

Substation Extension, Imperial Park, Newport, Wales

784-B073302



Noise Impact Assessment

DWD Property and Planning Limited

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Appendix A – Acoustic Terminology

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Acronyms/Abbreviations

Acronyms/Abbreviations	Definition
CADNA	Computer Aided Noise Abatement
DMRB	Design Manual for Roads and Bridges
HGV	Heavy Goods Vehicle
PPG	Planning Practice Guidance
UDP	Unitary Development Plan
UKAS	United Kingdom Accreditation Service

Executive Summary

This report presents the findings of a noise assessment to support a planning application for the extension of an existing substation development close to Imperial Park, Newport, Wales.

National and Local planning policy and appropriate guidance document 'BS 4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound' has been used to set criteria.

Baseline Noise surveys were undertaken in June 2025 and the results used to verify predictions of the short-term and long-term effects of noise from the site.

CADNA noise modelling software has been used to model predicted noise emissions from the site using the ISO 9613-2 noise propagation methodology at the closest sensitive receptors.

The results of the assessment show the proposed development is not expected to have an adverse impact on health or quality of life and the requirements of Planning Policy Wales to incorporate measures to reduce noise levels are considered to be met.

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1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment to support a planning application for the extension of an existing substation development close to Imperial Park, Newport, Wales. A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise.

A list of acoustic terminology used in this report is provided in Appendix A.

1.2 Legislative Context

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Future Wales: The National Plan 2040 and Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. They are supplemented by a series of Technical Advice Notes (TANs), Technical Advice Note 11 which relates to Noise, Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places. Paragraph 6.7.5 says:

“In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means

a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.”

Paragraphs 6.7.6 and 6.7.7 says:

“In proposing new development, planning authorities and developers must, therefore: address any implication arising as a result of its association with, or location within, air quality, noise action planning priority areas or areas where there are sensitive receptors;

- not create areas of poor air quality or inappropriate soundscape; and
- seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.

To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer.”

Paragraph. 6.7.24 says:

“The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport-related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided, and assessment undertaken.”

TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

1.3 Local & Regional Policy Context

The Newport Local Development Plan 2011-2026 states the following in relation to noise:

“GP2: Development will be permitted where, as applicable: i) there will not be a significant adverse effect on local amenity, including in terms of noise, disturbance, privacy, overbearing, light, odours and air quality;

(...)

GP4: Development proposals should be designed to avoid or reduce transport severance, noise and air pollution;

(...)

GP7: development will not be permitted which would cause or result in unacceptable harm to health because of land contamination, dust, instability or subsidence, air, heat, noise or light pollution, flooding, water pollution, or any other identified risk to environment, local amenity or public health and safety”

1.4 Acoustic Consultants' Qualifications and Professional Memberships

The lead project Acoustic Consultant is Daisy Flatters. The report has been checked by Joe Nott and verified by Dawit Abraham. Relevant qualifications, membership and experience are summarised in Table 1.2 below.

Table 1.1: Acoustic Consultants' Qualifications & Experience

Name	Education	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
Daisy Flatters	BA(Hons) 2023	Jan 2024	-	-
Joe Nott	BSc 2016	Aug 2016	Aug 2017	-
Dawit Abraham	BSc 2008 MSc 2010	Oct 2010	Jan 2011	Jan 2015

2.0 Assessment Criteria

2.1 BS 4142 Assessment Criteria

A comparison of noise from the proposed development with existing background noise levels has been undertaken with reference given to the guidance provided within BS 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound'. This standard sets down the following guidelines for assessing the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, based upon difference between the measured background noise level and the rating level of the source under consideration. In particular, the standard states:

- "a) Typically, the greater the difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

In addition to noise levels the significance of the impact depends on the individuals affected and to the acoustic features present which may be assessed subjectively or objectively as appropriate. Section 9 of BS 4142:2014+A1:2019 recommends that correction factors be applied to the specific noise level if the noise contains certain acoustic features such as:

- tonality
- impulsivity
- other sound characteristics which are readily distinctive
- intermittency

It should be noted that the significance of an industrial sound source depends upon both the margin by which the rating level exceeds the background sound level and the overall context in which the sound occurs.

