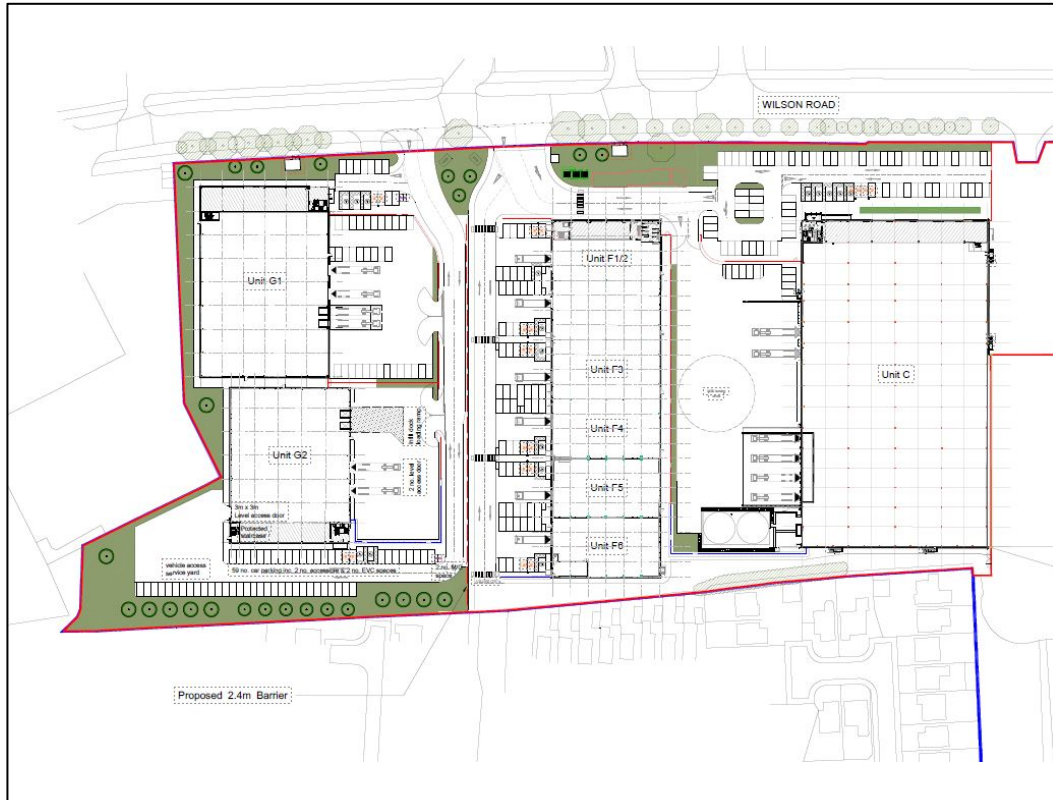


Sovereign Business Park, Huyton, Liverpool

784-B029681



Noise Assessment

DAVOS Industrial Ltd

26th November 2024



Tetra Tech Limited. Registered in England number: 01959704

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Table of Contents

Executive Summary	7
1.0 Introduction	8
1.1 Purpose of this Report	8
1.2 Legislative Context	8
1.3 Acoustic Consultants' Qualifications and Professional Memberships	11
2.0 Assessment Criteria	13
3.0 Assessment Methodology	17
3.1 Noise Modelling Methodology	17
3.2 Model Input Data	18
3.3 Modelling Inputs & Rating Corrections	19
3.4 Sensitive Receptors	20
4.0 Noise Survey	22
4.1 Noise Survey Details	22
4.2 Noise Survey Results	24
4.3 Representative Background Noise Levels	26
5.0 Assessment of Effects	27
5.1 Plant Noise Assessment	27
5.2 Noise Intrusion Assessment - Cumulative	32
6.0 Mitigation	37
6.1 Noise Mitigation	37
6.2 Noise Intrusion Assessment – with Mitigation	38
6.3 Cumulative Noise Assessment – with Mitigation	41
7.0 Conclusion	43
Appendices	44

List of Tables

Table 1.1: NPPG Noise Exposure Hierarchy	10
Table 1.2: Acoustic Consultants' Qualifications & Experience	12
Table 2.1: Noise Level Criteria and Actions	14
Table 3.1: Modelling Parameters Sources and Input Data	17
Table 3.2: Summary of Noise Input Data (Sound Pressure Levels)	18
Table 3.3: Modelling Inputs & Rating Corrections	19
Table 3.4: Existing Sensitive Receptor Locations	20
Table 4.1: Noise Monitoring Locations	23
Table 4.2: Meteorological Conditions during the Survey	24
Table 4.3: Results of Baseline Noise Monitoring Survey (Average Levels)	25
Table 4.4: Representative Background Noise Levels (All Receptors)	26
Table 5.1: Indicative BSP Emissions (Per Unit) as Modelled	28
Table 5.2: BS4142 Assessment	31
Table 5.3: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$	32
Table 5.4: Night-time Noise Intrusion Levels $L_{Aeq,15mins}$	33
Table 5.5: Night-time Noise Intrusion Levels L_{Amax}	34
Table 5.6: Change in Noise Level Assessment	36
Table 6.1: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$ – with Mitigation	39
Table 6.2: Night-time Noise Intrusion Levels $L_{Aeq,15 mins}$ – with Mitigation	39
Table 6.3: Night-time Noise Intrusion Levels L_{Amax} – with Mitigation	40
Table 6.4: Cumulative Noise Assessment – with Mitigation	42

List of Figures

Figure 3.1: Sensitive Receptors Location	21
Figure 4.1: Noise Monitoring Locations	23
Figure 5.1: Worst-case BSP Locations	27
Figure 5.2: Existing Daytime Background Noise Level – Statistical Analysis LT1	28
Figure 5.3: Existing Night-time Background Noise Level – Statistical Analysis LT1	29
Figure 5.4: Existing Daytime Background Noise Level – Statistical Analysis LT2	29
Figure 5.5: Existing Night-time Background Noise Level – Statistical Analysis LT2	30
Figure 5.6: Existing Daytime Background Noise Level – Statistical Analysis LT3	30
Figure 5.7: Existing Night-time Background Noise Level – Statistical Analysis LT3	31
Figure 5.8: Night-time Noise Contour Plot (Grid Height: 4.0m)	35
Figure 6.1: Proposed Mitigation Locations	38
Figure 6.2: Night-time Contour Plot – with Mitigation	41

Appendices

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 development at Sovereign Business Park, Huyton, Liverpool.

Maximum permissible noise limits have been set for proposed building services plant which are predicted to result in a noise rating level which is at least 10 dB below the existing background noise level during both the daytime and night-time periods at the closest sensitive receptor locations. Accordingly, the proposed plant is expected to have a low impact at the closest sensitive receptors.

Including the mitigation described in Section 6.0, cumulative operational noise levels during the daytime and night-time periods are predicted to be below the guideline noise intrusion criteria at nearby properties assuming both a windows-open and a windows-closed scenario.

A change in noise level assessment has been undertaken which shows that noise levels are not expected to change significantly, which falls within the No Observed Adverse Effect Level.

1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment to support a Section 73 planning application for the development at Sovereign Business Park, Huyton, Liverpool. 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. Report Conditions are available upon request.

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 2023. With regard to noise and planning, the NPPF contains the following statement at Paragraph 191:

“191. 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 [...]

“193. 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.

“194. 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
Not present	No Effect	No Observed Effect	No Specific Measures Required
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.

Furthermore, the PPG: Noise identifies at Paragraph: 011 Reference ID: 30-011-20190722 the requirement for developments proposals to incorporate measures to mitigating the impact of noise on residential developments. In particular:

“Noise impacts may be partially offset if residents have access to one or more of:

- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;*
- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;*
- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5-minute walking distance).*

1.3 Acoustic Consultants’ Qualifications and Professional Memberships

The lead project Acoustic Consultant is Travis Smith. The report has been checked by David Fink 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)
Travis Smith	BSc 2022	Jul 2022	-	-
David Fink	BEng 2016	Mar 2017	Jul 2017	-
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:

- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings – Code of practice'
- BS4142:2014 'Method for rating industrial and commercial sound'
- World Health Organisations (1999) 'Guidelines for Community Noise'
- 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 for the following noise sources with windows closed: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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
Absolute external noise criteria for the following noise sources: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels are below 50dBL _{Aeq,16hours}	Justification for Effect Level: Less than 'desirable' values in BS8233:2014 Paragraph 7.7.3.2. Action Required: None
Change in noise levels for the following noise sources: - Road traffic noise - Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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 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 between 1-4dB.	Justification for Effect Level: 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 for the following noise sources with windows closed:	Noise levels are between: Living Rooms: - 35-40 dBL _{Aeq,16hours}	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999)

- Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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 10th highest L_{AFmax,2min} sample)	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
Absolute external noise criteria for the following noise sources: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels are between 50-55 dBL_{Aeq,16hours}	Justification for Effect Level: Exceed 'desirable' threshold guidelines but within upper threshold guidelines in Paragraph 7.7.3.2 of BS8233:2014
Change in noise levels for the following noise sources: - Road traffic noise - Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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_{Ar,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 for the following noise sources with windows closed: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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 10th highest L_{AFmax,2min} sample)	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,T} reasonable criteria by 5dB or exceeds L_{AFmax,2min} (10th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute external noise criteria for the following noise sources: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels exceed 55 dBL_{Aeq,16hours}	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,16hours} upper criteria. Action Required: Additional mitigation required to achieve effect of LOAEL or less.

