



IMP7694-2

INDUSTRIAL NOISE IMPACT ASSESSMENT

BESS SITE

British Standard 4142:2019

CLIENT:

REWE 11

SITE:

Land west of Mount Road,
Mount Road,
Rhigos,
Aberdare,
CF44 9YS.

SURVEY DATES:

24th – 30th October 2024

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Report Ref	Date	Commentary
IMP7964-1	November 2024	Original
IMP7964-2	January 2025	Update to report with new source data and a new layout with new modelling and new calculations
IMP7964-3	February 2025	Update to report

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1 EXECUTIVE SUMMARY

1.1 Instruction

Impact Acoustics have been instructed to undertake a background noise survey at the proposed BESS site; Land west of Mount Road, Mount Road, Rhigos, Aberdare, CF44 9YS to planning application for the proposed BESS site.

1.2 Scope of Report

The measurements have been undertaken in accordance with British Standard 4142:2019 and ISO 1996 – Part 2: 2007 to establish if the BESS site development will have a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. This report aims to establish the following:

- Existing background noise levels at the closest residential façades to the site
- Assessment of the impact of the site operation on nearby residential properties.

1.3 Summary of Report

1.3.1 Measured Background Noise Levels

Continuous background noise measurements were undertaken between 24th – 30th October 2024 at the Assessment Position. The modal 1 hour day time background noise levels between 07:00 and 23:00 was found to be $L_{A90,1 \text{ hour}}$ 35 dB at the assessment position and the modal 15 minute night time background noise levels between 23:00 – 07:00 was found to be $L_{A90,15 \text{ minutes}}$ 29 dB.

Assessment Position	Date	LAeq		LA90 (Modal)	
		Day	Night	Day	Night
		(0700 - 2300)	(2300 - 0700)	(0700 - 2300)	(2300 - 0700)
1	24/10/2024	51.4	43.4	35	29
1	25/10/2024	53.2	45.2		
1	26/10/2024	51.1	39.7		
1	27/10/2024	51.9	49.2		
1	28/10/2024	54.8	43.0		
1	29/10/2024	52.5	50.9		
1	30/10/2024	52.0			

1.3.2 Criterion on Noise Source and Context of Site

A working noise criterion factoring the main assessment methodologies has been set out below. Criterion has been set on the contextualisation of the environment where the plant is being proposed. From assessment and attendance at site; the site is considered rural with a road that has a sporadic flow of traffic (as shown in the baseline time history) which forms the dominant residual noise climate (Average Daytime LAeq,16 hour circa 52 dB(A)). It is therefore considered the below criterion applicable in order to safeguard the nearby residential amenity from noise emissions associated with the development and in accordance with local planning policy (+/- at or below the representative measured LA90) with a maximum rating level of 30dB in accordance with BS4142:2019 "low background levels".

1.3.3 Night Time (23:00 – 07:00)

Operating Hours	Criterion	Maximum Rating Level (LAeq,15min)	Colour Code
Night Time (2300 - 0700)	No Observed Affect Level	20	
	Low Impact	30	
	Adverse Effect	35	
	Significant Adverse Effect	40	

NOTE 1: the above is permissible rating level (specific noise level + source characteristic) which accounts for audible characteristics associated with proposed source.

1.3.4 Criterion on Plant

It is proposed to install multiple inverter stations, batteries and transformers located in different positions around the site. Source data shown in appendix. Sources to be positioned south east of the application site.

Items of Equipment	Operating Hours	Maximum Sound Power Level	
BESS Unit	24/7	L _{w(A)} 60 dB (with orientation and attenuation)	
Auxiliary Transformer	24/7	L _{w(A)} 63 dB	
Inverter (with attenuation kit)	24/7	L _{w(A)} 86 dB (80%)	L _{w(A)} 84 dB (60%)
HV Transformer	24/7	L _{w(A)} 84 dB	
Harmonic Filter	24/7	L _{w(A)} 83 dB	

1.4 Assessments

1.4.1 Night Time – 60% inverter with attenuation kit – Pre Mitigation

Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 – 0700)
Assessment Level	+5 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+5 dB		
Conclusion	The assessment level is 'Adverse Impact'		
	(additional) Meets internal absolute noise criterion with partially open window		

1.4.2 Mitigation

From review of the source contributions at the residences; the dominant source are the inverters. It is recommended that an acoustic screen is installed at the boundary to each run of inverters on the eastern side (residence facing) to reduce noise levels further. Acoustic screening should 1m higher than the inverter source, have no holes or gaps, be continuous and have a minimum superficial mass of 24Kg/m². The following should be considered the required mitigation to achieve a low impact across the site:

- Inverter fan speed at a maximum capacity of 60%
- Inverter with attenuation kit
- Acoustic screening at 1m higher than the source height of the inverters

