

Radcliffe BESS, M26 1FA

784-B065648

Noise Impact Assessment

Taiyo Power & Storage Limited

April 2025



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Appendix A – Acoustic Terminology

Appendix B – References

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

A noise assessment has been undertaken in support of a planning application for the installation of an 11 MW Battery Energy Storage System (BESS) on land at Shore Top House, Kearsley Road, Radcliffe, Manchester, M26 1FA.

The noise levels associated with the proposed development are assessed at the nearest sensitive receptors, including relatively tranquil areas surrounding the site, against the criteria outlined in BS 4142:2014, BS 8233:2014, WHO, and IEMA Guidelines for Environmental Noise Impact Assessment (2014).

The results of the assessment show that noise levels associated with the proposed development will be within the Lowest Observed Adverse Effect Level (LOAEL) during both the daytime and night-time periods.

Therefore, the development will have a low impact in relation to noise.

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 installation of an 11MW Battery Energy Storage System (BESS) on land at Shore Top House, Kearsley Road, Radcliffe, Manchester, M26 1FA.

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. Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in December 2024. With regard to noise and planning, the NPPF contains the following statement at Paragraph 198:

“198. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- (a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason [...]

“200. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

“201. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

Planning Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NPSE), is to **“identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”**

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated below in **Table 1.1**.

Table 1.1: NPPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No Specific Measures Required
No Observed Adverse Effect Level (NOAEL)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The NPPF, NPSE and PPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents including 'BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings' (2014) and 'BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound' (2014) have been used. Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG also states that neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.

1.3 Local & Regional Policy Context

The Bury Unitary Development Plan (UDP) was adopted by Bury Council on 29th August 1997. Although the Council is currently working on replacing the adopted UDP with a new document called the Bury Local Plan, it has yet to be published and as such the UDP is still considered to be the appropriate local guidance for reference. The UDP sets out the following policies to protect existing amenities and environment from adverse effects.

“EN4/1 – Renewable Energy

The Council will encourage proposals for the provision of renewable energy sources, subject to compliance with other policies and proposals of the Plan. In particular, the Council will seek to ensure that proposals:

- do not involve an unacceptable loss of amenity, for example through visual intrusion and noise;
- [...]
- would not result in a health or safety risk, or nuisance to the public;
- where necessary, include an environmental assessment as part of the planning application;
- would not have an unacceptable adverse impact on the Borough’s natural environment.”

“EN7/2 – Noise Pollution

In seeking to limit noise pollution the Council will not permit:

- development which could lead to an unacceptable noise nuisance to nearby occupiers and/or amenity users;
- development close to a permanent source of noise.”

1.4 Acoustic Consultants' Qualifications and Professional Memberships

The lead project Acoustic Consultant is Najwa Adnan-Smith. The report has been checked by Michaela Moffatt and verified by Dawit Abraham. Relevant qualifications, membership and experience are summarised in **Table 1.2**.

Table 1.2: 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)
Najwa Adnan-Smith	BSc 2016 PgDip 2024	Oct 2022	Jan 2025	-
Michaela Moffatt	BSc 2015 PgDip 2016 MSc 2018	Nov 2015	Jan 2017	Dec 2022
Dawit Abraham	BSc 2008 MSc 2010	Oct 2010	Jan 2011	Jan 2015

2.0 Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, **Table 2.1** presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

- BS4142:2014 'Method for rating industrial and commercial sound'
- World Health Organisations (1999) 'Guidelines for Community Noise'
- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings – Code of practice'
- IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014)

A full bibliography of documents referenced within this report is provided within Appendix B.

Table 2.1: Noise Level Criteria and Actions

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
No Observed Adverse Effect Level (NOAEL)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level ($L_{Ar,T}$) dB and existing background level $L_{A90,T}$ dB is less than or equal to 0dB	Justification for Effect Level: Below low impact threshold in BS4142:2014 Action Required: None
Absolute internal noise criteria	Noise levels are below: Living Rooms: - 35 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 40 dBL _{Aeq,16hours} Bedrooms: - 35 dBL _{Aeq,16hours} - 30dB $L_{Aeq,8hr}$ - $L_{AFmax,2min}$ noise levels do not exceed: 45dB L_{AFmax} based on 10 th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Less than threshold values in Table 4 in BS8233:2014 and Table 1 in World Health Organisation (1999) Guidelines on Community Noise Action Required: None
Change in noise levels	Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≤1dB.	Justification for Effect Level: Within negligible short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: None
Lowest Observed Adverse Effect Level (LOAEL)		
Fixed plant and equipment located	Difference between Rating Level ($L_{Ar,T}$) dB and existing background	Justification for Effect Level:

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
externally or internally with louvered ventilation grilles	sound level $L_{A90,T}$ dB is between 1-4dB.	Within less likely for adverse or significant adverse impact to occur low impact threshold in BS4142:2014 Action Required: Mitigate and reduce to a minimum the exceedance over 0dB above background threshold
Absolute internal noise criteria	Noise levels are between: Living Rooms: - 35-40 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 40-45 dBL _{Aeq,16hours} Bedrooms: - 35-40 dBL _{Aeq,16hours} - 30-35dB L _{Aeq,8hr} - L _{AFmax,2min} noise levels do not exceed 45dB L _{AFmax} based on 10 th highest L _{AFmax,2min} sample)	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999) Guidelines on Community Noise by no greater than 5dB to achieve <u>reasonable internal conditions</u> as defined by Note 7 to Table 1 in BS8233:2014 Action Required: Mitigate and reduce to a minimum the exceedance over the threshold
Change in noise levels	Increase in ambient L _{Aeq,T} due to contribution from proposed development of 1.0-2.9dB.	Justification for Effect Level: Within minor short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Significant Observed Adverse Effect Level (SOAEL)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level (L _{A,r,T}) dB and existing background sound level $L_{A90,T}$ dB is between 5-9dB.	Justification for Effect Level: Within adverse impact threshold in BS4142:2014. Action Required Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria	Noise levels are between: Living Rooms: - 40-45 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 45-50 dBL _{Aeq,16hours} Bedrooms: - 40-45 dBL _{Aeq,16hours} - 35-40dB L _{Aeq,8hr} - 45-55dB L _{AFmax,2min} based on 10 th highest L _{AFmax,2min} sample)	Justification for Effect Level: Exceeds BS8233:2014 L _{Aeq,T} reasonable criteria by 5dB or exceeds L _{AFmax,2min} (10 th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Change in noise levels	Increase in ambient L _{Aeq,T} due to contribution from proposed development of 3.0-4.9dB.	Justification for Effect Level: Within moderate short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required:

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
		Additional mitigation required to achieve effect of LOAEL or less.
Unacceptable Observed Adverse Effect Level (UOAE)		
Fixed plant and equipment located externally or internally with louvered ventilation grilles	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is equal to or greater than 10dB	Justification for Effect Level: Within significant adverse impact threshold in BS4142:2014 Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria	Noise levels exceed: Living Rooms: - 45 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 50 dBL _{Aeq,16hours} Bedrooms: - 45 dBL _{Aeq,16hours} - 40dB $L_{Aeq,8hr}$ - $L_{AFmax,2min}$ noise levels exceeds 55dB L_{AFmax} based on 10 th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 10dB or exceeds $L_{AFmax,2min}$ (10 th highest sample) by 10dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Change in noise levels	Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≥ 5.0 dB.	Justification for Effect Level: Within major short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment. Action Required: Additional mitigation required to achieve effect of LOAEL or less.

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. An illustration of the 3D view of the CADNA noise model is presented in **Figure 3.1**.

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	OS OpenMap
Ground levels – around site	DEFRA	LIDAR DTM 2m
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: 0.8 - Order of Reflections: 3 - Noise Contour Plot Grid Receiver Spacing: 10x10
Proposed Plans	Low Carbon Alliance	Drawing Title: Shore Top Farm BESS Proposed Site Layout Compound Area Drawing No: 121-10022 Rev. 012 Date: 22 nd February 2025
*All receptors modelled 1.0m from building façade unless otherwise stated.		

Figure 3.1: CADNA Noise Model

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

The primary sources of noise from the operational development are listed below.

- 13no. Battery Containers
- 2no. Transformer/Inverters
- 1no. DNO Substation
- 1no. Customer Substation

It is assumed that each battery container will have an HVAC unit which would be the dominant noise source from the battery container.

Information regarding noise emissions from the above noise sources have been determined using manufacturers data where possible. Where single values have been provided, typical frequency spectra have been applied. Data contained within **Table 3.2** presents noise information for each noise source.

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

Noise Source / Details	Third Octave Band (Hz) Sound Power Level (L _w) dB re: 1x10 ⁻¹² W																										L _w (A)	
	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8 kHz		10.0 kHz
Mitsubishi Cooler HVAC Unit / Point Source 1m Above 3m High Battery Container		81.5			81.5			76.5			72.5			69.5			63.5			56.0			51.0			45.5		70.4
Transformer / Inverters / Point Source 2.5m Above Ground	25.0	25.0	47.0	51.0	54.0	59.0	62.0	64.0	70.0	67.0	72.0	77.0	81.0	78.0	77.0	76.0	79.0	77.0	76.0	76.0	75.0	79.0	86.0	70.0	71.0	81.0	69.0	90.7
Substation / Point Source 2.9m Above Ground	74.2	66.2	75.2	74.2	73.2	71.2	83.2	67.2	62.2	78.2	67.2	80.2	70.2	64.2	74.2	66.2	67.2	55.2	49.2	46.2	45.2	44.2	45.2	44.2	43.2	40.2	40.2	78.0