Change in noise levels for the following noise sources: - Road traffic noise - Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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: 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 for the following noise sources with windows closed: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	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 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 10dB or exceeds $L_{AFmax,2min}$ (10th highest sample) by 10dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute external noise criteria for the following noise sources: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels exceed 60 dBL_{Aeq,16hours}	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,16hours}$ upper criteria by 5dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Change in noise levels for the following noise sources: - Road traffic noise - Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≥ 5.0dB.	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.

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	DEFRA	LiDAR 1m DTM
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 • Noise Contour Plot Grid • Receiver Spacing: 10.0
Proposed Plans	Proposed Site Plan Unit G2 (Cadent) Option 1	Drawing Title: Proposed Site Plan Unit G2 (Cadent) Option 1 Drawing No: 13546-AEW-SI-XX-DR-A-9001 Rev: P01

*All receptors modelled 1.0m 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

Information regarding noise emissions from operational noise sources have been determined using the Tetra Tech Library.

Data contained within Table 3.2 presents noise information for all operational noise sources.

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

Noise Source	Type	Sound Pressure Level (dB(A))	Distance (m)	Sound Power Level (L _w (A))	Source
HGV Unloading (Daytime)	Average	70.0	3.0	-	Tetra Tech Library
HGV Unloading (Night-time)	Average	73.0	3.0	-	Tetra Tech Library
HGV Unloading (Night-time)	Maximum	89.4	3.0	-	Tetra Tech Library
Vehicle (HGV & LGV) Movement	Average	48.9	3.0	-	Tetra Tech Library
Vehicle (HGV & LGV) Movement	Maximum	-	-	90.5	Tetra Tech Library
LGV Unloading	Average	65.8	3.0	-	Tetra Tech Library
LGV Unloading	Average	68.1	3.0	-	Tetra Tech Library
LGV Unloading	Maximum	85.4	3.0	-	Tetra Tech Library
Car Park	Average	54.0	1.5	-	Tetra Tech Library
BSP Daytime	Average	48.0	3.0	-	Maximum Permissible Limits
BSP Night-time	Average	49.0	3.0	-	Maximum Permissible Limits

3.3 Modelling Inputs & Rating Corrections

Table 3.3 below presents the model input information, and BS4142 rating penalty corrections applied to noise data presented within Tables 3.2. Rating corrections have been applied as +2dB to account for any uncertainty.

Table 3.3: Modelling Inputs & Rating Corrections

Noise Source	Height (m)	Source Type	Movements per Hour		BS4142 Rating Penalty
			Daytime	Night-Time	
HGV Movement	1.0	Line	14	7	-
LGV Movement	1.0	Line	6	3	-
BSP	1.0 (above roof)	Point	-	-	+2

3.4 Sensitive Receptors

3.4.1 Existing Sensitive Receptor Locations

Table 3.4 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 3.4: Existing Sensitive Receptor Locations

Ref.	Description	Type of Use	Height (m) Daytime / Night-time
R01	98 Logwood Road	Residential	1.5 / 4.0
R02	9 Holland Grove	Residential	1.5 / 4.0
R03	20 Rudgate Road	Residential	1.5 / 4.0
R04	26 Newsham Road	Residential	1.5 / 4.0
R05	24 Newsham Road	Residential	1.5 / 4.0
R06	10 Newsham Road	Residential	1.5 / 4.0
R07	59 Bridgewater Way	Residential	1.5 / 4.0
R08	99 Bridgewater Way	Residential	1.5 / 4.0
R09	62 Bridgewater Way	Residential	1.5 / 4.0
R10	48 Bridgewater Way	Residential	1.5 / 4.0
R11	34 Bridgewater Way	Residential	1.5 / 4.0
R12	4 Cronton Road	Residential	1.5 / 4.0
R13	1 Whitefield Lane	Residential	1.5 / 4.0
R14	Meadow Villa	Residential	1.5 / 4.0
R15	2 Sevenoak Grove	Residential	1.5 / 7.0
R16	1 Sevenoak Grove	Residential	1.5 / 4.0

Figure 3.1: Sensitive Receptors Location



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:

<i>Rion NL-52</i>	<i>Environmental Noise Analyser</i>	<i>s/n</i>	<i>620858</i>
<i>Rion NL-52</i>	<i>Environmental Noise Analyser</i>	<i>s/n</i>	<i>219904</i>
<i>Rion NL-52</i>	<i>Environmental Noise Analyser</i>	<i>s/n</i>	<i>732146</i>
<i>Rion NL-52</i>	<i>Environmental Noise Analyser</i>	<i>s/n</i>	<i>1176464</i>
<i>Rion NC-75</i>	<i>Sound Calibrator</i>	<i>s/n</i>	<i>35270131</i>

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 +0.8 dB was observed. 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 eleven locations (as specified in the following table and shown in Figure 4.1) from Friday 28th May 2021 to Wednesday 2nd June 2021. Attended short term measurements were undertaken at five locations during day, evening and night-time periods with three additional locations being measured unattended over a 121-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 variable wind direction during the survey.

Table 4.1: Noise Monitoring Locations

Ref	Description
LT1	North-western boundary of the site
LT2	Western boundary of the site
LT3	Southern boundary of the site
ST1	North-west of the site, Logwood Road
ST2	West of the site, Hastings Drive
ST3	North-west of the site, Rudgate Road
ST4	West of the site, Bridgewater Way
ST5	South-east of the site, adjacent to public house car park

Figure 4.1: Noise Monitoring Locations

4.2 Noise Survey Results

The dominant noise sources found in the area include road traffic noise from A5080, M57 and surrounding local roads.

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
Day ST1	01/06/2021 14:26	24	1 – 2	N	2	Road traffic noise A5080, Logwood Road
Day ST2	01/06/2021 15:09	24	1 – 2	W	2	Road traffic noise A5080
Day ST3	01/06/2021 15:54	25	1 – 2	E	2	Road traffic noise Rudgate Road
Day ST4	01/06/2021 16:14	24	1 – 2	NE	2	Road traffic noise A5080, M57
Day ST5	02/06/2021 09:36	22	1 – 2	NE	1	Road traffic noise A5080, M57
Evening ST1	01/06/2021 18:57	21	0 – 1	W	3	Road traffic noise A5080, Logwood Road, M57
Evening ST2	01/06/2021 19:17	21	0 – 1	E	3	Road traffic noise A5080, M57
Evening ST3	01/06/2021 19:37	21	0 – 1	E	2	Road traffic noise A5080, M57
Evening ST4	01/06/2021 19:58	21	0 – 1	SE	3	Road traffic noise A5080, M57
Evening ST5	01/06/2021 20:20	20	1 – 2	W	3	Road traffic noise A5080, M57, Wilson Road
Night ST1	01/06/2021 23:01	16	0 – 1	W	2	Road traffic noise A5080, Logwood Road
Night ST2	01/06/2021 23:21	15	0 – 1	NE	1	Road traffic noise A5080, M57
Night ST3	01/06/2021 23:41	15	0 – 1	NE	0	Road traffic noise A5080, M57
Night ST4	02/06/2021 00:01	15	0 – 1	NE	1	Road traffic noise A5080, M57
Night ST5	02/06/2021 00:22	15	0 – 1	NE	1	Road traffic noise A5080, M57