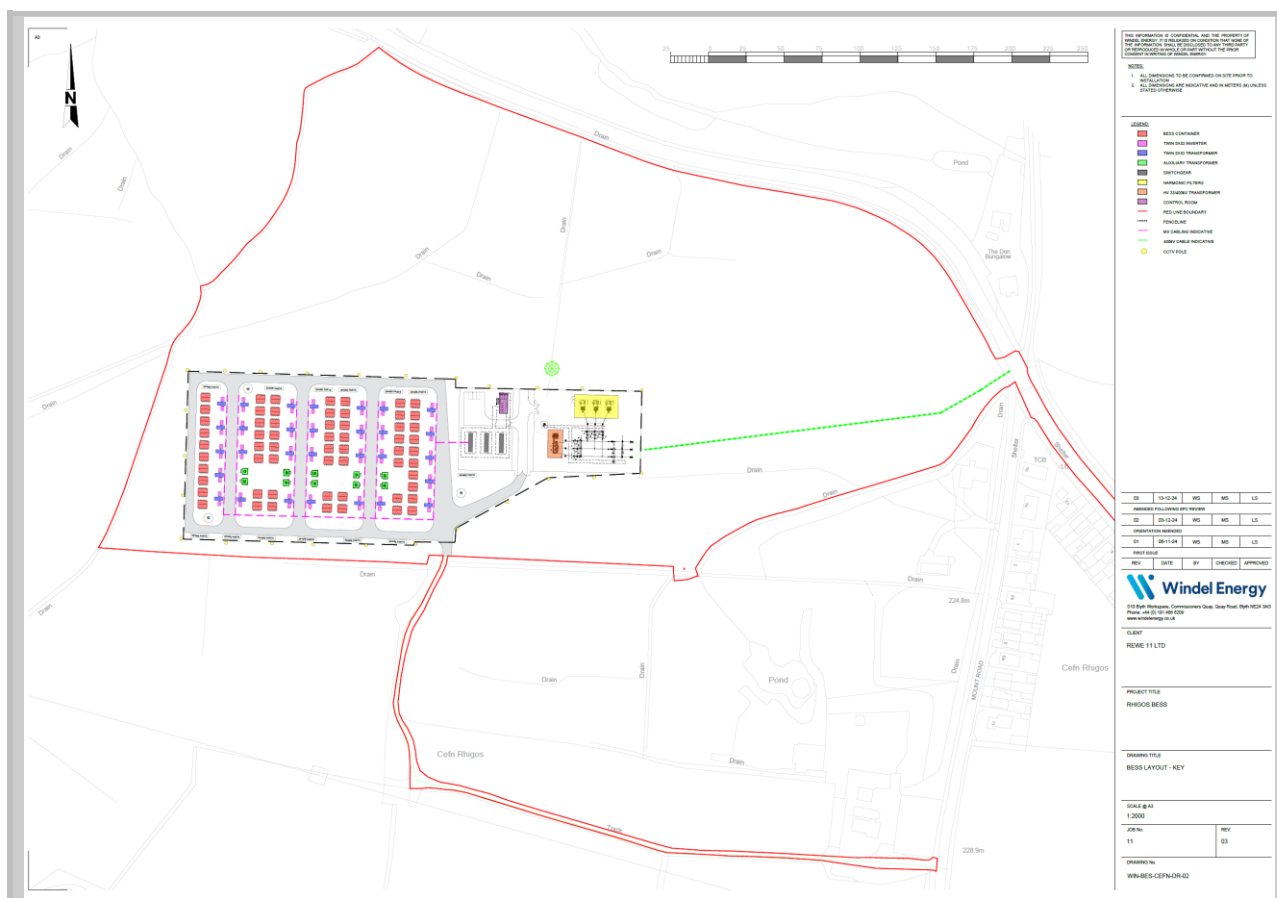
1.4.3 Night Time – 60% inverter with attenuation kit – Post Mitigation

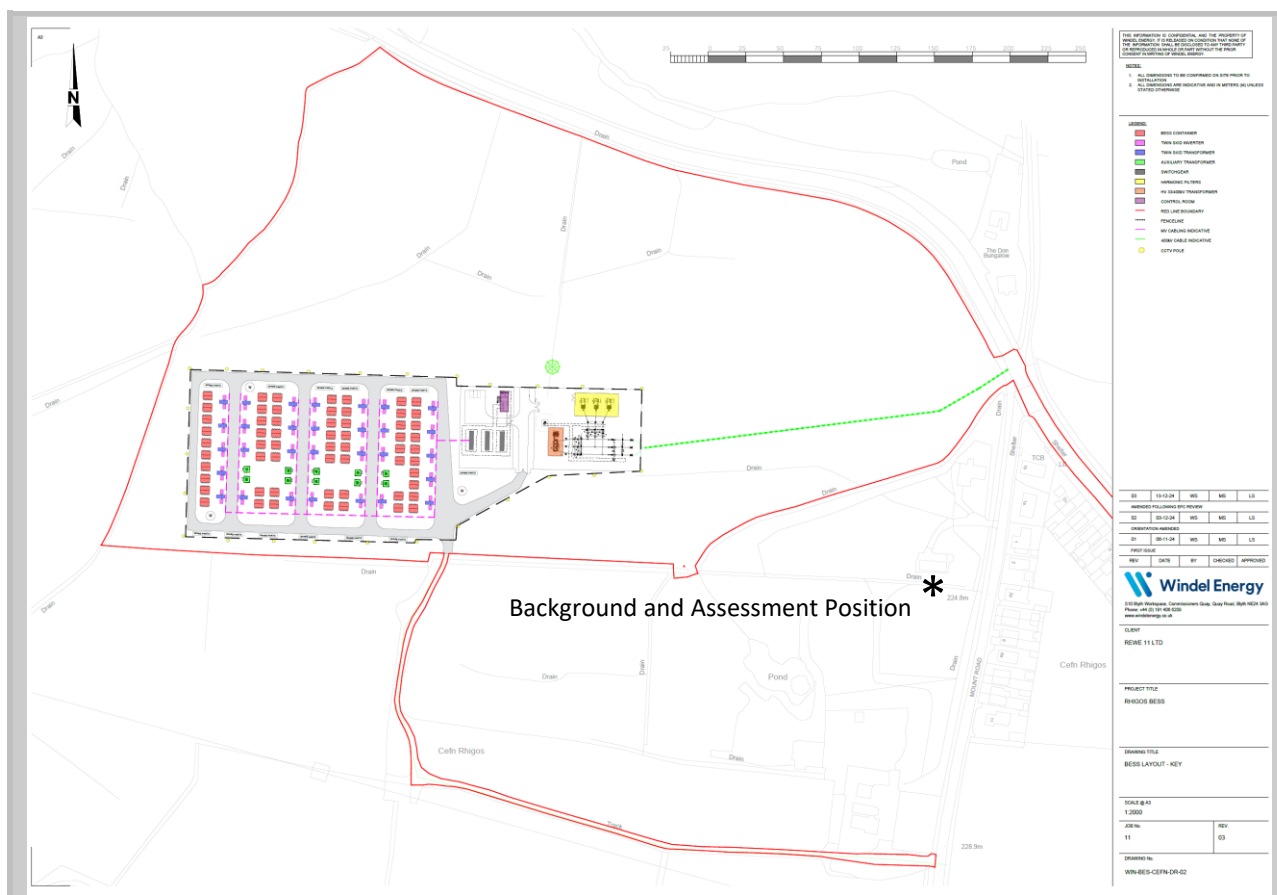
Rating Level	32 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 – 0700)
Assessment Level	+2 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+2 dB		
Conclusion	The assessment level is 'Low Impact'		
	(additional) Meets internal absolute noise criterion with partially open window		

1.5 Conclusions

The operation of the proposed BESS site has been assessed to establish if the BESS site development will have a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142:2019 and ISO 1996 – Part 2: 2017. This report aims to establish: the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario (with mitigation and reduced fan speed) are unlikely to have the potential to give rise to significant adverse effect at the assessment positions. It should be noted that this assessed level of impact will not be all year round and will only be present when all worst case factors are active i.e. summer solstice, hot temperatures, positive wind vector from source to receiver, no traffic noise etc.