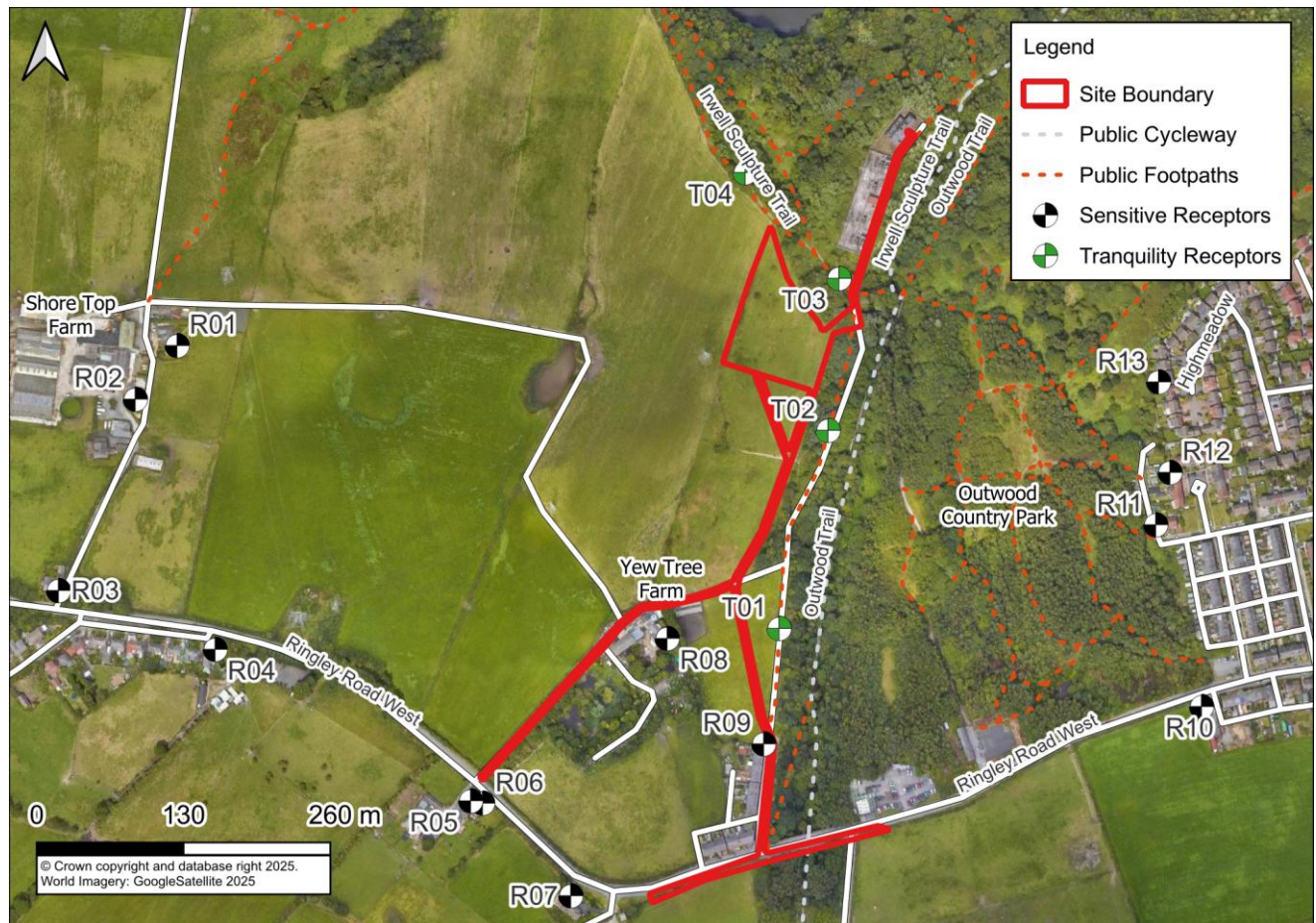
3.3 Sensitive Receptors

Table 3.3 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. Moreover, sensitive receptors used within the Tranquillity Assessment have also been included and are referred to as ‘T’ receptors. The locations of the receptors are presented within **Figure 3.2**.

Table 3.3: Existing Sensitive Receptor Locations

Location	Description	Type of Use	Height (m) Daytime / Night-time
R01	Shore Top Farm	Residential	1.5 / 1.5
R02	Shore Top Farm	Residential	1.5 / 4.0
R03	334 Ringley Road West	Residential	1.5 / 1.5
R04	351 Ringley Road West	Residential	1.5 / 4.0
R05	265 Ringley Road West	Residential	1.5 / 4.0
R06	261 Ringley Road West	Residential	1.5 / 1.5
R07	Ashed Road	Residential	1.5 / 4.0
R08	Yew Tree Farm	Residential	1.5 / 4.0
R09	23 Wood Street	Residential	1.5 / 4.0
R10	159 Ringley Road West	Residential	4.0 / 4.0
R11	1 Sycamore Avenue	Residential	1.5 / 4.0
R12	5 Hazel Grove	Residential	1.5 / 4.0
R13	34 Highmeadow	Residential	1.5 / 4.0
T01	Outwood Trail	Public Footpaths	1.5
T02	Outwood Trail	Public Footpaths	1.5
T03	Irwell Sculpture Trail	Public Footpaths	1.5
T04	Irwell Sculpture Trail	Public Footpaths	1.5

Figure 3.2: 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	1043466
Rion NL-52	Environmental Noise Analyser	s/n	710312
Rion NL-52	Environmental Noise Analyser	s/n	1021257
Rion NC-75	Sound Calibrator	s/n	34735017

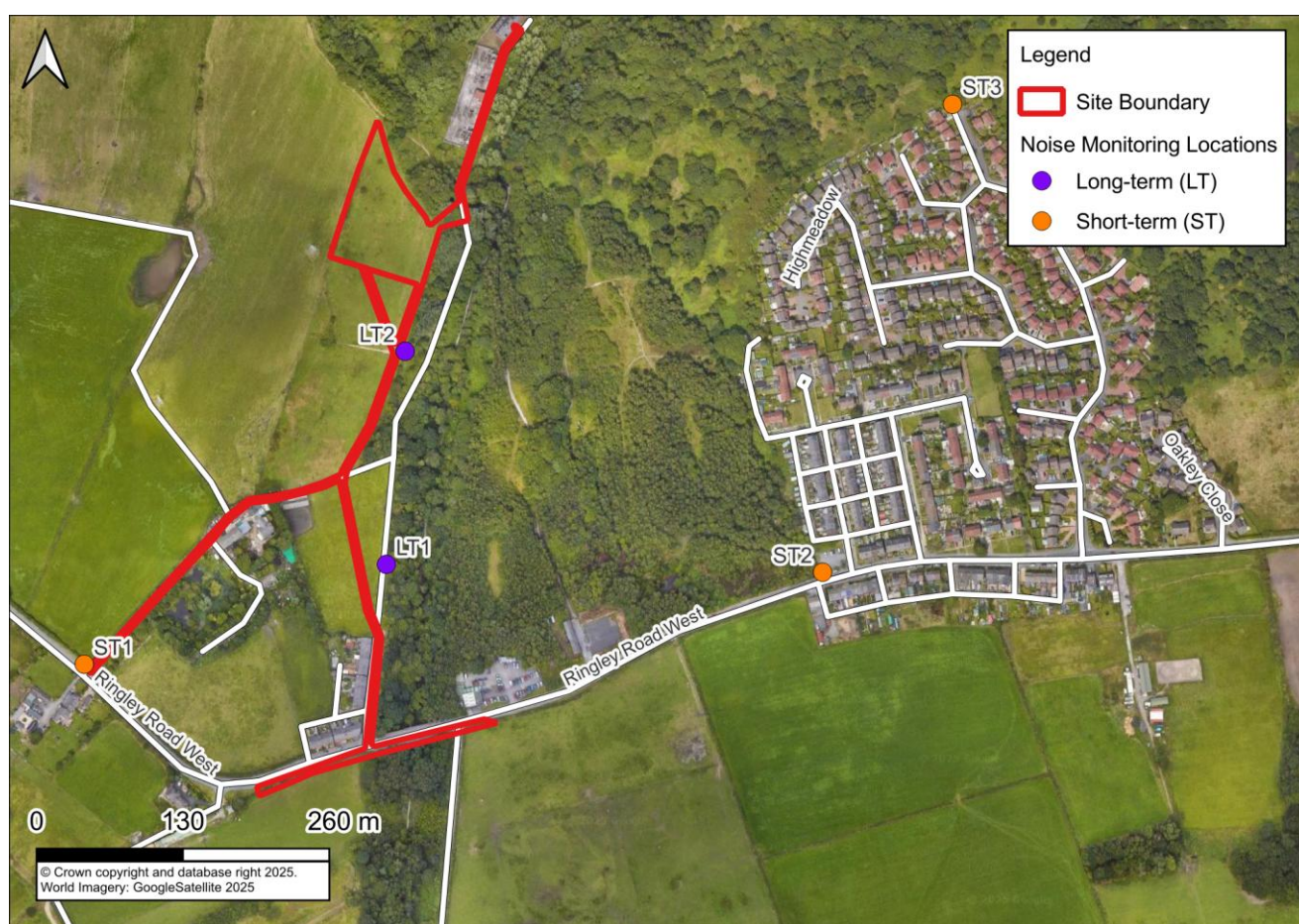
The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, a drift of ± 0.1 dB was observed on meters s/n 1043466 and 710312 and ± 0.2 dB on meter s/n 1021257. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at five locations (as specified in **Table 4.1** and shown in **Figure 4.1**) from Thursday 2nd May 2024 to Tuesday 7th May 2024. Attended short-term (ST) measurements were undertaken at three locations during day, evening and night-time periods with two additional long-term (LT) locations being measured unattended over a 120-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.

