



Battery Substation
- Harlands Road,
Haywards Heath,

Noise Impact
Assessment Report

Reference: 14889.RP02.PNA.1

Prepared: 24 November 2025

Revision Number: 0

Zake Energy Storage Systems
(ZESS)

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	28 October 2025	Martin Raisborough	Torben Andersen
1	Updated with Further Equipment Information	28 October 2025	Martin Raisborough	Torben Andersen

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.



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1.0 INTRODUCTION

RBA Acoustics has been commissioned by Zake Energy Storage Systems (ZESS) to undertake a noise impact assessment for the proposed installation for new battery substation facility on Harlands Road in Haywards Heath, West Sussex. The site lies within the authority of Mid Sussex District Council.

This report has been prepared to support a planning application for the new substation facility to demonstrate that the Local Authority's plant noise emission requirements may be satisfied such that there will be no adverse impact upon the nearby affected noise sensitive properties.

This report occasionally employs technical acoustic terminology. In order to assist the reader, a brief description of the acoustic parameters used in this report is included within Appendix A.

2.0 SITE DESCRIPTION

The new substation is proposed on an area of grass on the corner junction of Harlands Road and Turner Mills Road in the north west area of Haywards Heath, West Sussex.

The site is in a mixed residential and commercial area. predominantly residential area. To the east of the proposed substation is Chester House / The Aspen, a 7 storey commercial office building, while to the north, west and south of the substation are terraced residential properties of 2-3 storeys in height.

Haywards Heath College is located approximately 125 metres to the north west of the site, while a large industrial unit, Flowserve GB Ltd. Is located approximately 70 metres to the north east of the site.

The predominate source of noise across the site is that due to road traffic movements along the nearby and surrounding roads.

The location of the site is shown in Figure A in Appendix B, while the proposed site plan is shown in Figure B in Appendix B.

The nearest affected noise sensitive properties to the proposed substation are presented below.

- 2A Turners Mill Road, approximately 20 metres to the north east of the substation
- 5 Turners Mill Road, approximately 23 metres to the north west of the substation

3.0 ASSESSMENT CRITERIA

3.1 National Planning Policy Framework (NPPF)

The NPPF determines the government's planning policy for England. The NPPF states that, with respect to noise, planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from a new development, including through the use of conditions;
- Recognise that development will often create some noise and existing business wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established; and

- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The guidance contained within the NPPF further determines that consideration should be given to the Noise Policy Statement for England (DEFRA, March 2010).

3.2 Noise Policy Statement for England (NPSE, March 2010)

The NPSE attends to three types of noise;

- “Environmental noise” which includes noise from transportation sources;
- “Neighbour noise” which includes noise from inside and outside people’s homes; and
- “Neighbourhood noise”, which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

In line with the aims determined in the NPPF, the NPSE determines three aims;

1. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;
2. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development; and,
3. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The guidance detailed within the NPSE relates a number of key phrases with regards to adverse effects which can be applied to noise impacts as used by the World Health Organisation.

- **NOEL – No Observed Effect Level** - The level below which no health effect or detrimental impact on the quality of life is observed.
- **LOAEL – Lowest Observed Adverse Effect Level** - The level at which adverse effects on health and quality of life can be detected
- **SOAEL – Significant Observed Adverse Effect Level** - The level above which significant adverse effects on health and quality of life occur.

The guidance indicates that it is not possible to have a single objective noise based measure that defines SOAEL, and as such the SOAEL is likely to be different for different noise sources and receptors. The document indicates that further research is required to establish what may constitute a significant adverse impact on health and quality of life from noise.

While the NPSE determines the NOEL, LOAEL and SOAEL descriptions, the document indicates that, unlike other environmental disciplines, there are currently no European or national noise limits which have to be met although the NPSE states that “there can be specific local limits for specific developments” allowing for negotiation.