Furthermore, an assessment into absolute levels in accordance with Night Noise Guidelines show that there would be a night time impact for internal levels (32dB LMax internal).





3 BACKGROUND NOISE LEVELS

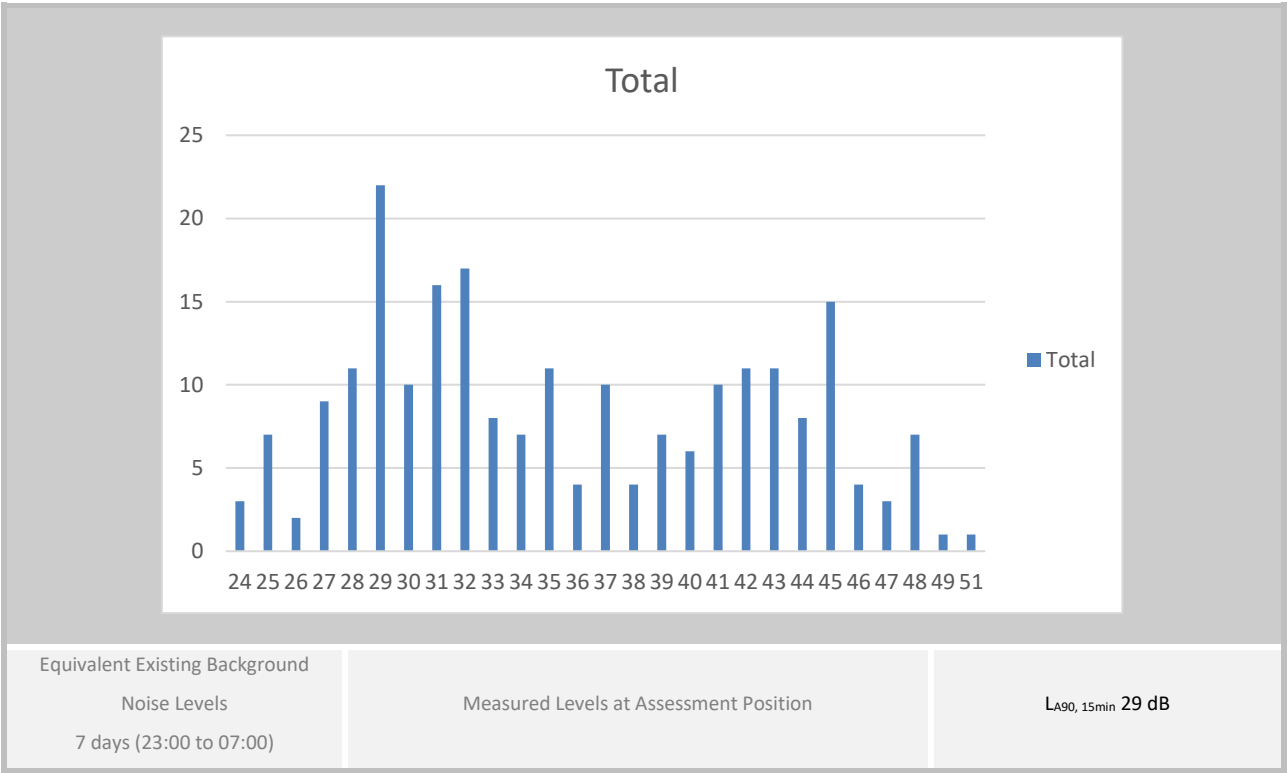
3.1 Summary of Report

3.1.1 Measured Background Noise Levels

Continuous background noise measurements were undertaken between 24th – 30th October 2024 at the Assessment Position. The modal 1 hour day time background noise levels between 07:00 and 23:00 was found to be LA90,1 hour 35 dB at the assessment position and the modal 15 minute night time background noise levels between 23:00 – 07:00 was found to be LA90,15 minutes 29 dB.

Assessment Position	Date	LAeq		LA90 (Modal)	
		Day	Night	Day	Night
		(0700 - 2300)	(2300 - 0700)	(0700 - 2300)	(2300 - 0700)
1	24/10/2024	51.4	43.4	35	29
1	25/10/2024	53.2	45.2		
1	26/10/2024	51.1	39.7		
1	27/10/2024	51.9	49.2		
1	28/10/2024	54.8	43.0		
1	29/10/2024	52.5	50.9		
1	30/10/2024	52.0			

3.1.1.1 Night Time (23:00 to 07:00 Monday to Sunday)



4 CRITERION

4.1 Night Noise Guidelines (“NNGL”)

The European Union and the World Health Organisation jointly published a document entitled “Night Noise Guidelines” in 2009 (“NNGL”). The overall goal of the document was detailed within the summary pages:

“The goal of the NNGL project was to provide and expand scientific advice to the European Commission and its Member States in developing future legislation in the area of night noise exposure, control and surveillance. The key objective of the project was to reach a consensus of experts and key stakeholders on the following subjects:

a) Guideline values for night noise to protect the public from adverse health effects.....”

4.1.1 No Observed Adverse Effect Level (NOAEL)

The section entitled “*Threshold for Observed Effects*” within the executive summary of the NNGL a list of the absolute level at which there is sufficient evidence available for the no observed adverse effect level (NOAEL):

Effect of Noise	Description	Indicator	Threshold (NOAEL)
Biological Effects	EEG awakening	L _{Amax,inside}	35 dB
	Motility, onset of motility	L _{Amax,inside}	32 dB
	Changes in duration of various stages of sleep, in sleep structure and fragmentation of sleep	L _{Amax,inside}	35 dB
Sleep Quality	Waking up in the night and / or too early in the morning	L _{Amax,inside}	42 dB

4.1.2 Vulnerable Groups

In setting the LOAEL and the SOAEL within the scope of the NPSE consideration has been made for the statement made under the title “*Vulnerable Groups*” which indicates that young children, elderly adults and shift workers should be considered vulnerable groups and more likely to be effected by unwanted noise.