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	49 Hours	28/05/2021 – 02/06/2021 11:20 – 12:05	LT1	54.7	89.7	34.8	54.4	50
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		53.5	89.7	33.3	52.7	42
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		52.6	80.4	38.5	53.1	50
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		51.1	81.9	34.2	52.3	44
Weekday Daytime 07:00 - 23:00	49 Hours	28/05/2021 – 02/06/2021 10:43 – 11:18	LT2	50.1	82.5	32.3	49.4	46
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		46.7	72.9	31.6	46.6	42
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		48.2	80.9	33.8	47.6	41
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		46.5	78.7	30.3	46.8	42
Weekday Daytime 07:00 - 23:00	49 Hours	28/05/2021 – 02/06/2021 10:13 – 10:58	LT3	66.7	102.7	41.8	69.8	60
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		61.5	97.2	36.6	61.2	46
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		66.6	97.2	45.2	70.0	58
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		60.3	84.8	37.5	62.3	49
Daytime 07:00 - 19:00	15 Mins	01/06/2021 14:26	ST1	52.6	68.6	46.5	52.9	49.5
	15 Mins	01/06/2021 15:09	ST2	48.0	54.9	44.6	49.3	46.4
	15 Mins	01/06/2021 15:54	ST3	52.6	68.2	48.2	53.9	49.9
	15 Mins	01/06/2021 16:14	ST4	50.4	69.9	44.4	52.5	46.9
	20 Mins	02/06/2021 09:36	ST5	59.4	84.8	51.6	60.8	55.1
Evening 19:00 - 23:00	15 Mins	01/06/2021 18:57	ST1	52.4	71.9	45.8	53.7	48.6
	15 Mins	01/06/2021 19:17	ST2	52.1	71.7	40.8	56.1	44.4
	15 Mins	01/06/2021 19:37	ST3	53.2	72.8	46.2	56.0	48.9
	15 Mins	01/06/2021 19:58	ST4	52.5	80.9	41.7	54.2	44.7
	15 Mins	01/06/2021 20:20	ST5	56.4	81.1	49.5	57.9	52.3
Night-time 23:00 - 07:00	15 Mins	01/06/2021 23:01	ST1	50.7	68.9	43.4	51.34	46.7
	15 Mins	01/06/2021 23:21	ST2	45.1	55.0	40.1	46.5	43.2
	15 Mins	01/06/2021 23:41	ST3	51.6	76.6	41.7	50.3	45.2
	15 Mins	02/06/2021 00:01	ST4	56.3	75.4	36.4	45.3	39.2
	15 Mins	02/06/2021 00:22	ST5	49.2	61.1	41.1	52.3	44.3

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 3.1. Table 4.4 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 – R03	LT1	Daytime (07:00 – 23:00)	50
		Night-time (23:00 – 07:00)	42
R04 – R09	LT2	Daytime (07:00 – 23:00)	41
		Night-time (23:00 – 07:00)	42
R10 & R11	ST4	Daytime (07:00 – 23:00)	47
		Night-time (23:00 – 07:00)	39
R12 – R16	LT3	Daytime (07:00 – 23:00)	58
		Night-time (23:00 – 07:00)	46

*Lowest $L_{A90,T}$ 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.

5.0 Assessment of Effects

5.1 Plant Noise Assessment

Details relating to the finalised specification of the proposed BSP are currently unknown, therefore noise levels from a series of predictions were made by defining different sound power levels (assuming hemi-spherical radiation) at the point source. When the sound pressure levels are set as shown in Table 3.2 (which is considered to be achievable), the rating levels at all the representative receptors are predicted to be at least 10 dB below the background noise levels, as shown in Table 5.1. The indicative worst-case plant locations are presented in Figure 5.1 below. To account for any uncertainty, a + 2 dB correction has been applied to the predicted noise level to create the 'Rating Level'.

Figure 5.1: Worst-case BSP Locations

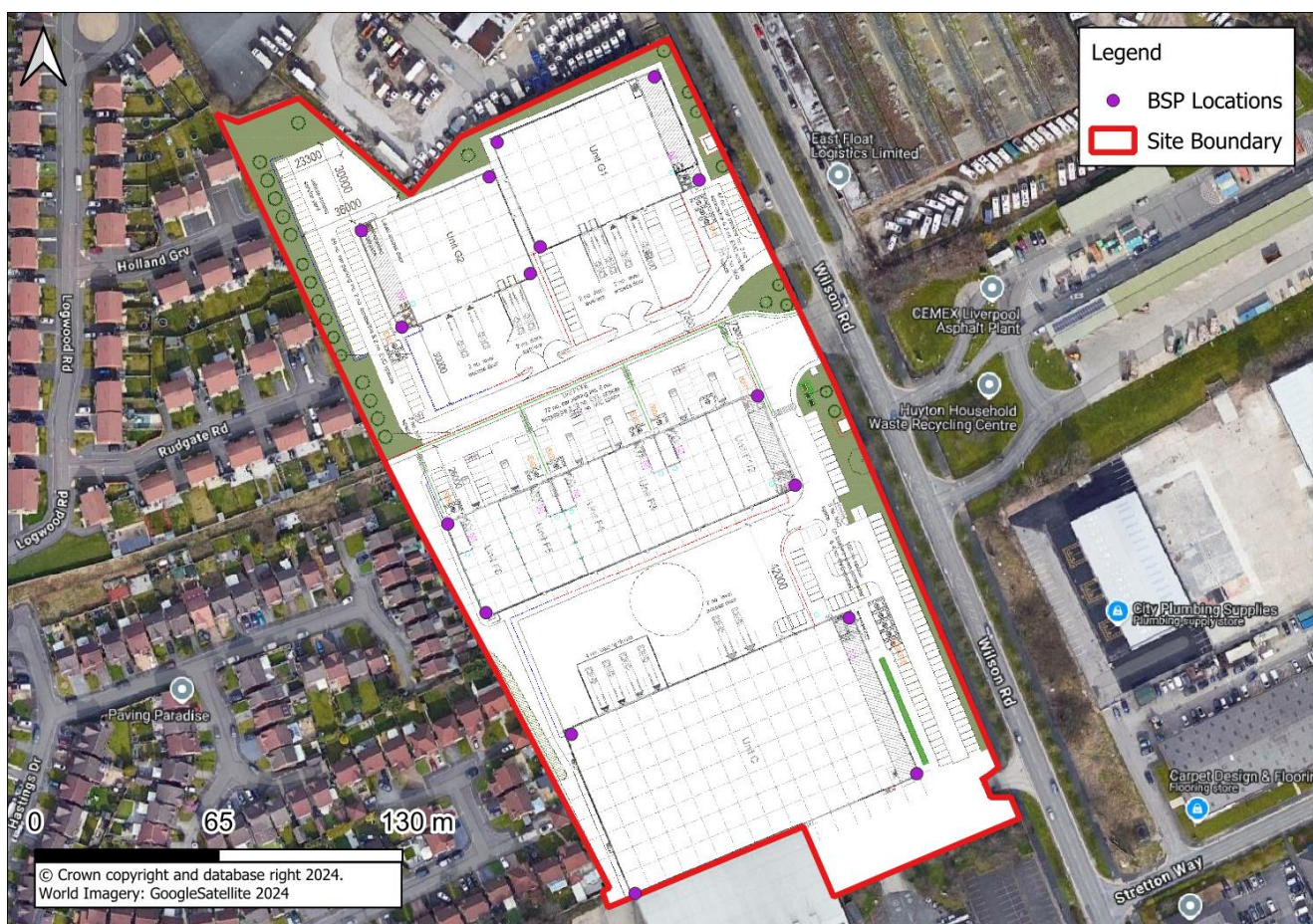


Table 5.1: Indicative BSP Emissions (Per Unit) as Modelled

BSP Location	Noise Emission - Sound Pressure Level	
	Daytime	Night-time
Roof-mounted BSP unit	48.0 dB(A) at 3 m <i>OR</i> 37.5 dB(A) at 10 m	49.0 dB(A) at 3 m <i>OR</i> 38.5 dB(A) at 10 m

Statistical analysis of the long-term measured data, to derive representative background noise levels for the daytime and night-time periods are shown in Figures 5.2 – 5.7.