3.3 Planning Practice Guidance - Noise

The Planning Practice Guidance for noise (updated December 2014) broadly considers the same issues as demonstrated within both the NPPF and the NPSE with regards to noise within the planning realm. The information detailed within the PPG indicates that noise should be considered when:

- New developments may create additional noise; and/ or,

- New developments would be sensitive to the prevailing acoustic environment.

The guidance indicates that Local Planning Authorities should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and,
- Whether or not a good standard of amenity can be achieved.

The impact of noise is rated within the policy document in terms of the relative 'Observed Effect Level', defined in line with the criteria summarised above. Based upon this the Planning Practice Guidance provides the following matrix of likely average response:

Table 1 – PPG Observer Effect Levels

Perception	Example of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/ or attitude, e.g. avoiding certain activities during periods of intrusion: where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/ or an ability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

3.4 British Standard 8233:2014

BS 8233:2014 *Guidance on Sound insulation and noise reduction for buildings* draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions.

The noise level values given are in terms of an average (L_{Aeq}) level.

The standard advises internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties as set out in Table 2. A brief explanation of the acoustic terminology used in this report is shown in Appendix A attached.

Table 2 – BS 8233:2014 Residential Criteria

Room	07:00 to 23:00	23:00 to 07:00
Habitable Rooms	35 dB $L_{Aeq,16hour}$	--
Bedrooms	35dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,16h}$, with an upper guideline value of 55 dB $L_{Aeq,16h}$, which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances, such as within city centres, urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

3.5 Criteria to be Adopted for This Assessment

Considering the above requirements and guidance documents, it is recommended that the assessment of noise impact from the operation of the substation equipment on the adjacent noise sensitive properties should ensure that British Standard 8233 recommended noise levels are not exceeded within habitable rooms of the nearby dwellings.

The assessments should be undertaken considering that windows of the dwellings will be partially open to allow for ventilation. BS 8233 states that the sound insulation provided by a partially open window is at least 10dB. BS 8233 also states that, for mechanical services noise, the equivalent Noise Rating (NR) level would be around 5dB less than a dBA level. As such, the night time internal noise level of 30dBA would equate to a Noise Rating level of NR25.

In relation to the adverse effect levels in the NPSE, and with regard to the context of this site (it being in an urban environment), it is considered that, assuming the above BS 8233 criteria are met, this would correspond with 'No Observed Effect Level' according to the NPSE.