4.1.3 Attenuation of an Open Window

The NNGL indicates an attenuation of around 10 – 15 dB(A) through an open window. It could therefore be appropriate to consider an overall reduction of 10 dB(A) through a partially open window.

4.2 Proposed Criterion

4.2.1 Relative to Background

Having regard to the guidance within BS4142:2019 it is considered the following are the appropriate criteria against which the plant noise emissions should be assessed to ensure they do not have an adverse effect on the local community. The criteria level for this assessment has been set at the level defined as “*low adverse impact*” within BS4142:2019. The criteria level has been set at above the minimum level where a change is perceptible and well below the level which will have an adverse impact.

4.2.2 Criterion on Noise Source and Context of Site

A working noise criterion factoring the main assessment methodologies has been set out below. Criterion has been set on the contextualisation of the environment where the plant is being proposed. From assessment and attendance at site; the site is considered rural with a road that has a sporadic flow of traffic (as shown in the baseline time history) which forms the dominant residual noise climate (Average Daytime LAeq,16 hour circa 52 dB(A)). It is therefore considered the below criterion applicable in order to safeguard the nearby residential amenity from noise emissions associated with the development and in accordance with local planning policy (+/- at or below the representative measured LA90) with a maximum rating level of 30dB in accordance with BS4142:2019 “low background levels”.

4.2.3 Night Time (23:00 – 07:00)

Operating Hours	Criterion	Maximum Rating Level (LAeq,15min)	Colour Code
Night Time (2300 - 0700)	No Observed Affect Level	20	
	Low Impact	30	
	Adverse Effect	35	
	Significant Adverse Effect	40	

NOTE 1: the above is permissible rating level (specific noise level + source characteristic) which accounts for audible characteristics associated with proposed source.

5 OPERATION OF SITE

5.1 Proposed Site



5.2 Criterion on Plant

It is proposed to install multiple inverter stations, batteries and transformers located in different positions around the site. Source data shown in appendix. Sources to be positioned south east of the application site.

Items of Equipment	Operating Hours	Maximum Sound Power Level	
BESS Unit	24/7	$L_{w(A)}$ 60 dB (with orientation and attenuation)	
Auxiliary Transformer	24/7	$L_{w(A)}$ 63 dB	
Inverter (with attenuation kit)	24/7	$L_{w(A)}$ 86 dB (80%)	$L_{w(A)}$ 84 dB (60%)
HV Transformer	24/7	$L_{w(A)}$ 84 dB	
Harmonic Filter	24/7	$L_{w(A)}$ 83 dB	

6 ASSESSMENT OF OPERATION OF SITE

6.1 Calculation Formulas - ISO 9613:1996

6.1.1 Source Directivity (D_c)

A correction is made to account for the location of the source and the effect of additional reflective surfaces excluding the ground and is contained within section 6 of ISO 9613 - Part 2:1996.

Number of Surfaces	Correction in dB (D_c)
No Reflective Surfaces	+0 dB
1 Reflective Surface	+3 dB
2 Reflective Surfaces	+6 dB
3 Reflective Surfaces	+9 dB

6.1.2 Geometric Divergence (A_{div})

A correction is made for the distance between the source and assessment position using the following formula defined in section 7.1 of ISO 9613-Part 2:1996.

Formula	Symbols
$A_{div} = 20 \cdot \log_{10} (d/d_0) + 11$	A_{div} = Reduction due to Geometric Divergence (dB) d = Distance from source to receiver (m) d_0 = reference distance (1m)

6.1.3 Ground Absorption (A_{gr})

A correction is made for the effect of the ground between the source and receiver depending on whether it is considered hard or soft ground.

Type of ground	Correction in dB (A_{gr})
Hard Ground	+ 3 dB
Soft Ground	+ 0 dB

6.3 Summary of Calculations

The resulting specific noise source has been calculated and predicted using noise modelling software in accordance with ISO9613-2 and the parameters set out above.