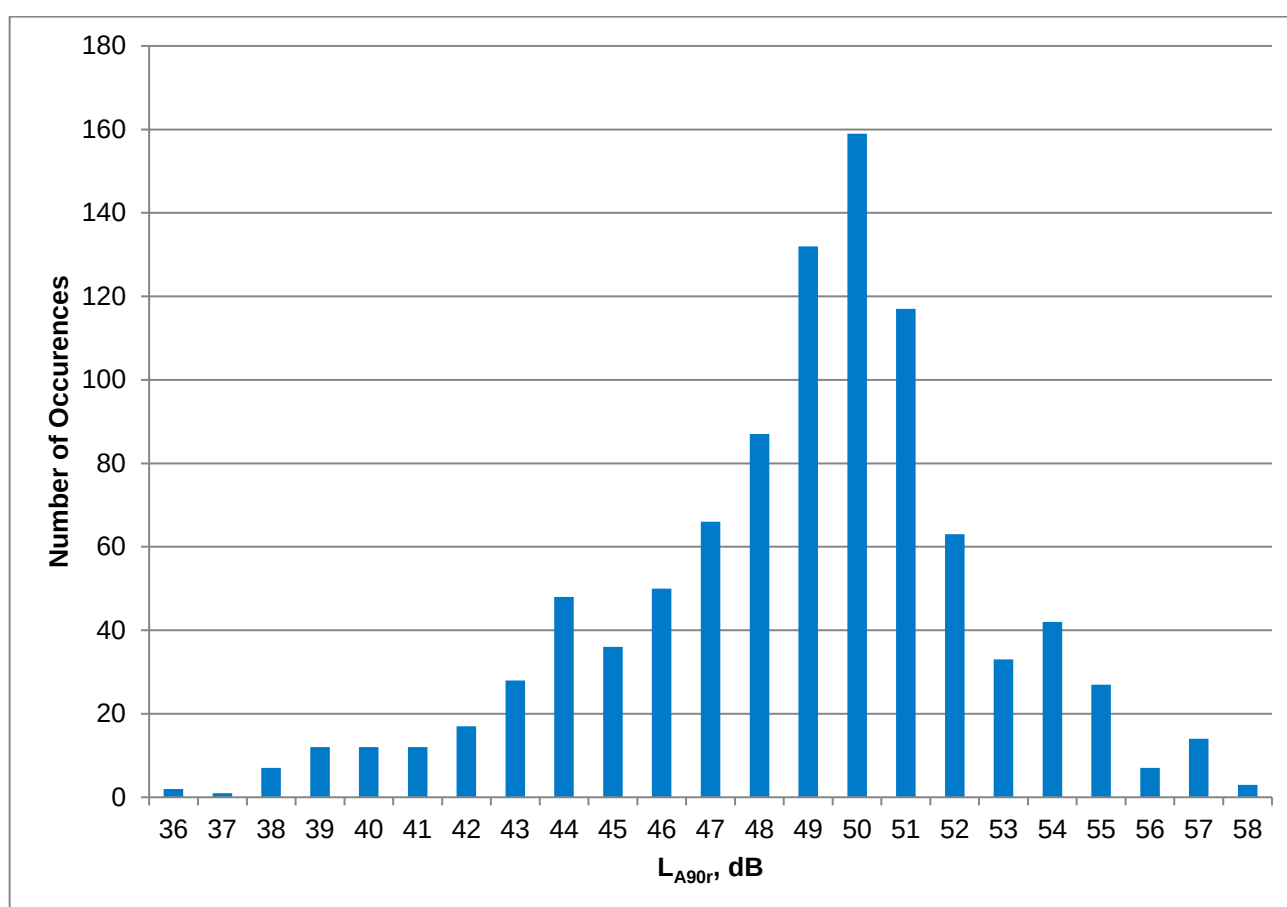
Figure 5.2: Existing Daytime Background Noise Level – Statistical Analysis LT1

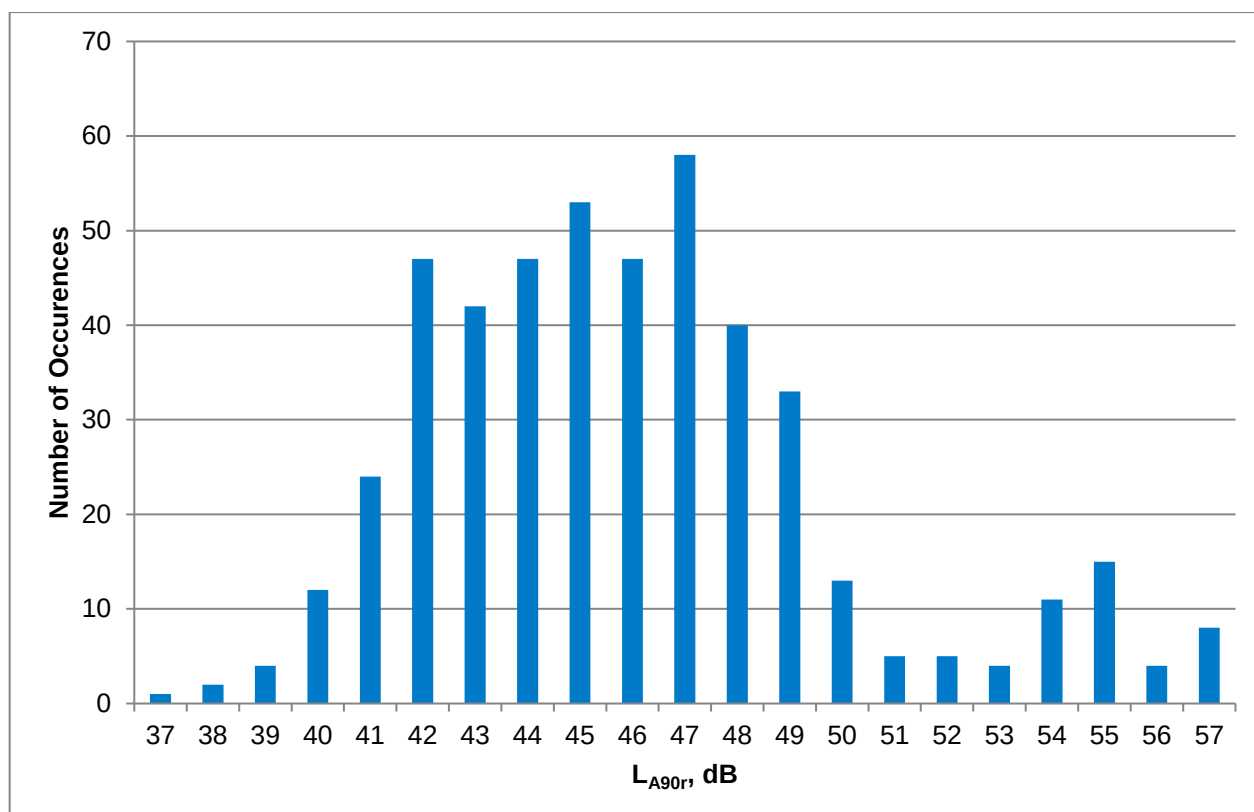
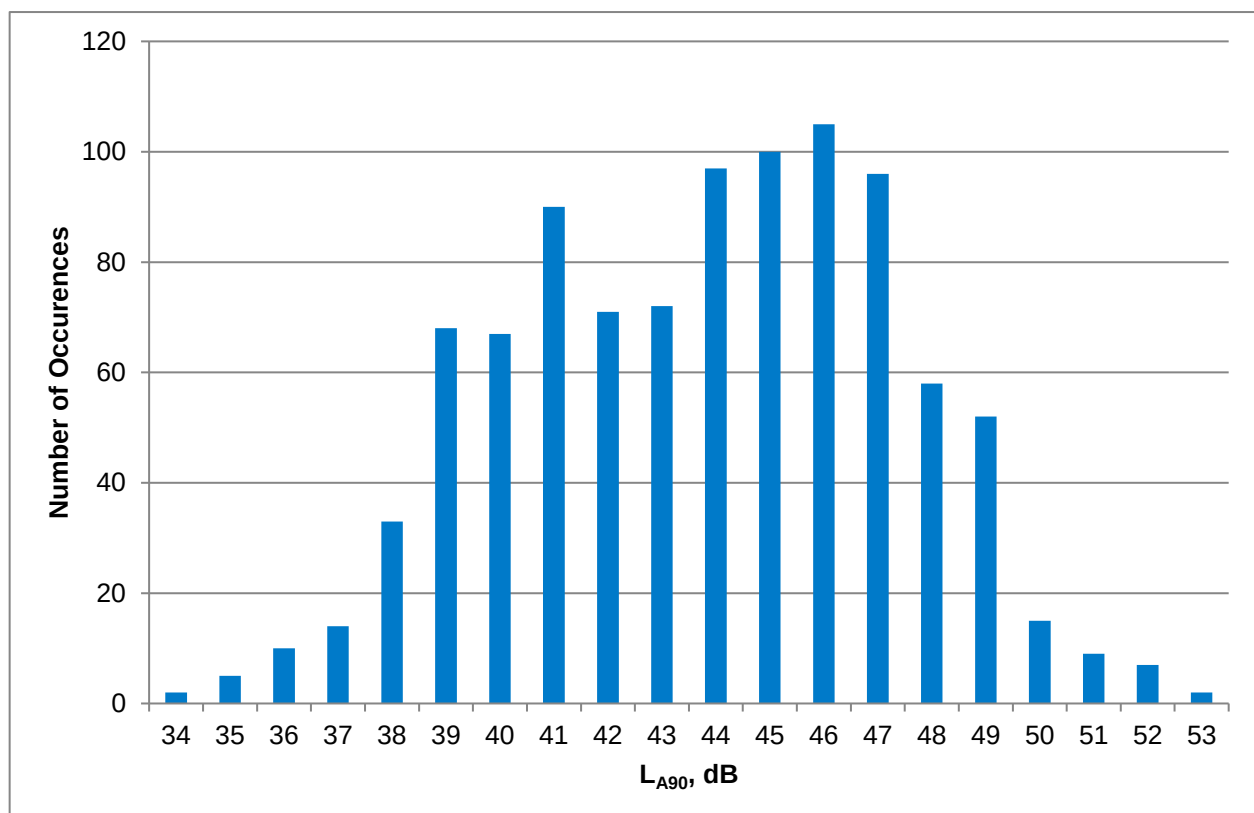
Figure 5.3: Existing Night-time Background Noise Level – Statistical Analysis LT1**Figure 5.4: Existing Daytime Background Noise Level – Statistical Analysis LT2**