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict noise levels at a number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on ISO 9613-2 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data and model settings as given in Table 3.1 below have been used.

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Defra 1m Lidar Data
Building heights – around site	Tetra Tech Observations	4.0m height for one-storey properties 8.0 m height for two storey properties 3.0m per additional storey
Receptor positions*	Tetra Tech	1.5 m for ground floor properties 4.0m height for first-floor properties
Modelling Parameters	Tetra Tech	- Ground Absorption: 0.5 - Order of Reflections: 3.0 - Noise Contour Plot Grid Receiver Spacing: 5.0
Proposed Plans	SSE Energy Solutions	Drawing Title: GROUND FLOOR PLAN WIP Drawing No: B2494900-JAC-ZZ-00-DR-AR-0002
Plant source inputs	Tetra Tech	1x Transformer modelled as no.4 vertical area sources and 1no. area source at a height of 4m. 1x Auxiliary transformer modelled as a point source at a height of 2m.
Substation building louvres	SSE Energy Solutions Drawing	12x louvres modelled as vertical area sources: 6x louvres located on north-eastern façade of substation wall 6x louvres located on south-western façade of substation wall Area of each louvre is 5.25m ²
*All receptors modelled 0.5m from building façade unless otherwise stated.		

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are worst-case.

3.2 Model Input Data

Table 3.2: Summary of Noise Input Data (Sound Power Levels)

Noise Source	Type	Sound Power Level (L _w (A))	Sound Reduction Performance R _w	Source
SGT1A Transformer	Average	95	N/A	Noise Impact Assessment for Imperial Park 400kv Substation Scheme
Substation Building Louvre	Average	100 (internal noise level)	15	Tetra Tech Library
400-33kV Auxiliary Transformer	Average	90	N/A	Tetra Tech Library

3.3 Sensitive Receptors

3.3.1 Existing Sensitive Receptor Locations

Table 3.5 below summarises receptor locations that have been selected to represent worst-case sensitive receptors with respect to direct noise from the site. Façades of the nearest noise sensitive properties to the development site have been represented. The locations of the receptors are presented within Figure 3.1 below.

Table 3.3: Existing Sensitive Receptor Locations

Ref.	Description	Type of Use	Height (m) Daytime / Night-time
R01	37 Dunraven Drive	Residential	1.5 / 4.0
R02	5 Bronllys Mews	Residential	1.5 / 4.0
R03	29 Bronllys Grove	Residential	1.5 / 4.0
R04	21 Bronllys Grove	Residential	1.5 / 4.0
R05	3 Bronllys Grove	Residential	1.5 / 4.0
R06	18 Pennard Close	Residential	1.5 / 4.0
R07	16 Pennard Close	Residential	1.5 / 4.0

Figure 3.1: Existing Sensitive Receptor Locations



4.0 Noise Survey

4.1 Noise Survey Details

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

Rion NL-52	Environmental Noise Analyser	s/n	264488
Rion NC-75	Sound Calibrator	s/n	34145522

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at one location (as specified in Table 4.1 and shown in Figure 4.1 below) from Tuesday 24th June 2025 to Wednesday 25th June 2025. The unattended long-term (LT) location was measured over a 24-hour period. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in general accordance with BS 7445-1:2003 The Description and Measurement of Environmental Noise: Guide to quantities and procedures. Weather conditions during the survey period were observed as being dry. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey, with a predominant north-eastern wind direction during the survey.

Table 4.1: Noise Monitoring Locations

Ref	Description
LT1	Roughly 90 meters south of 25 Dunraven Drive

Figure 4.1: Noise Monitoring Locations

4.2 Noise Survey Results

The dominant noise sources found in the area include distant road traffic noise and occasional rail noise as well as distant construction noise from Imperial Park to the north-west of the site. Other contributions to the ambient noise environment consist of birdsong/insect noise (crickets) and trees rustling in the wind.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5-minute measurement over the stated survey period.

Table 4.2: Meteorological Conditions During the Survey

Survey Location	Date	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)
LT1	24/06/2025 daytime	20	4	W	4
LT1	24/06/2025 night-time	16	3	S/W	3
LT1	25/06/2025 daytime	19	5	S/W	5

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2×10^{-5} Pa).