6.3.1 Resulting Levels (ISO9613-2 predicted with SoundPLAN)

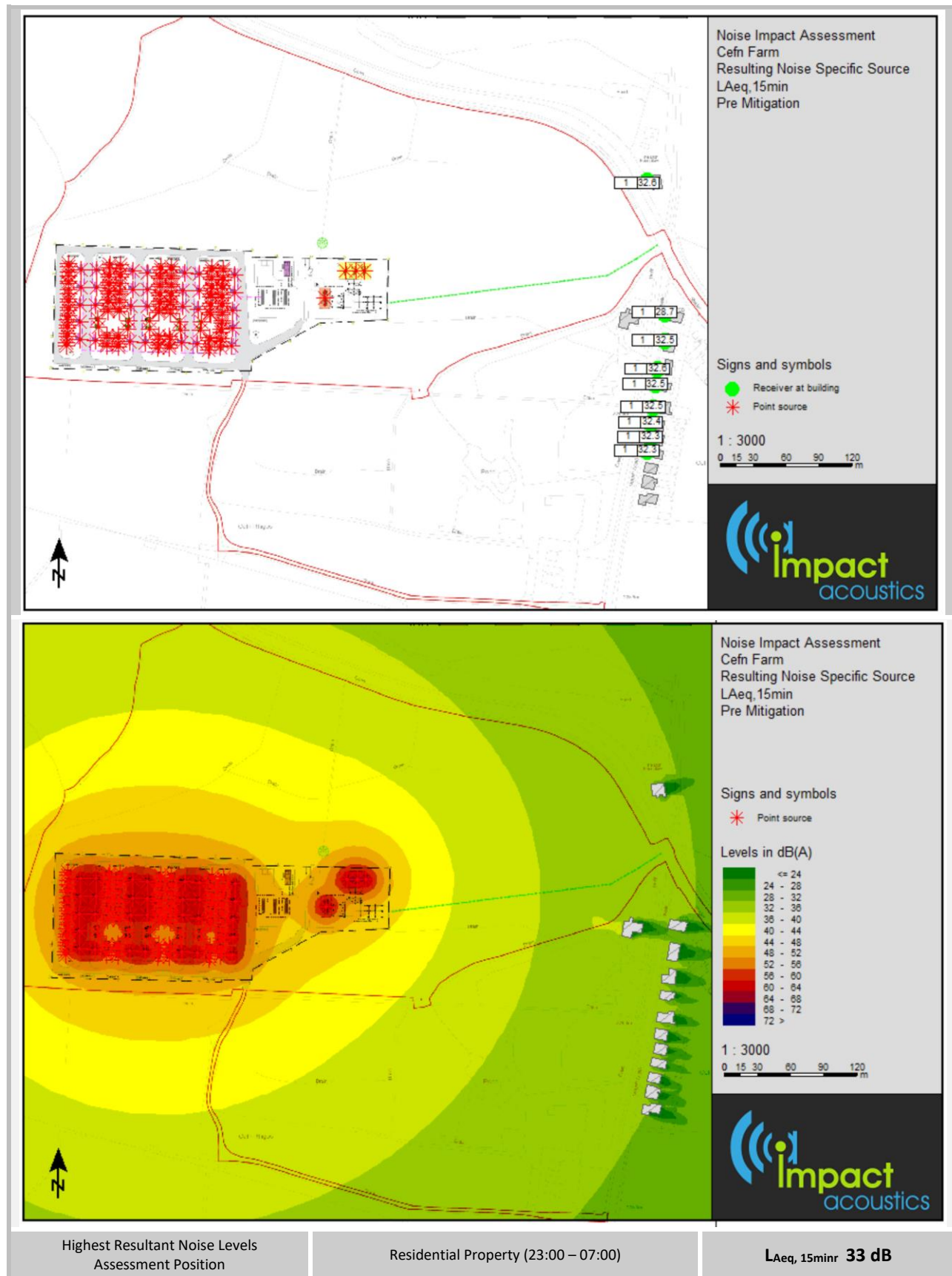
Model Number	Receiver name	Building	Resulting Level (Fans @ 60%)
1	1 Mount Road	West	32.6
2	1a Mount Road	West	32.5
3	1b Mount Road	West	28.7
4	2 Mount Road	West	32.5
5	2a Mount Road	West	32.5
6	3/4 Mount Road	West	32.4
7	5/6 Mount Road	West	32.3
8	6a Mount Road	West	32.3
9	The Don Bungalow	West	32.6

6.3.2 Discussion of Results

It can be seen that both Assessment Position "1 Mount Road" has the highest specific noise present when calculated in accordance with ISO9613-2 and assessed in accordance with BS4142:2019.

6.4 3D Noise Maps

6.4.1 Night Time Levels 2300 - 0700 hours



6.5 Assessments

6.5.1 Night Time – 60% inverter – Pre Mitigation

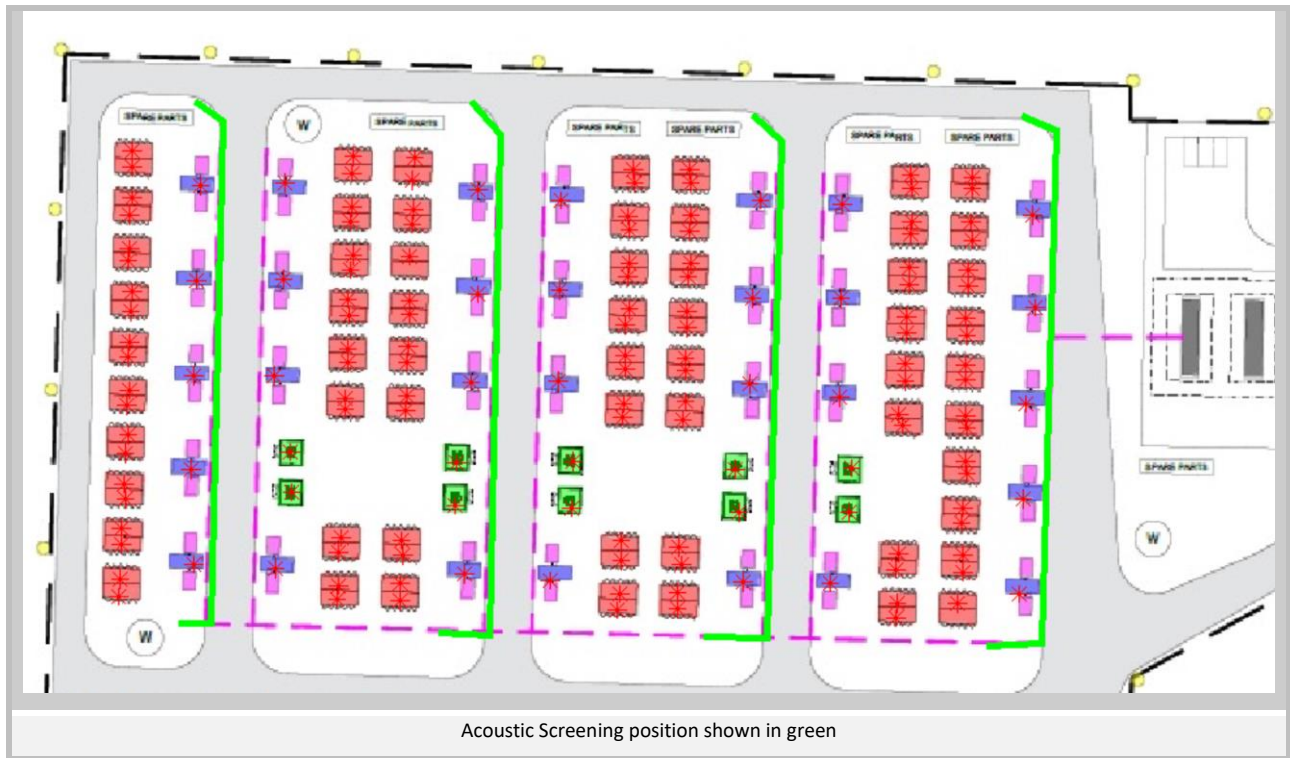
Rating Industrial Noise affecting Mixed Industrial and Residential Areas			
British Standard 4142:2019 Night Time (2300 - 0700)			
Source	Operating Times		Source Position
	(2300 - 0700)		See Plans
	7 days per week		
	Worst case scenario		
Assessment Position	As Report		
Background Position	At a position representative to the assessment position		
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,15min}$	33 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 - 0700)
Assessment Level	+5 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+5 dB		
Conclusion	The assessment level is ‘Adverse Impact’		
	(additional) Meets internal absolute noise criterion with partially open window in accordance with NNGL		