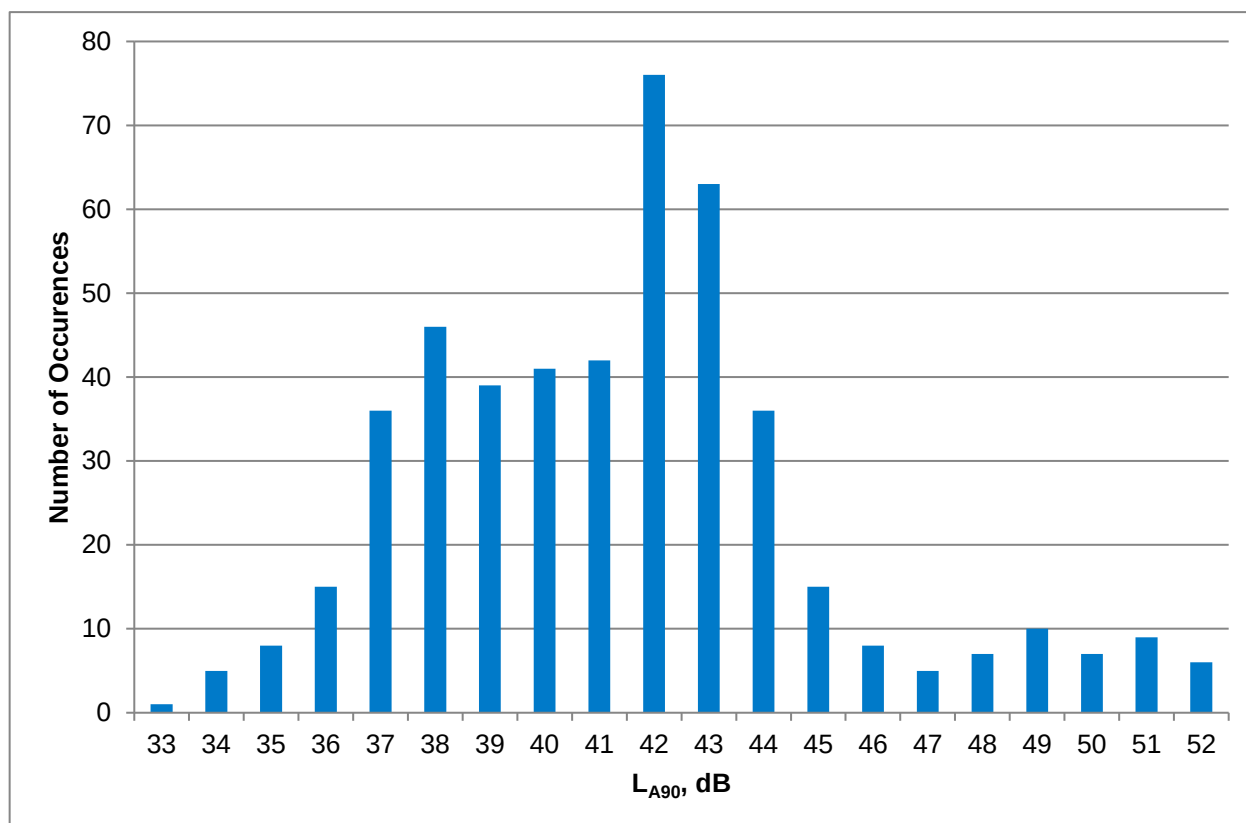
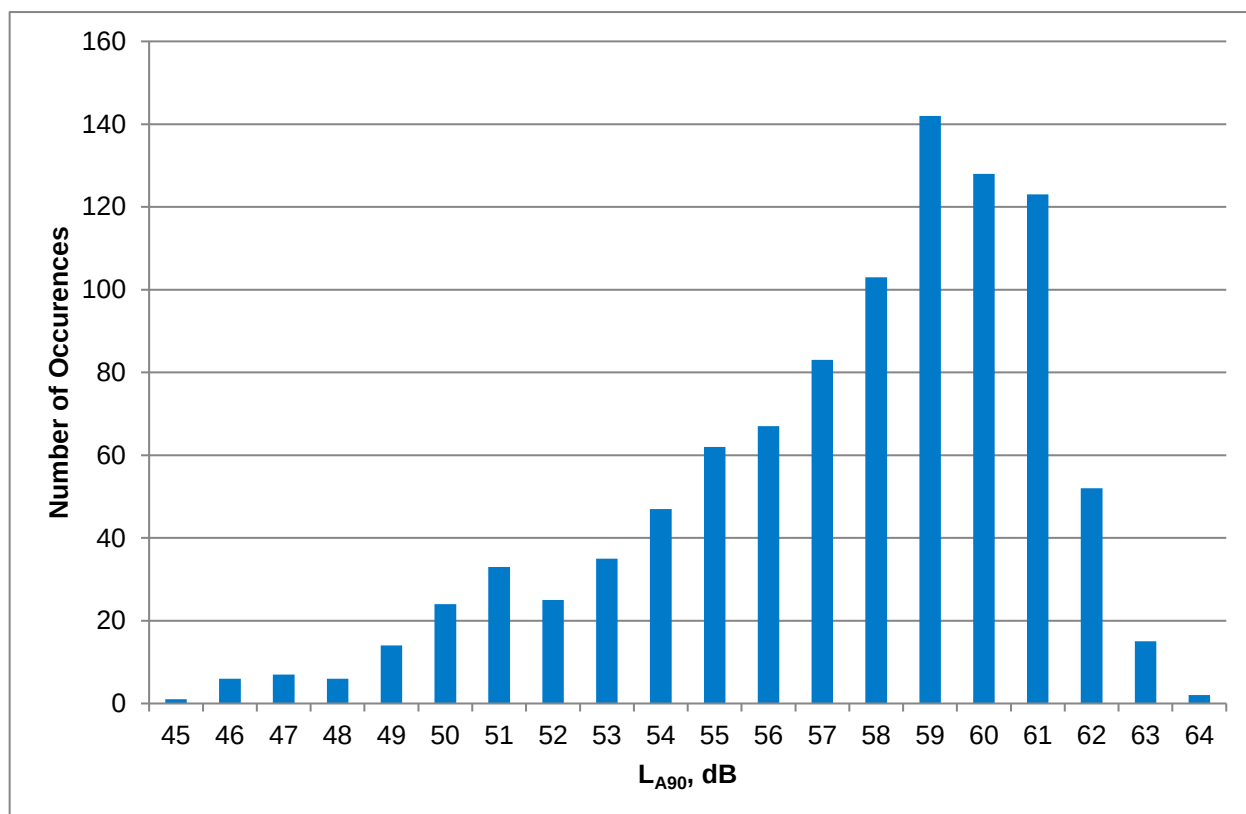
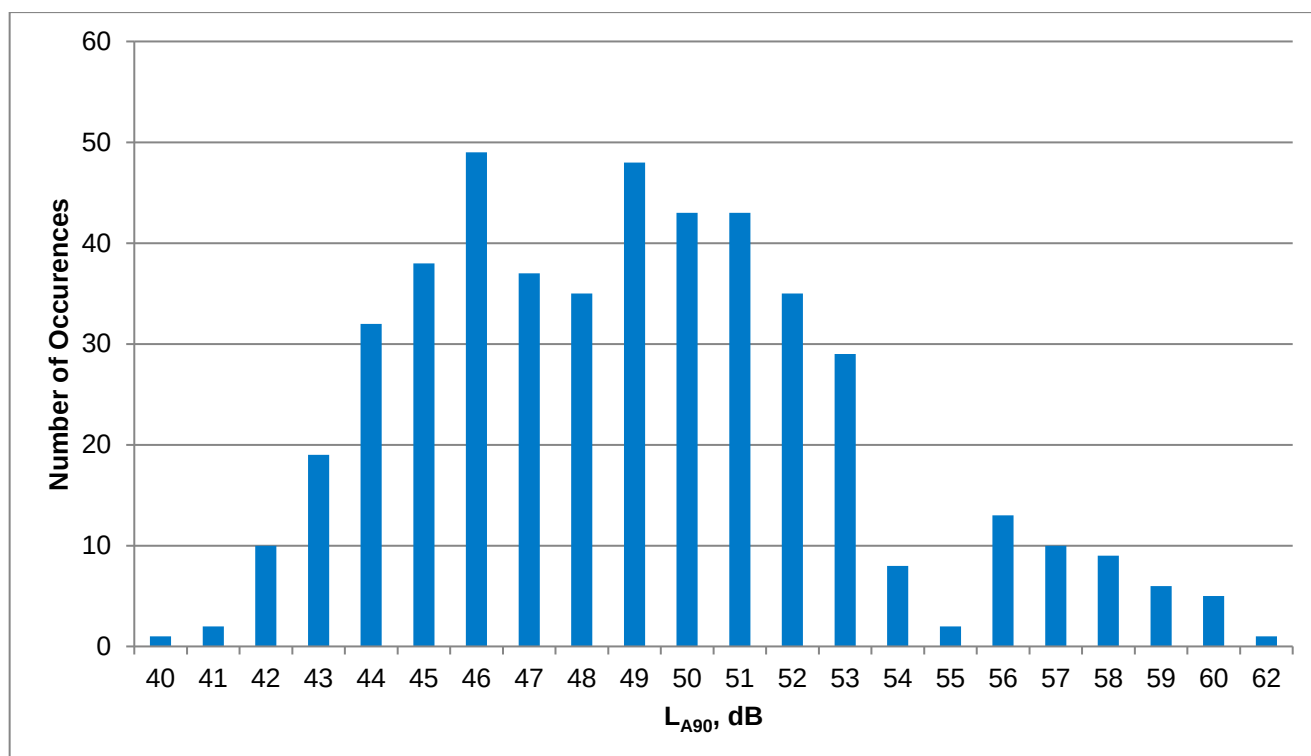
Figure 5.5: Existing Night-time Background Noise Level – Statistical Analysis LT2**Figure 5.6: Existing Daytime Background Noise Level – Statistical Analysis LT3**