Table 4.3: Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
Weekday Daytime 07:00 - 23:00	16 hours	24/06/2025 – 25/06/2025	LT1	44.8	73.5	32.0	46.4	40.0
Weekday Night-time 23:00 – 07:00	8 hours	24/06/2025 – 25/06/2025		46.8	78.9	31.3	42.9	36.0

All values are sound pressure levels in dB re: 2×10^{-5} Pa

4.3 Representative Background Noise Levels

Using the data collected during the baseline survey, representative background noise levels have been derived for all receptor locations presented in Figure 3.5. Table 4.3 presents the representative background noise levels considered appropriate for the existing sensitive receptors within the area (the lower of the respective daytime and evening measurements have been used to represent daytime noise levels, where appropriate).

Table 4.4: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)*
R01-R07	LT1	Daytime (07:00 – 23:00)	40.0
		Night-time (23:00 – 07:00)	36.0
*Lowest $L_{A90,T}$ value selected from either Weekday or Weekend.			

The representative noise levels presented in Table 4.3 have been used to inform the assessment presented in Section 5.0.

5.0 Assessment of Effects

5.1 Operational Phase

5.1.1 Building Services Plant Noise Assessment

This assessment has been undertaken to establish the maximum predicted external noise levels from the proposed building services plant. This includes substation transformer and substation building louvres, as described within Table 3.2.

An acoustic characteristic correction of +2dB has been applied for tonal noise sources that are considered to be just perceptible at the nearest residential receptors.

The results of the plant noise assessment are presented within Table 5.1, and the locations of plant units included within the assessment are presented within Figure 5.1.

Figure 5.1: Assessed Plant Unit Locations



Table 5.1: BS4142 Assessment

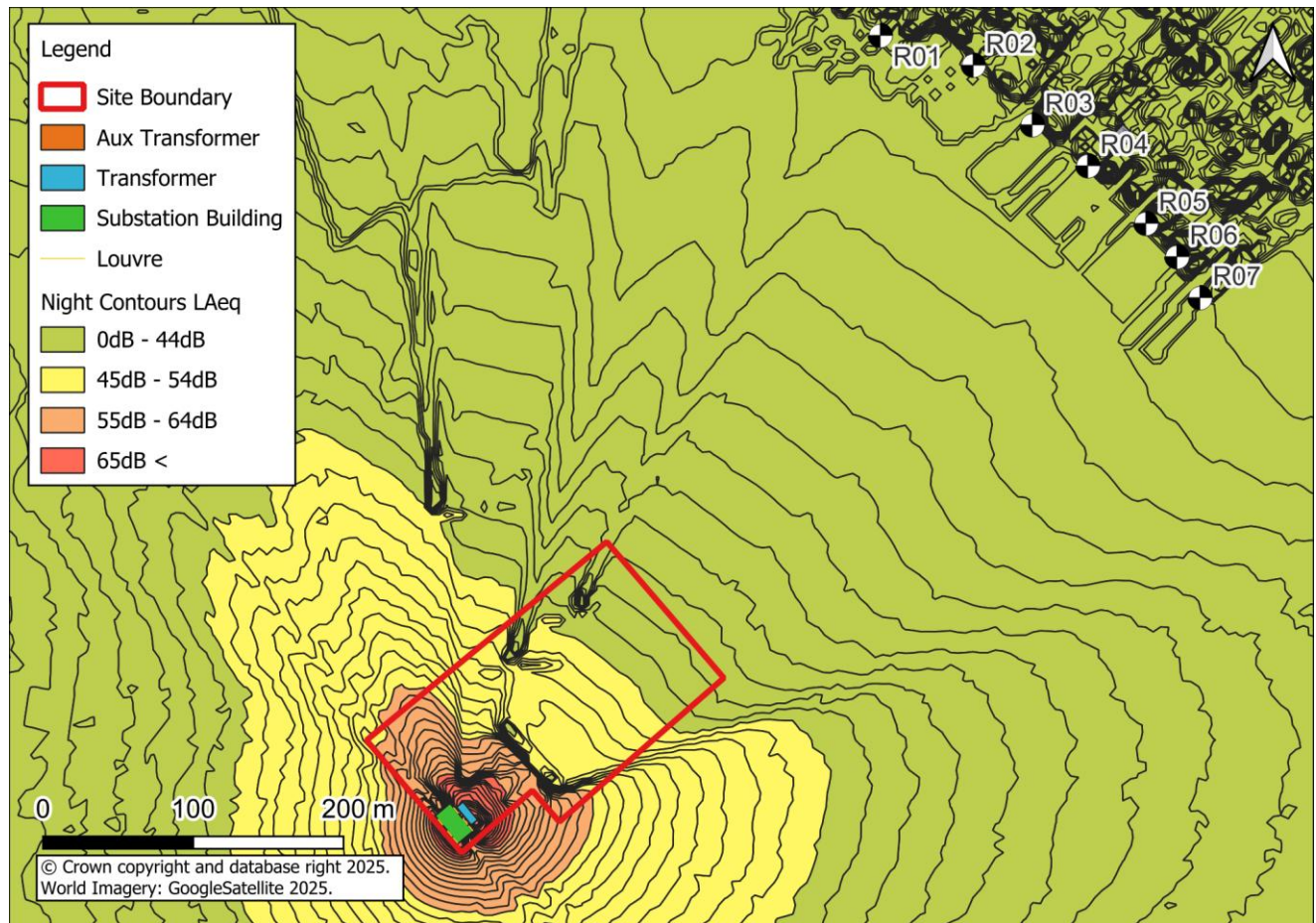
Location	Existing Measured Background L_{A90}		Noise rating level from plant		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	40	36	34	36	-6	0
R02	40	36	34	35	-6	-1
R03	40	36	34	35	-6	-1
R04	40	36	34	35	-6	-1
R05	40	36	35	36	-5	0
R06	40	36	35	36	-6	-1
R07	40	36	34	35	-6	-1