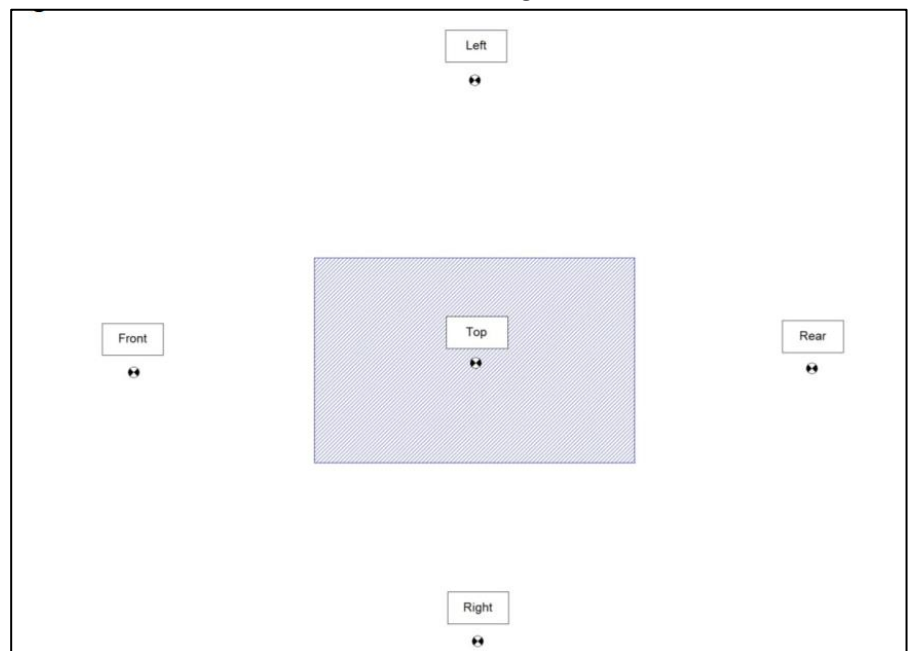
4.0 PROPOSED SUBSTATION EQUIPMENT

The proposed equipment to be installed on the site is 200kW (800kWhr) Energy Storage System. Energy Storage Systems ('ESS') are being deployed across the UK to provide a low-carbon, flexible, and decentralised means of storing electricity, delivering benefits for local communities, businesses, and households.

An ESS operates by importing electricity from the local network during periods of low demand or when renewable generation is abundant. This electricity is then exported back to the grid during peak demand, providing much-needed system flexibility and helping to address reliability issues associated with the increasing share of intermittent generation from wind and solar.

Each battery cabinet is 50kW (200kWhr) supplied by Huawei Digital Power Technologies Co Ltd. The manufacturers of the units conducted noise testing of the units on a reflecting plane at a height of 1.5 meters above the ground, and at approximately 1 metre from the cabinet at five designated locations around the unit, as shown in Figure 1.

Figure 1 – Measurement Locations



The noise data supplied at the various measurement positions is presented in Table 3 below.