Table 4.1: Noise Monitoring Locations

Location	Description
LT1	Off Wood Street, south of site.
LT2	On southeast boundary.
ST1	On Ringley Road West, southwest of site.
ST2	On Ringley Road West, southeast of site.
ST3	On St Aidan's Close, east of site.

Figure 4.1: Noise Monitoring Locations

4.2 Noise Survey Results

The dominant noise sources found in the area include road traffic noise on Ringley Road West to the south of site. Other contributions to the ambient noise environment consist of birdsong and road traffic noise from distant traffic to the northeast and east of site (A665 and Outwood Road respectively).

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 & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
ST1 Daytime	Thursday 02/05/2024 14:00	20	2	ENE	1	Road traffic noise on Ringley Road West, birdsong
ST2 Daytime	Thursday 02/05/2024 14:30	20	1	ENE	1	Road traffic noise on Ringley Road West, birdsong
ST3 Daytime	Thursday 02/05/2024 14:57	21	1	ENE	1	Farm equipment in distant field, birdsong, distant road traffic noise from east and northeast
ST1 Evening	Thursday 02/05/2024 19:44	18	1	NE	1	Road traffic noise on Ringley Road West, birdsong
ST2 Evening	Thursday 02/05/2024 20:11	17	2	NE	1	Road traffic noise on Ringley Road West, birdsong
ST3 Evening	Thursday 02/05/2024 20:41	15	1	NE	1	Birdsong, distant road traffic noise from east and northeast
ST1 Night-time	Thursday 02/05/2024 23:19	12	1	NE	1	Occasional road traffic noise on Ringley Road West, distant road traffic noise from northeast
ST2 Night-time	Thursday 02/05/2024 23:41	11	1	NE	1	Occasional road traffic noise on Ringley Road West
ST3 Night-time	Friday 03/05/2024 00:04	11	1	NE	1	Distant road traffic noise from east

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 & 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	47 Hours	Thursday 02/05/2024 13:56 – Tuesday 07/05/2024 13:01	LT1	49.2	82.7	27.9	50.0	44.0
Weekday Night-time 23:00 – 07:00	24 Hours	Thursday 02/05/2024 23:01 – Tuesday 07/05/2024 06:56		49.6	82.9	26.0	44.0	30.0
Weekend Daytime 07:00 - 23:00	32 Hours	Saturday 04/05/2024 07:01 – Sunday 05/05/2024 22:56		50.2	89.9	31.4	50.4	42.0
Weekend Night-time 23:00 – 07:00	16 Hours	Saturday 04/05/2024 23:01 – Monday 06/05/2024 06:56		49.5	76.3	25.2	44.9	36.0
Weekday Daytime 07:00 - 23:00	48 Hours	Thursday 02/05/2024 13:25 – Tuesday 07/05/2024 13:10	LT2	46.6	86.4	29.2	47.0	41.0
Weekday Night-time 23:00 – 07:00	24 Hours	Thursday 02/05/2024 23:00 – Tuesday 07/05/2024 06:55		51.6	82.1	28.2	42.7	31.0
Weekend Daytime 07:00 - 23:00	32 Hours	Saturday 04/05/2024 07:00 – Sunday 05/05/2024 22:55		49.1	88.8	31.6	48.4	38.0
Weekend Night-time 23:00 – 07:00	16 Hours	Saturday 04/05/2024 23:00 – Monday 06/05/2024 06:55		49.0	79.8	28.6	43.5	35.0
Daytime 07:00 - 19:00	16 Mins	Thursday 02/05/2024 13:59 – 14:14	ST1	70.5	86.2	43.5	75.6	48.8
	15 Mins	Thursday 02/05/2024 14:30 – 14:45	ST2	69.1	89.8	43.4	73.1	53.5
	17 Mins	Thursday 02/05/2024 14:57 – 15:14	ST3	47.1	65.3	38.1	49.8	41.8
Evening 19:00 - 23:00	15 Mins	Thursday 02/05/2024 19:44 – 19:59	ST1	69.9	88.7	39.3	75.0	46.6
	16 Mins	Thursday 02/05/2024 20:11 – 20:27	ST2	67.6	83.7	41.6	72.5	49.5
	15 Mins	Thursday 02/05/2024 20:41 – 20:56	ST3	43.1	58.1	37.6	45.5	39.6
Night-time 23:00 - 07:00	15 Mins	Thursday 02/05/2024 23:19 – 23:35	ST1	64.6	85.7	32.0	65.7	34.2
	16 Mins	Thursday 02/05/2024 23:42 – 23:58	ST2	58.3	83.6	29.0	54.3	31.7
	15 Mins	Friday 03/05/2024 00:04 – 00:19	ST3	36.2	53.2	33.5	37.5	34.8

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa.