Figure 5.7: Existing Night-time Background Noise Level – Statistical Analysis LT3**Table 5.2: 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	50	42	21	23	-29	-19
R02	50	42	24	26	-27	-16
R03	50	42	24	26	-26	-16
R04	41	42	25	27	-16	-15
R05	41	42	28	31	-13	-11
R06	41	42	27	29	-14	-13
R07	41	42	26	28	-15	-15
R08	41	42	28	31	-14	-12
R09	41	42	31	32	-10	-10
R10	47	39	18	20	-29	-19
R11	47	39	14	16	-33	-23
R12	58	46	9	12	-49	-34
R13	58	46	11	12	-48	-34
R14	58	46	10	12	-48	-34
R15	58	46	13	15	-45	-31
R16	58	46	13	14	-45	-32

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.

5.2 Noise Intrusion Assessment - Cumulative

Internal noise levels, at nearby sensitive receptors from all sources of potential noise associated with the proposed development (including HGV/LGV movements, unloading, parking and building services plant) have been assessed both with windows open, where a reduction from a partially open window of 15 dB has been used, and with windows closed where an assumption of single glazing with a sound reduction of 30 dB has been used. It is worth noting that previously agreed mitigation has been utilised within Section 5.0. If exceedances of criteria occur, only new mitigation required will be outlined within Section 6.0.

Results of the noise intrusion assessments for average daytime and night-time noise levels are presented within Tables 5.2 and 5.3 respectively, with daytime noise levels presented illustratively within Figure 5.8.

Table 5.3: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	36.8	21.8	6.8	35
R02	38.0	23.0	8.0	35
R03	40.5	25.5	10.5	35
R04	37.8	22.8	7.8	35
R05	38.6	23.6	8.6	35
R06	37.3	22.3	7.3	35
R07	37.0	22.0	7.0	35
R08	38.0	23.0	8.0	35
R09	29.9	14.9	0.0	35
R10	23.7	8.7	0.0	35
R11	22.7	7.7	0.0	35
R12	23.6	8.6	0.0	35
R13	24.6	9.6	0.0	35
R14	24.5	9.5	0.0	35
R15	25.2	10.2	0.0	35
R16	25.1	10.1	0.0	35

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

Table 5.4: Night-time Noise Intrusion Levels $L_{Aeq,15mins}$

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	40.4	25.4	10.4	30
R02	43.4	28.4	13.4	30
R03	45.2	30.2	15.2	30
R04	43.3	28.3	13.3	30
R05	44.4	29.4	14.4	30
R06	41.6	26.6	11.6	30
R07	41.7	26.7	11.7	30
R08	41.8	26.8	11.8	30
R09	32.7	17.7	2.7	30
R10	28.0	13.0	0.0	30
R11	26.4	11.4	0.0	30
R12	27.1	12.1	0.0	30
R13	27.4	12.4	0.0	30
R14	27.2	12.2	0.0	30
R15	29.1	14.1	0.0	30
R16	27.8	12.8	0.0	30

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

As demonstrated within Tables 5.3 and 5.4 above, predicted noise levels are within criteria at all sensitive receptors apart from R03 during the night-time where it exceeds BS 8233 windows open criteria by 0.2dB. As such, it falls within the Lowest Observed Adverse Effect Levels (LOAEL) and mitigation is outlined in Section 6.0 below.

Results of the noise intrusion assessment for maximum night-time noise levels are presented within Table 5.5.

Table 5.5: Night-time Noise Intrusion Levels L_{Amax}

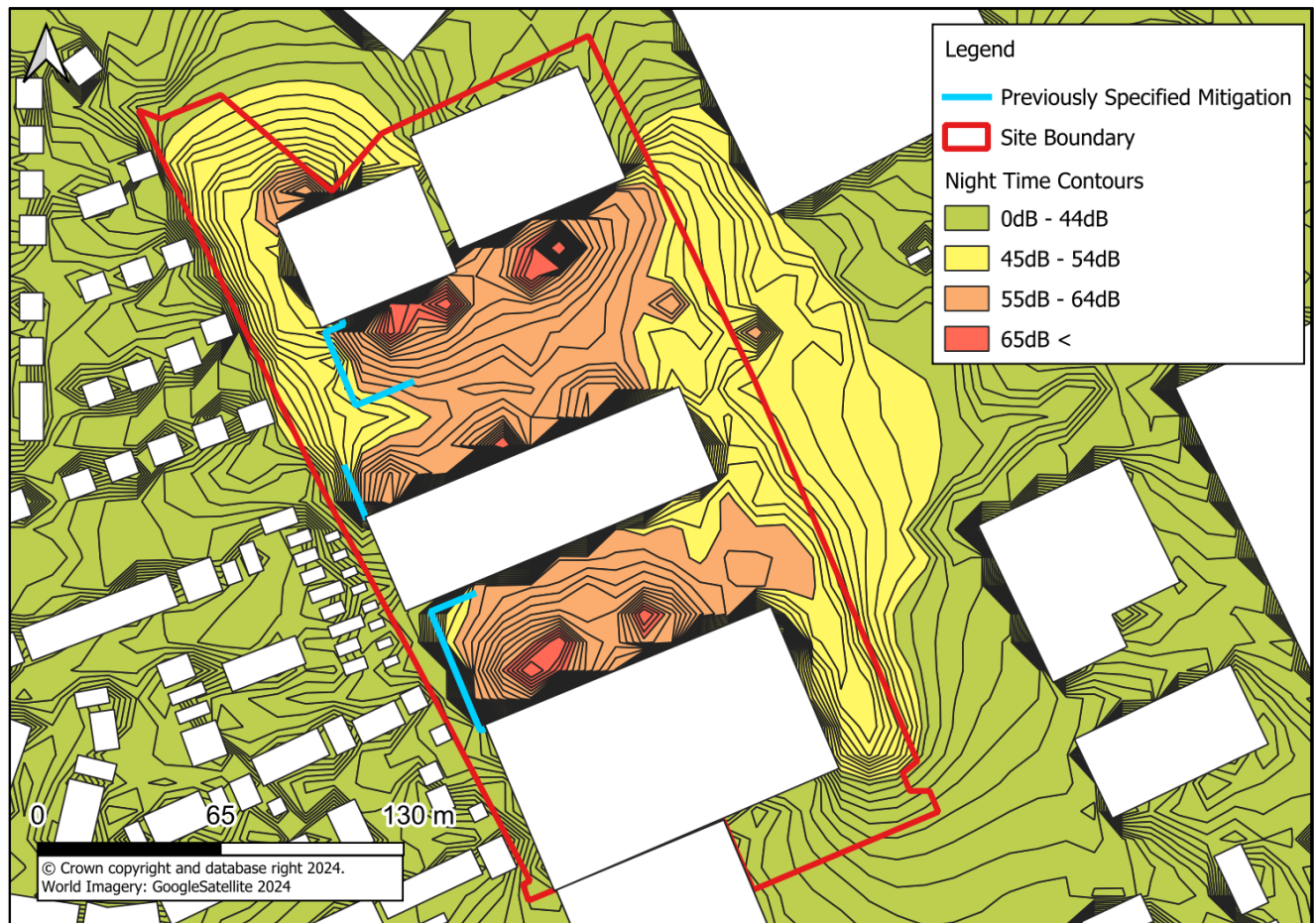
Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	55.9	40.9	25.9	45
R02	58.7	43.7	28.7	45
R03	56.4	41.4	26.4	45
R04	52.0	37.0	22.0	45
R05	55.8	40.8	25.8	45
R06	52.7	37.7	22.7	45
R07	54.9	39.9	24.9	45
R08	54.2	39.2	24.2	45
R09	41.1	26.1	11.1	45
R10	37.2	22.2	7.2	45
R11	34.3	19.3	4.3	45
R12	35.4	20.4	5.4	45
R13	35.5	20.5	5.5	45
R14	35.4	20.4	5.4	45
R15	37.3	22.3	7.3	45
R16	36.1	21.1	6.1	45

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

The L_{Amax} noise levels during the night-time fall within the BS 8233 windows open criteria and therefore fall within a No Observed Adverse Effect Level (NOAEL).