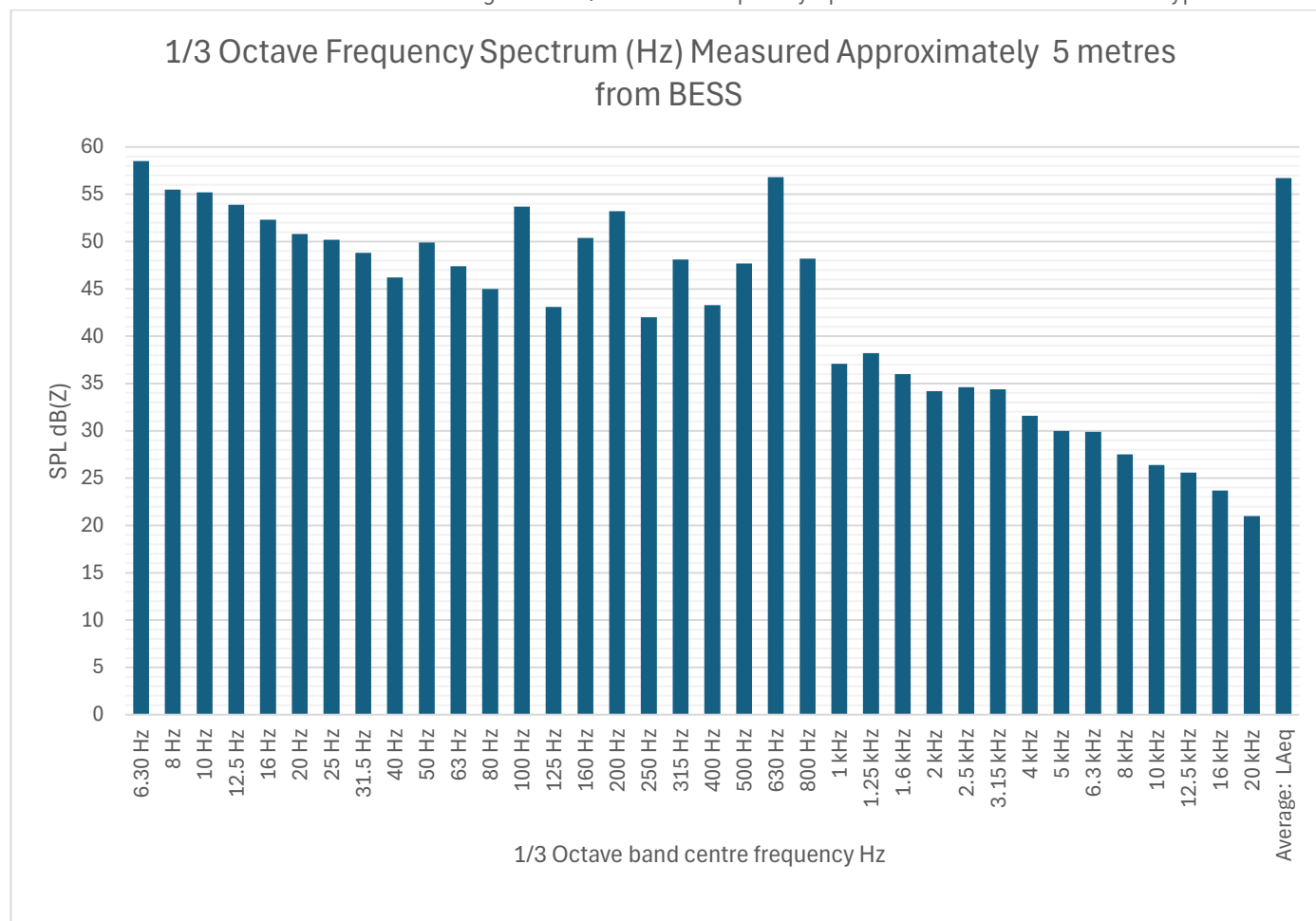
Table 3 – Manufacturer's Noise Data

Position	Sound Pressure Level (dB re 20x10 ⁻⁶ Pa.)
Front (1 metre distance)	53 dBA
Rear (1 metre distance)	45 dBA
Left (1 metre distance)	46 dBA
Right (1 metre distance)	46 dBA
Top (1 metre distance)	45 dBA

The manufacturers have not supplied any detailed information with respect to the frequency and tonal content of the equipment. From experience, however, there are often tonal components to the noise from the BESS units that are likely to result in a greater subjective adverse response from nearby sensitive receptors.

On the basis of the above, reference has been made to measurements of noise from similar BESS cabinet undertaken by RBA Acoustics. The figure below shows the 1/3 octave frequency spectrum of the measurements

Figure 2 - 1/3 octave frequency spectrum of measurements of typical BESS



From analysis of the figure above, the following observations can be made:

- The level in the 630 Hz 1/3 octave band is more than 8 dB above the adjoining bands and therefore tonal as described by the Objective method in Annex C of BS 4142. This would attract a 6 decibel penalty when deriving the rating level to compare with the representative background noise level for the BS 4142 initial assessment.
- There are pronounced peaks in the levels at the 50 Hz, 100 Hz, 160 Hz, 200 Hz, 315 Hz and 500 Hz 1/3 Octave bands. Although these are not classed as tonal by the BS 4142 Annex C Objective method, these peaks indicate harmonic tones which are hidden by the relatively coarse resolution of the 1/3 octave analysis of this method.

Consequently, it is considered that the rating level of noise from the proposed BESS should include a 6 dB correction for tones.

5.0 NOISE IMPACT ASSESSMENT

Table 4 below presents the results of the noise impact assessment from the proposed equipment on the nearest noise sensitive receptors.

Table 4 – Cumulative Noise impact assessment of all units (Daytime)

Units	Sound Pressure Level (dB re 20x10 ⁻⁶ Pa.)
One 50kW (200kWhr) Battery Cabinet	53 dBA
4 No. Cabinets	+5 dB
Distance Loss to nearest Receptor (20 metres)	-26 dB
Loss of Partially Open Window	-10 dB
Correction for Tonal Content	+6
Total Noise Level within Dwelling	28 dBA / NR23
BS 8233 Limit	30 dBA / NR25
Total Excess	0

The above assessment suggests that the noise level from plant will be some 8dBA below the recommended limit within the worst affected dwellings.

As such, no mitigation measures are considered necessary to sufficiently control the impact of noise on the nearby noise sensitive receptors.

6.0 CONCLUSIONS

RBA Acoustics has been commissioned by Zake Energy Storage Systems (ZESS) to undertake a noise impact assessment for the proposed installation for new battery substation facility on Harlands Road in Haywards Heath, West Sussex. The site lies within the authority of Mid Sussex District Council.