4.3 Representative Background & Ambient Noise Levels

Using the data collected during the baseline survey, representative background noise levels have been derived for all receptor locations presented in **Figure 3.2**. **Table 4.4** presents the representative background and ambient 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). The statistical analysis of the background noise levels is presented in **Figure 4.2** to **Figure 4.5**.

Table 4.4: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)*	Representative Ambient Noise Level ($L_{Aeq,T}$)*
R01, R02, R11, R12, R13, T02, T03, T04	LT2	Daytime (07:00 – 23:00)	38.0	46.6
		Night-time (23:00 – 07:00)	31.0	49.0
R03 – R10, T01	LT1	Daytime (07:00 – 23:00)	42.0	49.2
		Night-time (23:00 – 07:00)	30.0	49.5

*Lowest value selected from either Weekday or Weekend.

The representative noise levels presented in **Table 4.4** have been used to inform the assessment presented in Section 5.0.

Figure 4.2: Existing Daytime Background Noise Level – LT1

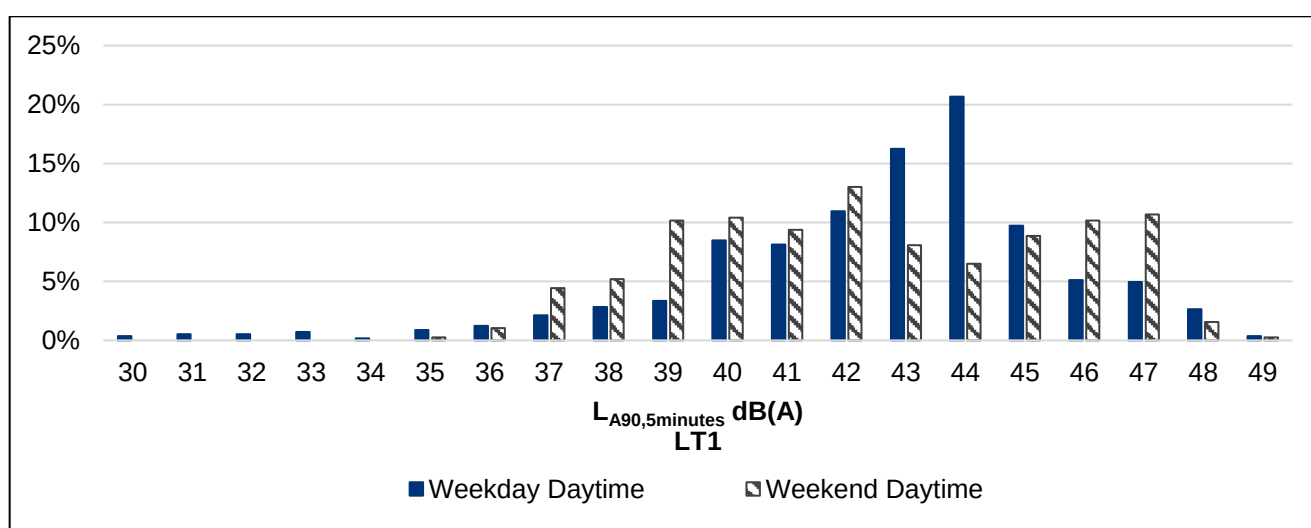
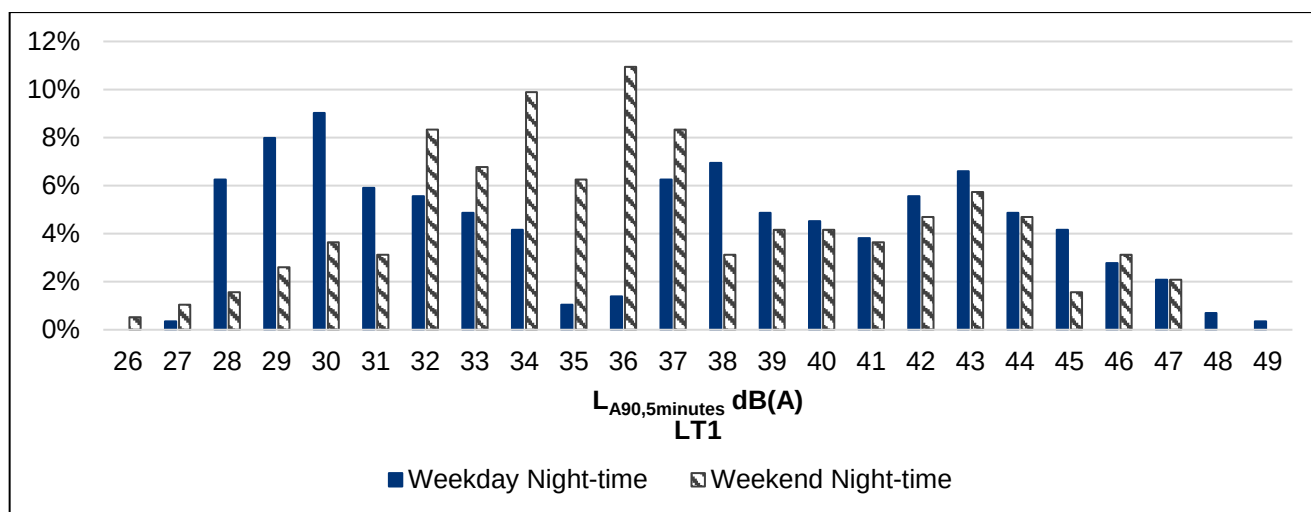
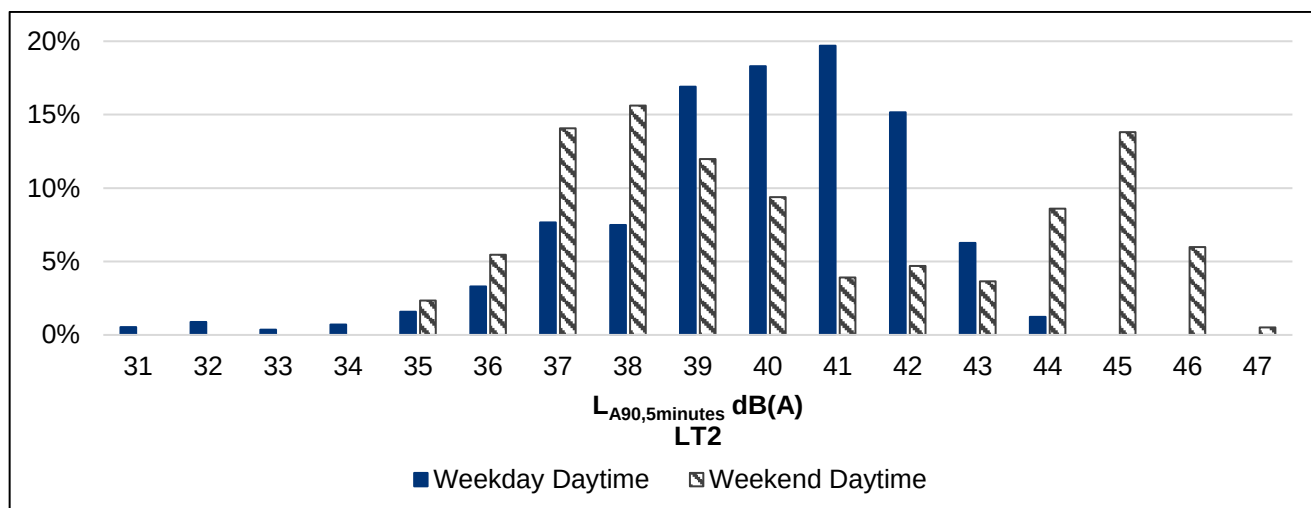
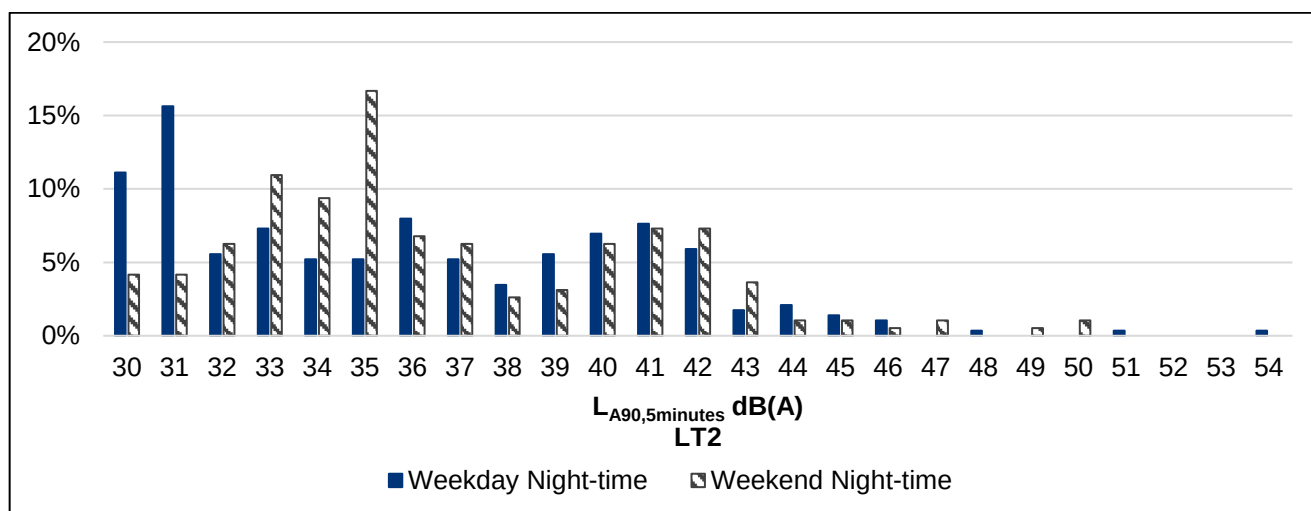