All values are sound pressure levels in dBA re: 2×10^{-5} Pa.

All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 para 8.6 the levels are expressed as integers (with 0.5 dB being rounded up). This may mean that the arithmetic in the above table may appear to be up to 1 dB incorrect due to this rounding.

As demonstrated within **Table 5.1**, the results of the assessment indicate that the predicted BS4142 Noise Rating Levels at sensitive properties are equal to or below the measured baseline noise level all receptors during both daytime and night-time periods. Therefore, the proposed development is not expected to have an adverse impact on health or quality of life. The average night-time 1-hour noise ($L_{Aeq,1hour}$) levels presented illustratively within **Figure 5.2**.

Figure 5.2: Noise Contour Plot Night-time $L_{Aeq,1hour}$ (Grid Height 4m)



6.0 Conclusion

A noise assessment has been undertaken to support a planning application for the extension of an existing substation development close to Imperial Park, Newport, Wales.

An assessment in accordance with BS4142 has been undertaken and the results of the assessment indicate that the predicted rating levels at the nearby sensitive receptors are would not exceed the measured background noise levels.

Based upon the assessments presented, it is considered that the development does not adversely affect or put sensitive receptors at risk from noise pollution, and no significant adverse effects are predicted to occur.

Therefore, the proposed development is not expected to have an adverse impact on health or quality of life and the requirements of Planning Policy Wales to incorporate measures to reduce noise levels are considered to be met.

Appendices

Appendix A – Acoustic Terminology

Acoustic Terminology

- dB** Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.
- dB(A)** Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.
- L_{Aeq}** Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The L_{Aeq, 07:00 – 23:00} for example, describes the equivalent continuous noise level over the 16-hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the L_{Aeq, 07:00 – 23:00}.
- L_{Amin}** The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L_{Amax}** The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L_n** Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say, 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10, 1 hr} = x dB.
- The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.
- R_w** The *weighted sound reduction index* determined using the above measurement procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

Appendix B – References

British Standards Institute (BSI). (2014). BS 4142:2014+A1:2019. *Method for Rating Industrial and Commercial Sound*. United Kingdom.

World Health Organization. (1999). *Guidelines for Community Noise*.

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