For indicative purposes, the night-time noise contour plot (inclusive of all potential noise sources) is presented in Figure 5.8.

Figure 5.8: Night-time Noise Contour Plot (Grid Height: 4.0m)



5.2.1 Change in Noise Level Assessment

This assessment has been undertaken to compare worst-case representative noise levels from the 'existing ambient noise levels' (L_{Aeq}) to predicted ambient noise levels inclusive of the proposed scheme at existing sensitive receptors. The differences between the 'existing' and the 'proposed' development scenarios, during the daytime and night-time are presented in Table 5.6.

Table 5.6: Change in Noise Level Assessment

Ref	Existing L_{Aeq} (Monitored)		Proposed L_{Aeq} (Modelled)		Combined L_{Aeq}		Contribution from Proposed Scheme dB	
	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time
R01	52.6	51.1	36.8	40.4	52.7	51.5	0.1	0.4
R02	52.6	51.1	38.0	43.4	52.7	51.8	0.1	0.7
R03	52.6	51.1	40.5	45.2	52.9	52.1	0.3	1.0
R04	48.2	46.5	37.8	43.3	48.6	48.2	0.4	1.7
R05	48.2	46.5	38.6	44.4	48.7	48.6	0.5	2.1
R06	48.2	46.5	37.3	41.6	48.5	47.7	0.3	1.2
R07	48.2	46.5	37.0	41.7	48.5	47.7	0.3	1.2
R08	48.2	46.5	38.0	41.8	48.6	47.8	0.4	1.3
R09	48.2	46.5	29.9	32.7	48.3	46.7	0.1	0.2
R10	50.4	56.3	23.7	28.0	50.4	56.3	0.0	0.0
R11	50.4	56.3	22.7	26.4	50.4	56.3	0.0	0.0
R12	66.7	60.3	23.6	27.1	66.7	60.3	0.0	0.0
R13	66.7	60.3	24.6	27.4	66.7	60.3	0.0	0.0
R14	66.7	60.3	24.5	27.2	66.7	60.3	0.0	0.0
R15	66.7	60.3	25.2	29.1	66.7	60.3	0.0	0.0
R16	66.7	60.3	25.1	27.8	66.7	60.3	0.0	0.0

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

As demonstrated in Table 5.6, the absolute noise level at the closest receptors is predicted to result in a contribution of 2.1 dB at the worst sensitive receptor during the night-time, indicative of a Lowest Observed Adverse Effect Level (LOAEL) short-term impact as defined by the IEMA 2014 Guidelines for Environmental Noise Impact Assessment. As such, the proposed development will have a negligible impact on surrounding residential locations and the change in ambient L_{Aeq} noise level is not considered to be significant.

6.0 Mitigation

6.1 Noise Mitigation

In order to reduce noise levels at the closest sensitive receptors from noise associated with the proposed development, the following mitigation has been included within the model as mitigation:

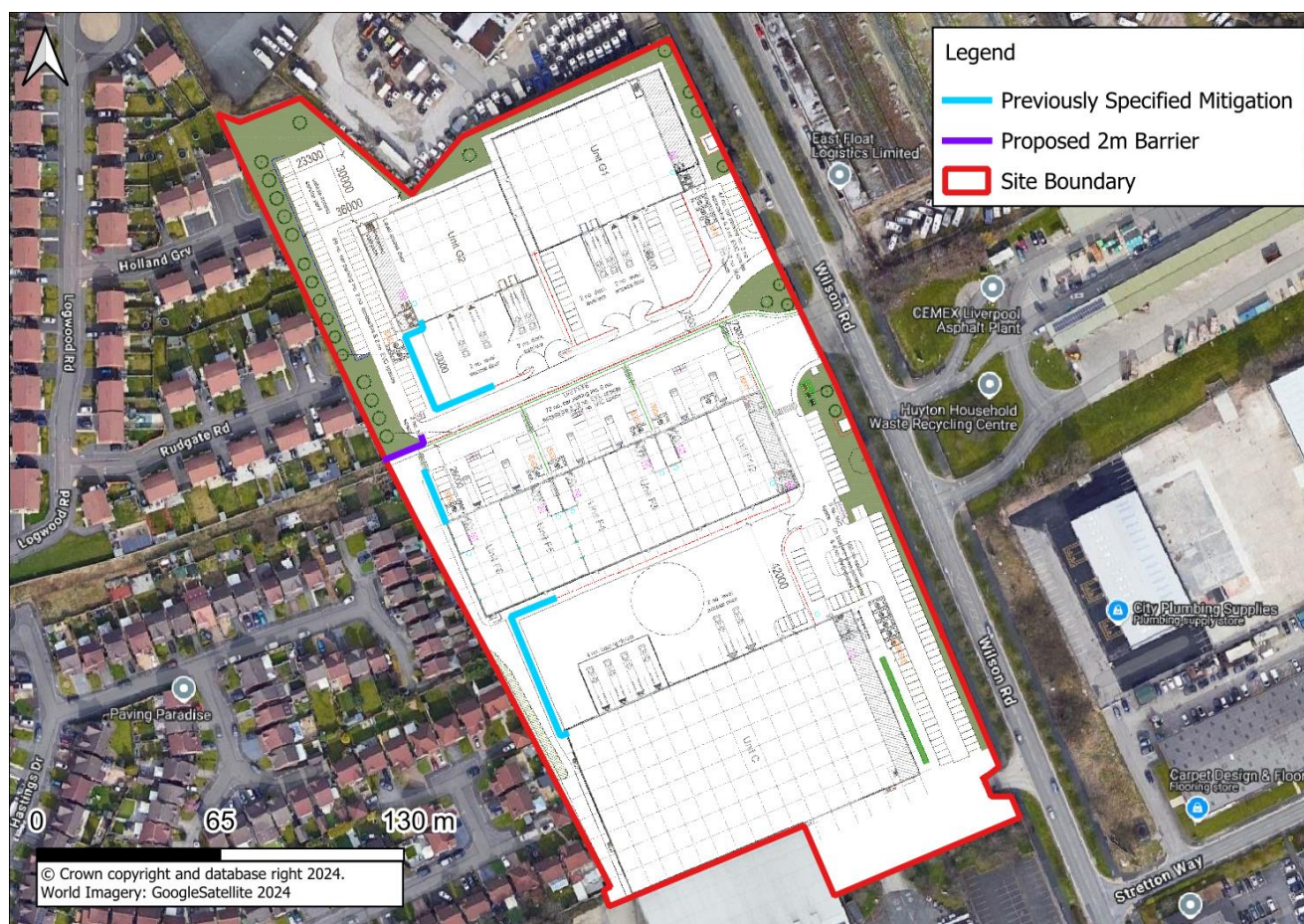
- 2.0m high, 20m long acoustic barrier near R03 at the western boundary

To qualify as an Acoustically screening obstacle, Acoustic Barriers should meet the following specifications presented within BS 9613-2:2024 'Acoustics. Attenuation of Sound During Propagation Outdoors - Engineering Method for the Prediction of Sound Pressure Levels Outdoors' as a minimum:

- The surface density should be at least 10kg/m^2
- The barrier should have a closed surface without large cracks or gaps
- The horizontal dimension of the barrier normal should be no less than 5.5m.

Additional to the above, it is recommended for the purposes of longevity that the barrier surface density should ideally be no less than 20kg/m^2 , and any timber sections should be constructed using either a lapped/feathered design or a twin-layered construction with offset joints between boards. It is recommended that a proprietary acoustic product is used to ensure required performance.

The location of the acoustic barrier is shown in Figure 6.1.

Figure 6.1: Proposed Mitigation Locations

6.2 Noise Intrusion Assessment – with Mitigation

The results of the Noise Intrusion assessment including the mitigation described above are presented in Tables 6.1 – 6.3.