Figure 4.3: Existing Night-time Background Noise Level – LT1**Figure 4.4: Existing Daytime Background Noise Level – LT2****Figure 4.5: Existing Night-time Background Noise Level – LT2**

5.0 Assessment of Effects

5.1 Operational Noise Assessment

5.1.1 BS 4142:2014 Noise Assessment

The assessment below compares the predicted cumulative noise levels from the proposed development with the existing background noise level ($L_{A90,T}$) at the surrounding noise sensitive receptors.

BS 4142:2014 states that corrections should be applied to account for certain acoustic features which have the potential to increase the level of effect at nearby properties.

The character of the sound from the development will generally be low level and constant, with no rapid change in the level or character of noise. Therefore, no impulsive penalty is considered necessary.

It is considered that the plant items will not have identifiable on/off conditions, with many items operating at gradually varying loads. Therefore, no intermittency penalty should be applied.

To determine whether a tonal penalty should be applied, the one-third octave objective method as described in Annex C of BS 4142:2014 has been utilised. The results of the analysis indicate that the predicted noise levels at the nearest sensitive receptors are unlikely to contain any tonal characteristics. Therefore, no tonal penalty has been applied.

It should be noted that the development is not expected to operate continuously, and similar developments tend to be called upon for short periods by National Grid, typically during the peak daytime periods and are rarely used during the night-time hours. However, to present a worst-case assessment, the proposed development is considered to be fully operational during the daytime and night-time periods.

Table 5.1 below presents the difference between the background noise level and noise rating level associated with the proposed development.