6.5.2 Penalty Corrections

Given the level above background; a +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

6.6 Mitigation

From review of the source contributions at the residences; the dominant source are the inverters. In addition to the reduced fan speed of the inverters; it is recommended that an acoustic screen is installed at the boundary to each run of inverters on the eastern side (residence facing) to reduce noise levels further. Acoustic screening should 1m higher than the inverter source, have no holes or gaps, be continuous and have a minimum superficial mass of 24Kgm².



6.6.1 Resulting Levels (ISO9613-2 predicted with SoundPLAN)

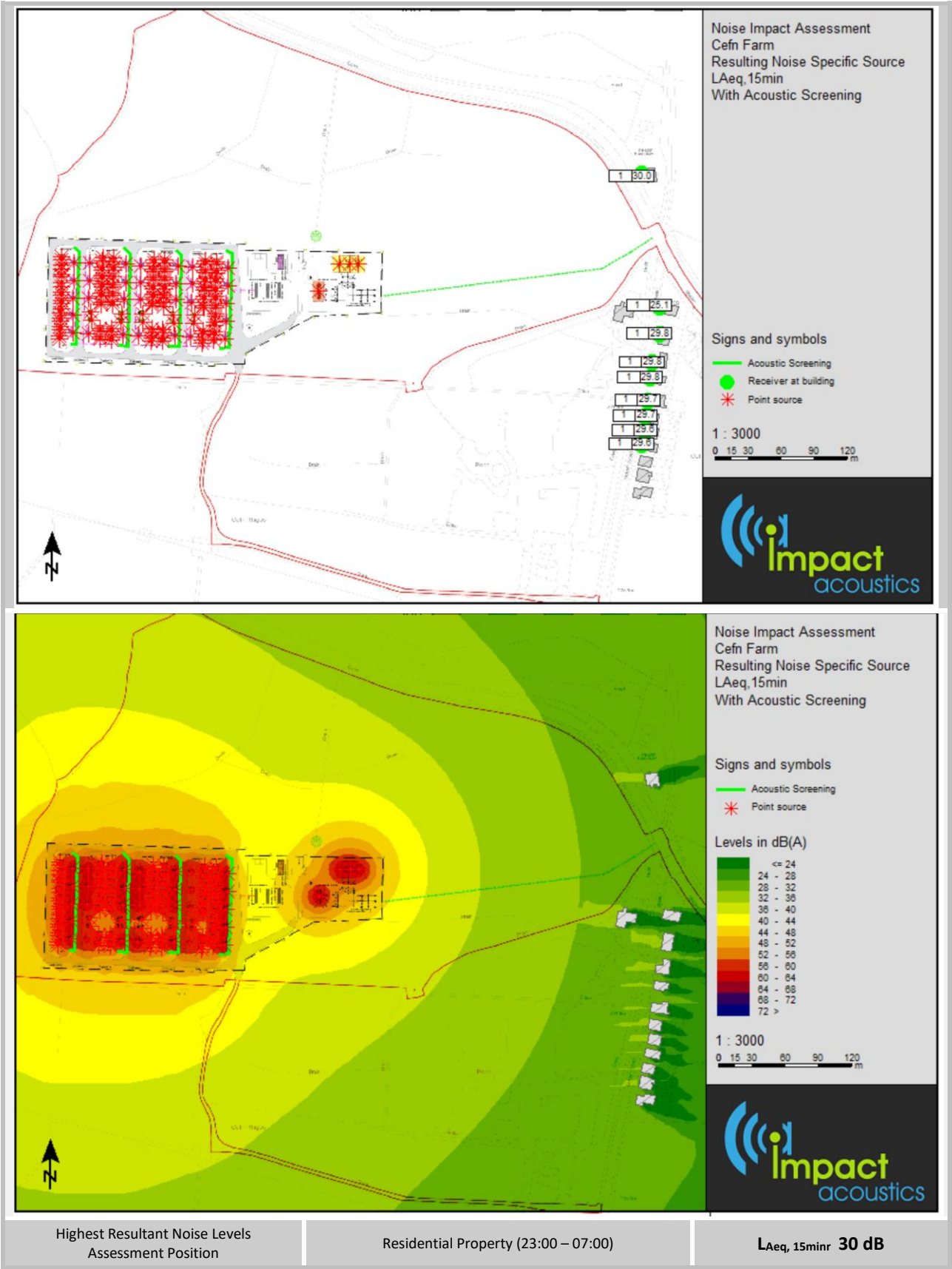
Model Number	Receiver name	Building	Resulting Level (Fans @ 60%)
1	1 Mount Road	West	29.8
2	1a Mount Road	West	29.8
3	1b Mount Road	West	25.1
4	2 Mount Road	West	29.8
5	2a Mount Road	West	29.7
6	3/4 Mount Road	West	29.7
7	5/6 Mount Road	West	29.6
8	6a Mount Road	West	29.6
9	The Don Bungalow	West	30

6.6.2 Discussion of Results

It can be seen that both Assessment Position “1 Mount Road” has the highest specific noise present when calculated in accordance with ISO9613-2 and assessed in accordance with BS4142:2019. With a reduction / insertion loss profile of -3dB(A) due to the screening.