Table 6.1: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$ – with Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	36.8	21.8	6.8	35
R02	38.0	23.0	8.0	35
R03	40.3	25.3	10.3	35
R04	37.8	22.8	7.8	35
R05	38.5	23.5	8.5	35
R06	37.2	22.2	7.2	35
R07	37.0	22.0	7.0	35
R08	38.0	23.0	8.0	35
R09	29.9	14.9	0.0	35
R10	23.7	8.7	0.0	35
R11	22.7	7.7	0.0	35
R12	23.6	8.6	0.0	35
R13	24.6	9.6	0.0	35
R14	24.5	9.5	0.0	35
R15	25.1	10.1	0.0	35
R16	25.1	10.1	0.0	35

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

Table 6.2: Night-time Noise Intrusion Levels $L_{Aeq,15 mins}$ – with Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	40.4	25.4	10.4	30
R02	43.4	28.4	13.4	30
R03	44.8	29.8	14.8	30
R04	43.3	28.3	13.3	30
R05	44.4	29.4	14.4	30
R06	41.6	26.6	11.6	30
R07	41.7	26.7	11.7	30
R08	41.7	26.7	11.7	30
R09	32.7	17.7	2.7	30
R10	28.0	13.0	0.0	30
R11	26.4	11.4	0.0	30
R12	27.1	12.1	0.0	30
R13	27.4	12.4	0.0	30
R14	27.2	12.2	0.0	30
R15	29.1	14.1	0.0	30
R16	27.8	12.8	0.0	30

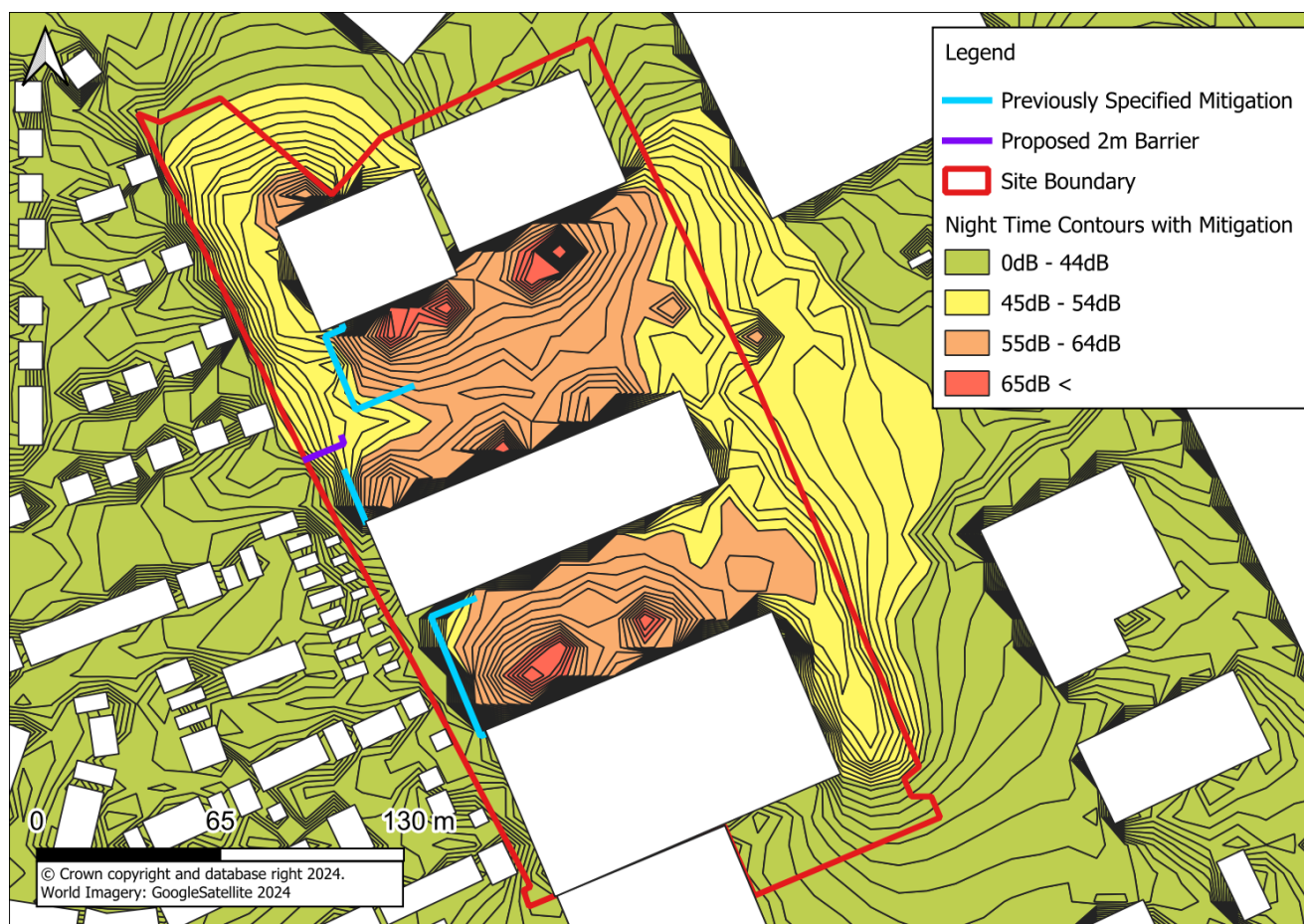
All values are sound pressure levels in dBA re: 2×10^{-5} Pa.

Table 6.3: Night-time Noise Intrusion Levels L_{Amax} – with Mitigation

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	55.9	40.9	25.9	45
R02	58.7	43.7	28.7	45
R03	56.4	41.4	26.4	45
R04	52.0	37.0	22.0	45
R05	55.8	40.8	25.8	45
R06	52.7	37.7	22.7	45
R07	54.9	39.9	24.9	45
R08	54.2	39.2	24.2	45
R09	41.1	26.1	11.1	45
R10	37.2	22.2	7.2	45
R11	34.3	19.3	4.3	45
R12	35.4	20.4	5.4	45
R13	35.5	20.5	5.5	45
R14	35.4	20.4	5.4	45
R15	37.3	22.3	7.3	45
R16	36.1	21.1	6.1	45
All values are sound pressure levels in dBA re: 2×10^{-5} Pa.				

The assessment shown in the tables above indicates that internal L_{Aeq} and L_{Amax} noise levels from all potential noise sources, during the daytime and night-time are predicted to be below the BS 8233 noise intrusion criteria at all sensitive receptors.

For indicative purposes, the night-time noise contour plot (inclusive of all potential noise sources) is presented in Figure 6.2.

Figure 6.2: Night-time Contour Plot – with Mitigation

6.3 Cumulative Noise Assessment – with Mitigation

This assessment compares the noise from the existing ambient noise climate (based on existing measured L_{Aeq}), with the predicted noise level from the proposed scenario from all noise sources associated with the commercial units including mitigation. The difference between the 'existing' ambient noise level and the predicted 'worst-case proposed' noise level is presented in the tables below.

Table 6.4: Cumulative Noise Assessment – with Mitigation

Ref	Existing L _{Aeq} (Monitored)		Proposed L _{Aeq} (Modelled)		Combined L _{Aeq}		Contribution from Proposed Scheme dB	
	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time	Daytime	Night-Time
R01	52.6	51.1	36.8	40.4	52.7	51.5	0.1	0.4
R02	52.6	51.1	38	43.4	52.7	51.8	0.1	0.7
R03	52.6	51.1	40.3	44.8	52.8	52.0	0.2	0.9
R04	48.2	46.5	37.8	43.3	48.6	48.2	0.4	1.7
R05	48.2	46.5	38.5	44.4	48.6	48.6	0.4	2.1
R06	48.2	46.5	37.2	41.6	48.5	47.7	0.3	1.2
R07	48.2	46.5	37	41.7	48.5	47.7	0.3	1.2
R08	48.2	46.5	38	41.7	48.6	47.7	0.4	1.2
R09	48.2	46.5	29.9	32.7	48.3	46.7	0.1	0.2
R10	50.4	56.3	23.7	28	50.4	56.3	0.0	0.0
R11	50.4	56.3	22.7	26.4	50.4	56.3	0.0	0.0
R12	66.7	60.3	23.6	27.1	66.7	60.3	0.0	0.0
R13	66.7	60.3	24.6	27.4	66.7	60.3	0.0	0.0
R14	66.7	60.3	24.5	27.2	66.7	60.3	0.0	0.0
R15	66.7	60.3	25.1	29.1	66.7	60.3	0.0	0.0
R16	66.7	60.3	25.1	27.8	66.7	60.3	0.0	0.0

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

The results presented in the table above show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution from the commercial units including mitigation. When the differences between the ‘existing’ and ‘proposed’ scenario are compared with the noise change criteria given in Table 2.1 of this report, the contribution from the proposed trading hours falls within the No Observed Adverse Effect Level (NOAEL). Therefore, the proposed scenario has ‘negligible’ impact on surrounding residential locations and the change in ambient L_{Aeq} noise level is not considered to be significant.

7.0 Conclusion

A noise assessment has been undertaken in support of a planning application for the development at Sovereign Business Park, Huyton, Liverpool.

Maximum permissible noise limits have been set for proposed building services plant which are predicted to result in a noise rating level which is at least 10 dB below the existing background noise level during both the daytime and night-time periods at the closest sensitive receptor locations. Accordingly, the proposed plant is expected to have a low impact at the closest sensitive receptors.

Including the mitigation described in Section 6.0, cumulative operational noise levels during the daytime and night-time periods are predicted to be below the guideline noise intrusion criteria at nearby properties assuming both a windows-open and a windows-closed scenario.

A change in noise level assessment has been undertaken which shows that noise levels are not expected to change significantly, which falls within the No Observed Adverse Effect Level.

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 and wider development 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 below 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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