This report has been prepared to support a planning application for the new substation facility to demonstrate that the Local Authority's plant noise emission requirements may be satisfied such that there will be no adverse impact upon the nearby affected noise sensitive properties.

Considering relevant guidance documents, it has been recommended that noise from the operation of the substation equipment on the adjacent noise sensitive properties should not exceed British Standard 8233 recommended noise levels are within habitable rooms of the nearby dwellings. Achieving these levels would be considered to correlate with the 'No Observed Effect Level' according to the NPSE.

Assessments have been undertaken to predict noise from the proposed substation equipment within the worst affected dwellings, which have been identified to be 2A Turners Mill Road and 5 Turners Mill Road. The results of the assessments suggest that noise within the dwellings, assuming that windows would be partially open, would be some 8dB less than the criteria recommended in BS 8233.

As such, no mitigation measures are considered necessary to sufficiently control the impact of noise on the nearby noise sensitive receptors.

APPENDICES

Appendix A – Acoustic Terminology

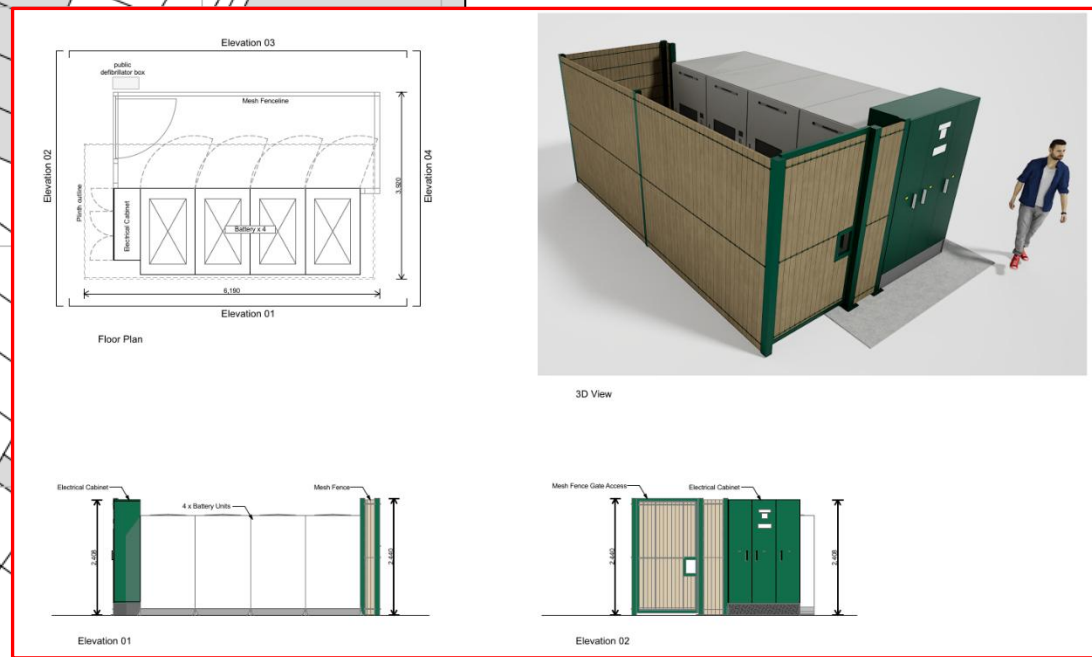
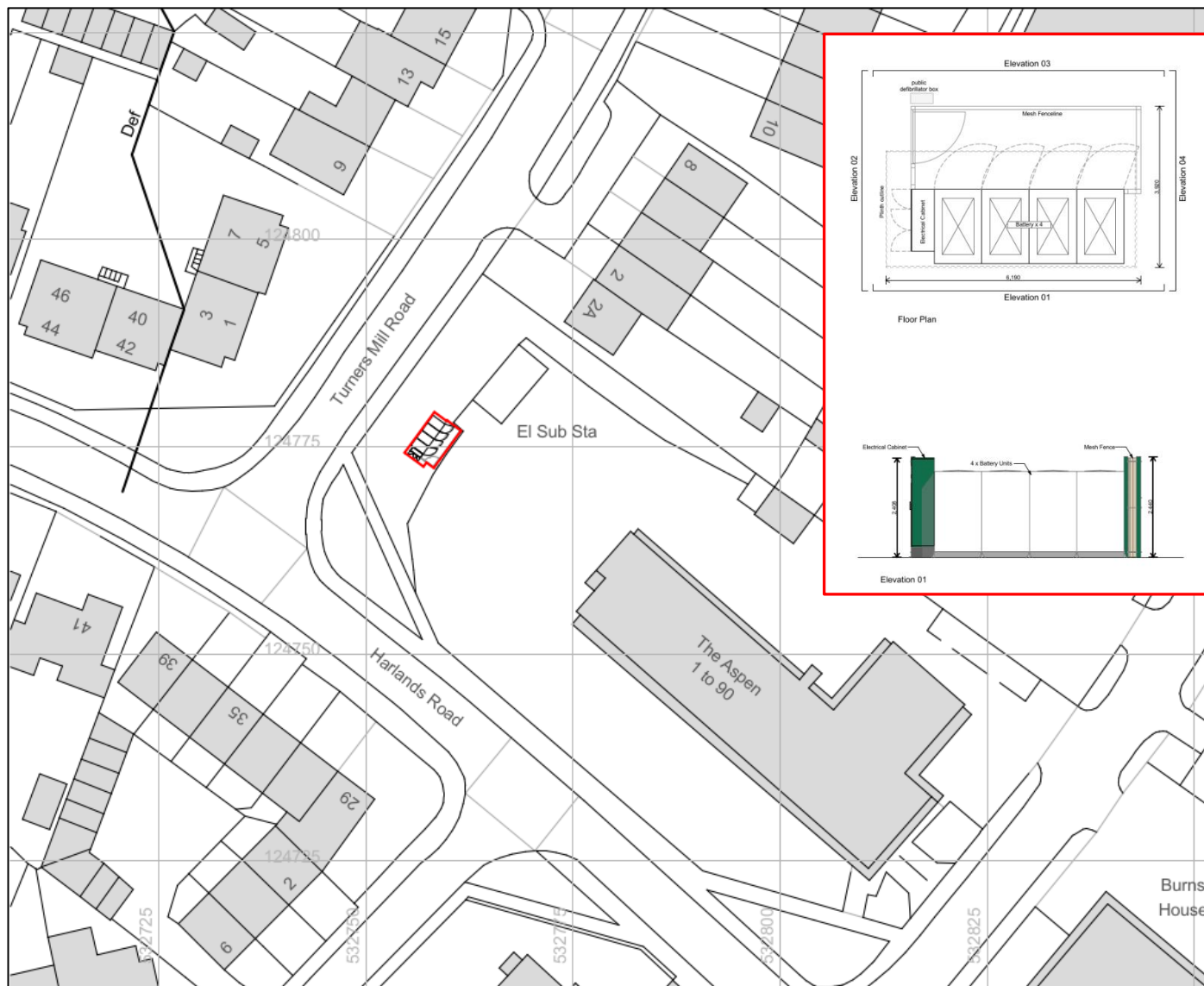
dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10} , L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.
Noise Rating (NR)	A standardised set of curves relating octave-band sound pressure level to the centre frequency of the octave bands, each of which is characterised by a 'noise rating' (NR), which is numerically equal to the sound pressure level at the intersection with the ordinate at 1kHz.

Appendix B –Site Plans



Battery Substation - Harlands Road, Haywards Heath,
Site Location Plan
Project 14889

Figure A
24 November 2025
Not to Scale



Battery Substation - Harlands Road, Haywards Heath,
Site Plan
Project 14889

Figure B
24 November 2025
Not to Scale

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