	36	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-32.0	-25.0	-18.1	-11.1	-12.4	-13.0	-5.5	-11.0	-8.7														

Table 5: Low Frequency Noise (LFN) Analysis during Daytime at Receptor R34 Rushey Farm

Predicted Noise Level from BESS, HV Transformer & Solar Plant

Substation Transformer **RECEPTOR R34 Rushey Farm**

	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-1.0	2.3	6.7	14.3	16.3	14.1	20.0	15.3	19.0	22.0	23.0	24.3	24.1	25.5	25.8	26.7	28.6	24.9	22.8	19.0	14.4	8.8	35.7
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			43.8	41.8	41.2	44.6	42.5	36.5	39.1	31.5	32.2	32.9	31.6	30.9	28.9	28.7	27.7	27.5	28.6	24.3	21.8	17.8	13.1	7.6	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			38.8	36.8	36.2	39.6	37.5	31.5	34.1	26.5	27.2	22.9	21.6	20.9	18.9	18.7	17.7	17.5	18.6	14.3	11.8	7.8	3.1	-2.4	
A-weighted Bedroom level			-6.0	-2.7	1.7	9.3	11.3	9.1	15.0	10.3	14.0	12.0	13.0	14.3	14.1	15.5	15.8	16.7	18.6	14.9	12.8	9.0	4.4	-1.2	26.4
NANR 45 Limits	DAY		69	61	54	48	47	45	43	41	39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-30.2	-24.2	-17.8	-8.4	-9.5	-13.5	-8.9	-14.5	-11.8														

Table 6: Low Frequency Noise (LFN) Analysis during Daytime at Receptor R38 The Cottage

Predicted Noise Level from BESS, HV Transformer & Solar Plant

Substation Transformer **RECEPTOR R38 The Cottage**

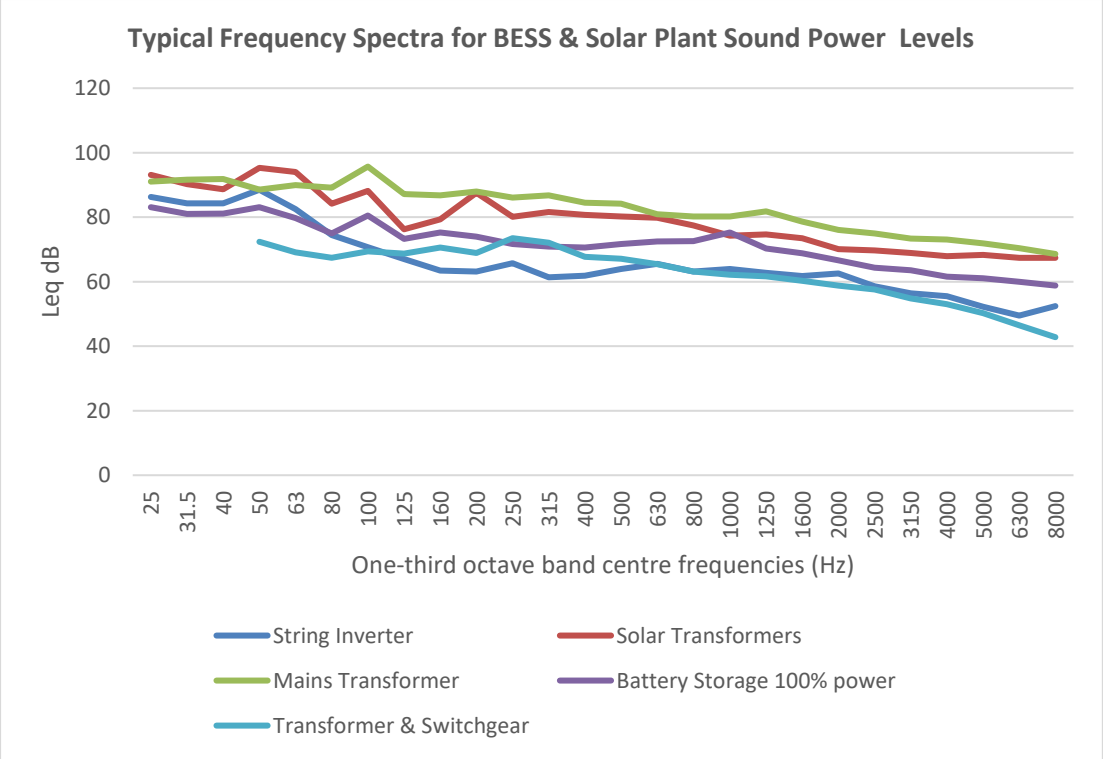
	Freq (Hz)		25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	LAeq
R35 A-weighted Level	Leq (dB)	SWL	-0.7	2.2	6.5	16.4	19.0	14.2	20.1	14.5	18.2	23.5	22.3	24.3	24.8	26.1	26.2	26.2	26.6	25.1	22.8	18.5	15.1	10.3	35.6
A-weighting			44.8	39.5	34.5	30.3	26.2	22.4	19.1	16.2	13.2	10.9	8.6	6.6	4.8	3.2	1.9	0.8	0	-0.6	-1	-1.2	-1.3	-1.2	
Un-Weighted Level			44.1	41.7	41.0	46.7	45.2	36.6	39.2	30.7	31.4	34.4	30.9	30.9	29.6	29.3	28.1	27.0	26.6	24.5	21.8	17.3	13.8	9.1	
Open Window Attenuation	5		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Internal bedroom level			39.1	36.7	36.0	41.7	40.2	31.6	34.2	25.7	26.4	24.4	20.9	20.9	19.6	19.3	18.1	17.0	16.6	14.5	11.8	7.3	3.8	-0.9	
A-weighted Bedroom level			-5.7	-2.8	1.5	11.4	14.0	9.2	15.1	9.5	13.2	13.5	12.3	14.3	14.8	16.1	16.2	16.2	16.6	15.1	12.8	8.5	5.1	0.3	26.4
NANR 45 Limits	DAY		69	61	54	48	47	45	43	41	39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Level Difference (dB)			-29.9	-24.3	-18.0	-6.3	-6.8	-13.4	-8.8	-15.3	-12.6														

1.1.5 The results of the analysis show no exceedance of the NANR45 Guidance threshold levels for LFN during daytime or night-time periods at the receptors with the highest likely predicted noise levels. This is with an open window scenario and therefore a realistic `worst-case' prediction.

1.2 Sample Plant Noise Frequency Spectra

1.2.1 Graph 1 below provides detail of the one-third octave band centre frequency spectra that is typical of the BESS & Solar plant assumed for the noise assessment.

Graph 1: Typical One Third Octave Band Centre Frequency Spectra for BESS & Solar Plant



1.2.2 The frequency spectra data for the BESS & solar plant show a relatively flat frequency response which supports the view, based on the author's extensive experience and test data from modern plant provided by technology providers, that tonal character is suitably controlled by design and mitigation.