6.7 3D Noise Maps

6.7.1 Night Time Levels 2300 - 0700 hours



6.8 Assessments

6.8.1 Night Time – 60% inverter – Post Mitigation

Rating Industrial Noise affecting Mixed Industrial and Residential Areas			
British Standard 4142:2019 Night Time (2300 - 0700)			
Source	Operating Times		Source Position
	(2300 - 0700)		See Plans
	7 days per week		
	Worst case scenario		
Assessment Position	As Report		
Background Position	At a position representative to the assessment position		
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,15min}$	30 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Rating Level	32 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 - 0700)
Assessment Level	+2 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+2 dB		
Conclusion	The assessment level is ‘Low Impact’		
	(additional) Meets internal absolute noise criterion with partially open window in accordance with NNGL		

6.8.2 Penalty Corrections

Given the level above background; a +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

7 CONCLUSIONS

7.1 Summary of Report

7.1.1 Measured Background Noise Levels

Continuous background noise measurements were undertaken between 24th – 30th October 2024 at the Assessment Position. The modal 1 hour day time background noise levels between 07:00 and 23:00 was found to be $L_{A90,1 \text{ hour}}$ 35 dB at the assessment position and the modal 15 minute night time background noise levels between 23:00 – 07:00 was found to be $L_{A90,15 \text{ minutes}}$ 29 dB.

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7.1.2 Criterion on Noise Source and Context of Site

A working noise criterion factoring the main assessment methodologies has been set out below. Criterion has been set on the contextualisation of the environment where the plant is being proposed. From assessment and attendance at site; the site is considered rural with a road that has a sporadic flow of traffic (as shown in the baseline time history) which forms the dominant residual noise climate (Average Daytime $L_{Aeq,16 \text{ hour}}$ circa 52 dB(A)). It is therefore considered the below criterion applicable in order to safeguard the nearby residential amenity from noise emissions associated with the development and in accordance with local planning policy (+/- at or below the representative measured L_{A90}) with a maximum rating level of 30dB in accordance with BS4142:2019 “low background levels”.

7.1.3 Night Time (23:00 – 07:00)

Operating Hours	Criterion	Maximum Rating Level ($L_{Aeq,15min}$)	Colour Code
Night Time (2300 - 0700)	No Observed Affect Level	20	
	Low Impact	30	
	Adverse Effect	35	
	Significant Adverse Effect	40	

NOTE 1: the above is permissible rating level (specific noise level + source characteristic) which accounts for audible characteristics associated with proposed source.

7.1.4 Criterion on Plant

It is proposed to install multiple inverter stations, batteries and transformers located in different positions around the site. Source data shown in appendix. Sources to be positioned south east of the application site.

Items of Equipment	Operating Hours	Maximum Sound Power Level	
BESS Unit	24/7	$L_{w(A)}$ 60 dB (with orientation and attenuation)	
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HV Transformer	24/7	$L_{w(A)}$ 84 dB	
Harmonic Filter	24/7	$L_{w(A)}$ 83 dB	

7.2 Assessments

7.2.1 Night Time – 60% inverter with attenuation kit – Pre Mitigation

Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 – 0700)
Assessment Level	+5 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+5 dB		
Conclusion	The assessment level is 'Adverse Impact'		
	(additional) Meets internal absolute noise criterion with partially open window		

7.2.2 Mitigation

From review of the source contributions at the residences; the dominant source are the inverters. It is recommended that an acoustic screen is installed at the boundary to each run of inverters on the eastern side (residence facing) to reduce noise levels further. Acoustic screening should 1m higher than the inverter source, have no holes or gaps, be continuous and have a minimum superficial mass of 24Kg/m². The following should be considered the required mitigation to achieve a low impact across the site:

- Inverter fan speed at a maximum capacity of 60%
- Inverter with attenuation kit
- Acoustic screening at 1m higher than the source height of the inverters

7.2.3 Night Time – 60% inverter with attenuation kit – Post Mitigation

Rating Level	32 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,15min}$	30 dB	8.1	Modal Background Noise Level (2300 – 0700)
Assessment Level	+2 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+2 dB		
Conclusion	The assessment level is 'Low Impact'		
	(additional) Meets internal absolute noise criterion with partially open window		

7.3 Conclusions

The operation of the proposed BESS site has been assessed to establish if the BESS site development will have a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142:2019 and ISO 1996 – Part 2: 2017. This report aims to establish: the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario (with mitigation and reduced fan speed) are unlikely to have the potential to give rise to significant adverse effect at the assessment positions. It should be noted that this assessed level of impact will not be all year round and will only be present when all worst case factors are active i.e. summer solstice, hot temperatures, positive wind vector from source to receiver, no traffic noise etc.

Furthermore, an assessment into absolute levels in accordance with Night Noise Guidelines show that there would be a night time impact for internal levels (32dB L_{Max} internal).

7.3.1 Uncertainty

In line with the requirements of section 10 of British Standard 4142: 2019 it is expected that the reported expanded uncertainty with a confidence limit of 95% and assuming a convergence of $k=2$ is likely to be +/- 2.83dB. Uncertainty, in this instance has been minimised by undertaking longer background noise measurements over a 96 hour period.

8 APPENDIX A – INFORMATION TO BE REPORTED

8.1 a) Competency

1)	Name	Role	Competency
	I.Broom	Noise Consultant	IoA Diploma Acoustics Noise Control Associate Member of the Institute of Acoustics (AMIOA)

8.2 b) Source under Investigation

1)	Description of Source	Type	Manufacturer	Model
	BESS Site		--	--
	Description of Source	Source Location	Hours of Operation	Mode of Operation
	Inverter / Transformer / Battery	BESS Site	24/7	Continuous
	Description of Premises	Land west of Mount Road		

8.3 c) Subjective Impression of Source at Assessment Position

1)	Dominance	The sources will not be the dominant noise source at the assessment positions
	Audibility	Audibility is unlikely
2)	Residual Noise Sources	Residual noise due to local road traffic, HGV Movements

8.4 d) Existing Contexts

1)	Type of Receptor	Period	Sensitivity	Description
	Residential	Day	Moderate	Noise can disturb outside amenity space Noise can disturb inside living space
		Night	High	Noise can disturb sleeping