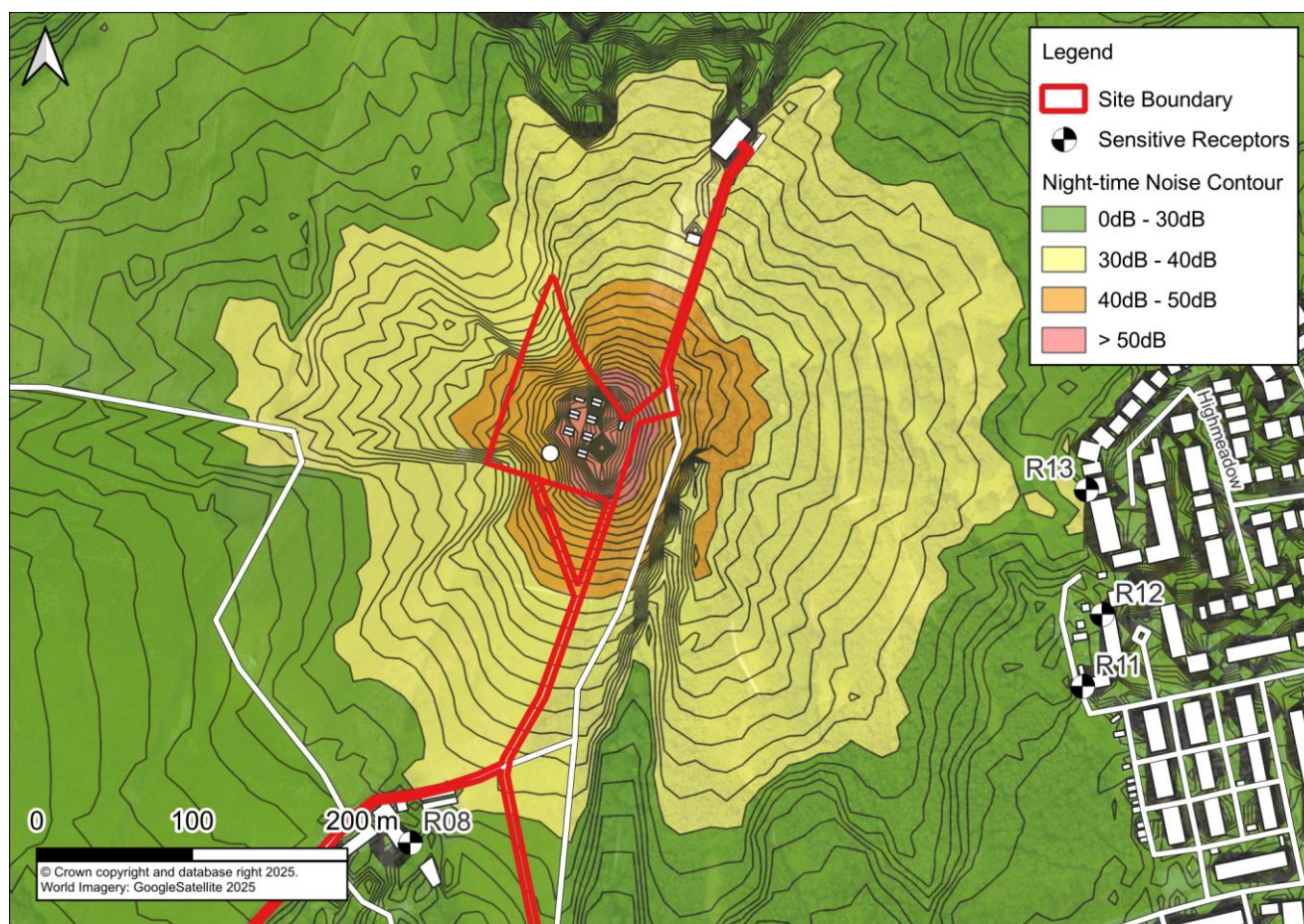
Table 5.1: BS 4142:2014 Operational Noise Assessment

Location	Existing Measured Background $L_{A90,T}$		Noise Rating Level ($L_{Ar,Tr}$)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	38	31	20	23	-18	-8
R02	38	31	21	22	-17	-9
R03	42	30	15	15	-27	-15
R04	42	30	18	19	-24	-11
R05	42	30	24	25	-18	-6
R06	42	30	22	19	-20	-11
R07	42	30	21	22	-21	-8
R08	42	30	26	28	-16	-2
R09	42	30	26	29	-17	-1
R10	42	30	21	21	-21	-9
R11	38	31	22	25	-16	-6
R12	38	31	25	27	-13	-4
R13	38	31	30	32	-8	+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 BS 4142 noise rating levels at sensitive façades of the existing noise sensitive properties are below the existing daytime and night-time background noise levels except at R13 during the night-time period where the rating level is up to +1 dB above the existing night-time background level. As such, noise associated with the proposed development will result up to the Lowest Observed Adverse Effect Level (LOAEL) with accordance to the BS 4142 criteria outlined in **Table 2.1**. For indicative purposes, the night-time noise contour plot (inclusive of all potential noise sources) is presented in **Figure 5.1**.

Figure 5.1: Night-time $L_{Aeq,15minutes}$ Noise Contour Plot (Grid Height: 4.0m)

5.1.2 Noise Intrusion Assessment

Internal noise levels at sensitive receptor locations, from all noise sources associated with the proposed development have been assessed both with windows open, where a reduction from a partially open window of 10 dB has been used, and with windows closed where an assumption of standard thermal double glazing with a sound reduction of 30 dB R_w has been used. The results of the assessment are presented in **Table 5.2** and **Table 5.3**.

Table 5.2: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows open	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
R01	20.4	10.4	0.0	35
R02	21.4	11.4	0.0	35
R03	15.2	5.2	0.0	35
R04	17.8	7.8	0.0	35
R05	24.0	14.0	0.0	35
R06	21.6	11.6	0.0	35
R07	20.9	10.9	0.0	35
R08	26.3	16.3	0.0	35
R09	25.5	15.5	0.0	35
R10	20.6	10.6	0.0	35
R11	22.2	12.2	0.0	35
R12	24.9	14.9	0.0	35
R13	30.3	20.3	0.3	35

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

Table 5.3: Night-time Noise Intrusion Levels $L_{Aeq,15minutes}$

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows open	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
R01	22.7	12.7	0.0	30
R02	22.1	12.1	0.0	30
R03	15.2	5.2	0.0	30
R04	18.9	8.9	0.0	30
R05	24.5	14.5	0.0	30
R06	19.2	9.2	0.0	30
R07	22.3	12.3	0.0	30
R08	28.1	18.1	0.0	30
R09	28.6	18.6	0.0	30
R10	20.6	10.6	0.0	30
R11	24.7	14.7	0.0	30
R12	27.1	17.1	0.0	30
R13	31.8	21.8	1.8	30

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

As demonstrated within **Table 5.2** and **Table 5.3** above, predicted noise levels are below the BS 8233/WHO criteria for noise intrusion at all sensitive receptors. As such, noise levels at all receptors are predicted to fall under the No Observed Adverse Effect Level (NOAEL) when assessed against the noise intrusion criteria.

Due to the nature of the noise sources i.e. not impulsive, the maximum noise levels L_{AFmax} generated during the daytime and night-time periods have been considered in the assessments presented above.

5.1.3 Change in Noise Level Assessment

This assessment compares noise from the existing ambient noise climate (based on existing measured $L_{Aeq,T}$) with the predicted noise level from the proposed scenario from all noise sources associated with the proposed development. The difference between the 'existing' ambient noise level and the predicted 'worst-case proposed' noise level is presented in **Table 5.4** below.

Table 5.4: Difference Between Baseline and Proposed Scenarios

Location	Existing $L_{Aeq,T}$ (Monitored)		Proposed $L_{Aeq,T}$ (Modelled)		Combined $L_{Aeq,T}$		Contribution from Proposed Scheme	
	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time
R01	46.6	49.0	20.4	22.7	46.6	49.0	0.0	0.0
R02	46.6	49.0	21.4	22.1	46.6	49.0	0.0	0.0
R03	49.2	49.5	15.2	15.2	49.2	49.5	0.0	0.0
R04	49.2	49.5	17.8	18.9	49.2	49.5	0.0	0.0
R05	49.2	49.5	24.0	24.5	49.2	49.5	0.0	0.0
R06	49.2	49.5	21.6	19.2	49.2	49.5	0.0	0.0
R07	49.2	49.5	20.9	22.3	49.2	49.5	0.0	0.0
R08	49.2	49.5	26.3	28.1	49.2	49.5	0.0	0.0
R09	49.2	49.5	25.5	28.6	49.2	49.5	0.0	0.0
R10	49.2	49.5	20.6	20.6	49.2	49.5	0.0	0.0
R11	46.6	49.0	22.2	24.7	46.6	49.0	0.0	0.0
R12	46.6	49.0	24.9	27.1	46.6	49.0	0.0	0.0
R13	46.6	49.0	30.3	31.8	46.7	49.1	0.1	0.1

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

As demonstrated in **Table 5.4**, the contribution from the proposed development to the existing ambient noise levels are up to +0.1 dB at all sensitive receptors. This is indicative of a negligible short-term impact as defined by the IEMA 2014 Guidelines for Environmental Noise Impact Assessment. As such, noise levels at all receptors are predicted to fall under the No Observed Adverse Effect Level (NOAEL) during both the daytime and night-time periods.

5.2 Tranquillity Assessment

An assessment of the existing tranquillity level of the site has been based on the mapping data published in 2007 by The Countryside Charity, formerly known as the Council for the Preservation of Rural England and the Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the site and the immediate surrounding area are assessed as falling into Zones 1 – 4 and is of low tranquillity.

There are several public footpaths which interact with the application site as presented in **Figure 3.2** and these provide access to Outwood Country Park which is considered to be an area of relatively greater tranquillity. A section of an existing track off Wood Street will be used as the access track to the proposed site which may indicate a negative effect to the tranquillity of the area. However, it is considered that other access to the areas of greater tranquillity will be maintained.

To assess the impact of the proposed development on the tranquillity of the surrounding areas, a change in noise level assessment has been undertaken and presented in **Table 5.5** below.

Table 5.5: Difference Between Baseline and Proposed Scenarios – Tranquillity

Location	Existing $L_{Aeq,T}$ (Monitored)	Proposed $L_{Aeq,T}$ (Modelled)	Combined $L_{Aeq,T}$	Contribution from Proposed Scheme
	Daytime	Daytime	Daytime	Daytime
T01	49.2	31.2	49.3	0.1
T02	46.6	40.4	47.5	0.9
T03	46.6	45.8	49.2	2.6
T04	46.6	30.6	46.7	0.1

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

The results presented above show that noise contribution from the proposed development result in an increase in ambient noise levels of up to +2.6 dB on the existing footpaths in proximity to the proposed site. This is indicative of a minor short-term impact as defined by the IEMA 2014 Guidelines for Environmental Noise Impact Assessment. As such, noise levels on the existing footpaths are predicted to result in the Lowest Observed Adverse Effect Level (LOAEL).

Considering the above, no restrictions to areas of relative tranquillity will occur due to the proposed development. **Figure 5.2** below illustrates the daytime noise levels as a result of the proposed development.

Figure 5.2: Daytime $L_{Aeq,1hour}$ Noise Contour Plot (Grid Height: 1.5m)



6.0 Conclusion

A noise assessment has been undertaken in support of a planning application for the installation of an 11 MW Battery Energy Storage System (BESS) on land at Shore Top House, Kearsley Road, Radcliffe, Manchester, M26 1FA.

The BS 4142 noise rating levels at the nearest sensitive receptors fall into the Lowest Observed Adverse Effect Level (LOAEL) when compared against the existing daytime and night-time background noise levels ($L_{A90,T}$).

The cumulative operational noise levels from all proposed noise sources associated with the site were also assessed against the BS 8233/WHO criteria. Noise levels at all sensitive receptors are predicted to fall within the No Observed Adverse Effect Level (NOAEL).

Furthermore, the change in ambient noise levels due to the operation of the proposed development would result in a negligible short-term impact at all sensitive receptors and therefore fall within the No Observed Adverse Effect Level (NOAEL).

An assessment of tranquillity has been undertaken. The results indicate that no restrictions to areas of relative tranquillity will occur due to the proposed development.

The NPPF provides test points against which the proposed development has been assessed. Considering these points, the following conclusions can be drawn:

NPPF paragraphs 191 and 194

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.

NPPF paragraph 193

Considering the existing use of the site, it is not considered that any existing businesses wanting to develop would be restricted by the proposals.

Planning Practice Guidance: Noise

It has been predicted that on-site operational noise effects associated with the Development will be within the Lowest Observed Adverse Effect Level (LOAEL), and therefore the development will have a low impact in relation to noise.

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

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