8.5 e) Relative Positions

1)	Assessment Position	See Report		
		BS 4142:2019 Criteria	Details	Compliance with Criteria
		Section 6	1.0m from façade (external)	Assessment position is valid
2)	Source Measurement	It is believed the sound power levels were established in accordance with BS EN 13487:2003		
	Justification	The site has yet to be developed or the source installed.		
3)	Background Measurement	At assessment positions in report		
	Justification	BS 4142:2019 Criteria	Details	Compliance with Criteria
		Section 6.2	3.5m to any reflecting surface	Does comply with Criteria
		Section 6.2	Height 1.2m to 1.5m	Does comply with Criteria
		Section 6.2	1 st floor 1m to facade	Does comply with Criteria
		Section 6.2	Measurement Height	1.5
			Distance to Reflecting Surface	3.5
4)	Topography, surfaces etc.	Agricultural land		
5)	Relative Distances	See Report		

8.6 f) Noise Measurement Equipment Calibration

8.6.1 Continuous and Spot Measurement

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	118	31471	2 YEARS	08.08.2023	08.08.2025
12.5mm Microphone (with windshield)	Norsonic	1220	41075	2 YEARS	08.08.2023	08.08.2025
Microphone Pre – Amplifier	Norsonic	1201	30327	2 YEARS	08.08.2023	08.08.2025

8.7 g) Noise Measurement Equipment Operation Test

1)	Ref. Level of Calibrator	94 dB@1000Hz
2)	Meter Reading Before	94 dB – Meter operation checked. Meter in good working order.
	Meter Reading After	94 dB - Meter operation checked. Meter in good working order.

8.8 h) Weather Conditions

1)	Weather Conditions	Dry
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8.9 i) Date and Time of Measurements

1)	Source Measurements	N/A
	Background Measurements	24 th October – 30 th October 2024

8.10 j) Measurement Time Interval

1)	Source Measurements	$T_m = 15$ minutes	
	Background Measurements	Day Time	Night Time
		(07:00 – 23:00)	(23:00 to 07:00)
		$T_m = 16$ hours	$T_m = 8$ hours

8.11 k) Reference Time Interval

1)	Reference Time Interval	Day Time	Night Time
		(07:00 – 23:00)	(23:00 to 07:00)
		$T_r = 1$ hour	$T_r = 15$ minutes

9 APPENDIX B – BRITISH STANDARD 4142:2019 FEATURE CORRECTION

9.1 Subjective Method

The subjective method establishes a rating penalty that is added to the specific noise level if any of the following is present at the assessment position.

If a tone is expected to be present a character correction of 0 dB to 6 dB is added depending on how perceptible it is at noise sensitive locations.

BS4142:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Tonality Ranging from not tonal to prominently tonal	Not tonal	+0
	Just perceptible	+2
	Clearly perceptible	+4
	Highly perceptible	+6

If the source is expected to be impulsive a character correction of 0 dB to 9 dB is added depending on how perceptible it is at noise sensitive locations.

BS4142:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Impulsivity Considering both the rapidity and any overall change in sound levels	Not impulsive	+0
	Just perceptible	+3
	Clearly perceptible	+6
	Highly perceptible	+9

When the sound features are neither tonal nor impulsive, a character correction of +3 is added for the readily distinctive quality against the acoustic environment or for the intermittency of the source.

BS4142:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Readily Distinctive	Is not present	+0
	Is present	+3
Intermittency	Is not present	+0
	Is present	+3

9.2 Objective Method

The objective method is used if the subjective method is not sufficient. This identifies tones from the one-third octave bands and adds a character correction of 6 dB if the tone is present.

According to BS4142:2019 (Annex C):

“For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the one-third octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third octave bands by some constant level difference.”

BS4142:2019 – Section 9.3 Objective Method	One – Third Octave Band	Difference
The level differences between adjacent one-third octave bands that identify a tone	25 Hz to 125 Hz	15 dB
	160 Hz to 400 Hz	8 dB
	500 Hz to 10,000 Hz	5 dB

9.3 Reference Method

The reference method is used if using one-third octave bands is not sufficient. This provides a method for assessing how audible a tone will be or how prominent the impulsive sounds will be and produces a penalty of up to 6 dB.

For full details of how to utilise the reference method see British Standard 4142:2019 Annexes D and E.

10 APPENDIX C – UNCERTAINTY BUDGET

Sources of Uncertainty	Uncertainty Notes	Commentary	Value (half Width)	Convert to Same Units (dB)	Distribution Divisor			Standard Uncertainty (u) dB
					Normal	Rectangular	Other	
Source								
Source Sound Power	Variation	Estimated From Plant to SLM	0.1		Normal			0.10
Position of Source	Height above ground	Estimated from 1.2m to 1.5m	0.3			rect(v/3)		0.14
	Run Condition	Normal Estimate Continuous (multiple source)	2.0			rect(v/3)		1.15
Environmental Effects	wind	Small Effect	0.5			rect(v/3)		0.29
	Temperature							
Transmission Path								
Weather	Propagation of source	downwind	0.1			rect(v/3)		0.07
	wind direction							
	variability of surface							
Reciever								
Measurement Position	Choice of position, ,	5m in 200m		0.2		rect(v/3)		0.13
	microphone orientation	Type 1 0 - 30deg	0.4		Normal			0.50
	Size of Façade							
	Type of Façade (windows etc)							
Other Reflections	Distance to Surface							
	Size of Surface							
	Type of Surface							
Instrumentation	Calibration	Calibration Drift	0.1		Normal			0.10
	Accuracy and precision (type 1)	Type 1 practical	1.9			rect(v/3)		0.50
	Windshield							
	Environmental influence							
Background Noise Level	Timing of Measurement							
	Modal Analysis Day	Calculated Standard Deviation	3.7				s/vn	0.11
	Modal Analysis Night	Calculated Standard Deviation	2.2				s/vn	0.12
	Choice of Measurement Position	GF						
Combined Uncertainty (root sum of squares)								1.42
Expanded Uncertainty U = Kuc (95% Confidence K =2)								2.83
Final Answer Expressed ads Value +/- U dB with a confidence Level of 95%								
REFERENCE: Uncertainty Budget Calculated in line with M3003: The Expression of Uncertainty and Confidence in Measurement Edition 3, November 2012 and A Good Practice Guide on the Sources and Magnitude of Uncertainty Arising in the Practical Measurement of Environmental Noise N J Craven, G Kerry Edition 1a – May 2007.								

