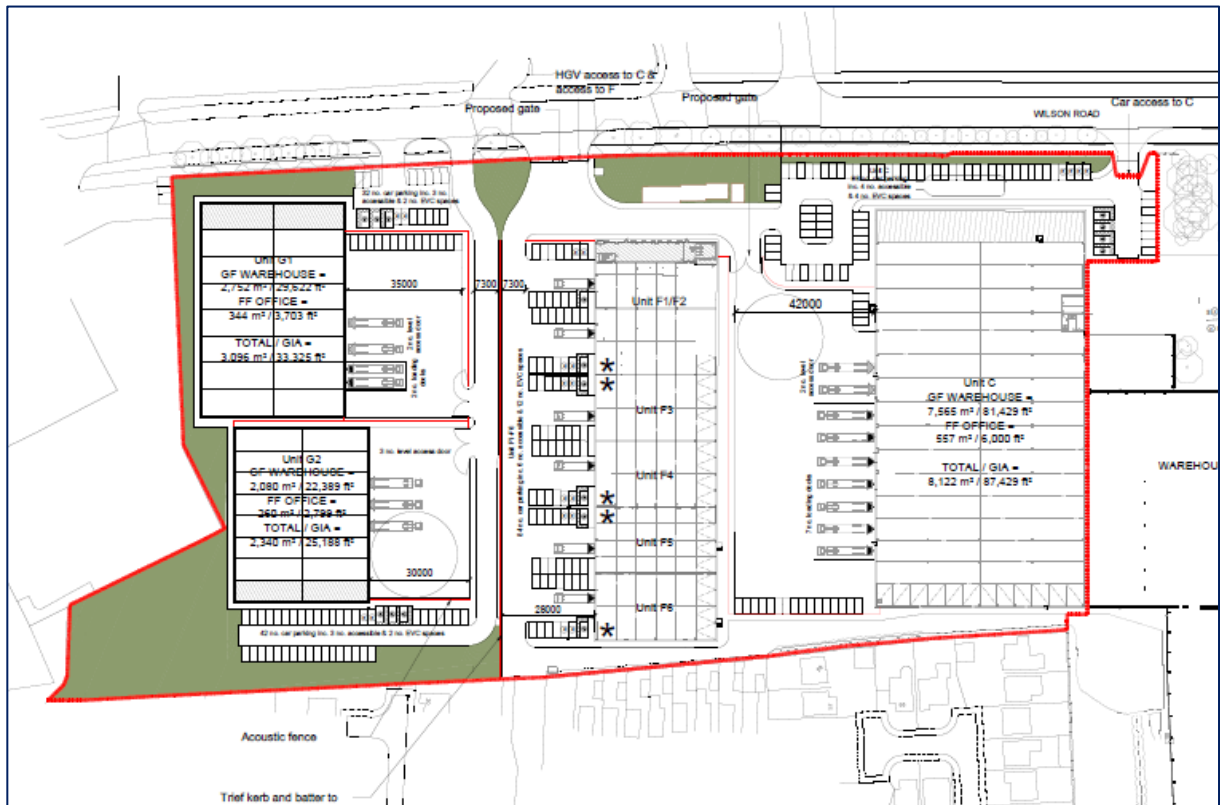


Network Space Ltd

Sovereign Business Park, Huyton, Liverpool



Noise Assessment

February 2022

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1.0 INTRODUCTION

1.1 Purpose of this Report

This report presents the findings of a noise assessment undertaken to support a planning application for the development at Sovereign Business Park, Huyton, Liverpool.

This report considers the potential noise impact of the following noise sources:

- New Building Services Plant (BSP)
- Customer Car Parking
- Goods Deliveries

The noise levels from the proposed development have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 methodologies and calculations.

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 July 2021. With regard to noise and planning, the NPPF contains the following statement at paragraph 174:

“174 Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...”

“185. 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...”

“187. 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.

188. 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.”

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 is, 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 as follows:

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 – Guidance on Sound Insulation and Noise Reduction for Buildings’ (2014). 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 Acoustic Consultants' Qualifications and Professional Memberships

The lead project Acoustic Consultant is Neil Fletcher. The report has been checked by Ashley Shepherd and verified by Nigel Mann. Relevant qualifications, membership and experience are summarised below.

Table 1.2 Acoustic Consultants' Qualifications & Experience

Name	Education	Institute of Acoustics Post Graduate Diploma in Acoustic and Noise Control (Pass Date)	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)
Neil Fletcher	BSc 1996 MSc 2005	-	Mar 2020	Mar 2020	-
Ashley Shepherd	BSc 2013	-	Feb 2014	Feb 2014	Nov 2017
Nigel Mann	BSc 1997 MSc 1999	Nov 2001	Nov 1998	Nov 2001	July 2005

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'

BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014)

Table 2.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Effect Level	Noise Intrusion Assessment	Noise levels are below: <i>Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms: 35 dB $L_{Aeq,16hours}$</i>	No Action Required Within BS 8233 Criteria
	Background Comparison	BS4142 Score of zero or lower	No Action Required Score of zero or lower is an indication of the noise source having a low impact
	Assessment of Overall Change in Noise Levels	Up to 3.0 dB Change or a Reduction in Noise Levels	No Action Required – Change in noise levels unlikely to be perceptible
Lowest Observed Adverse Effect Level (LOAEL)	Noise Intrusion Assessment	Noise levels are at: <i>Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms: 35 dB $L_{Aeq,16hours}$</i>	No Action Required Within BS 8233 Criteria
	Background Comparison	BS4142 Score of plus 5	Difference of +5 dB likely to be an indication of an adverse effect Mitigate to achieve: BS4142 Score of plus 5 or lower
	Assessment of Overall Change in Noise Levels	Up to 4.9 dB Increase in Noise Levels	No Action Required Slight Impact at Receptor of Some Sensitivity
Significant Observed Adverse Effect Level (SOAEL)	Noise Intrusion Assessment	Noise levels are exceeded: <i>Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms: 35 dB $L_{Aeq,16hours}$</i>	Mitigate and reduce to a achieve: <i>Bedrooms: 30 dB $L_{Aeq,8hours}$</i> <i>Living Rooms: 35 dB $L_{Aeq,16hours}$</i>
	Background Comparison	BS4142 Score greater than +5	Difference of +10 dB likely to be an indication of a significant adverse effect Mitigate to achieve: BS4142 Score of +5 or lower

Effect Level	Assessment	Noise Level Criteria	Action / Justification
	Assessment of Overall Change in Noise Levels	3.0 to 5.0 dB Change in Noise Levels at receptor of high sensitivity or Greater than 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 3.0 dB (high sensitivity) or Increase in Noise Levels of less than 5.0 dB (receptor of some sensitivity)
Unacceptable Observed Adverse Effect Level (UOAEL)	Noise Intrusion Assessment	Noise levels with mitigation exceed: <i>Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms: 35 dB $L_{Aeq,16hours}$</i>	Prevent
	Background Comparison	BS4142 Score of +10 or higher	Avoid, depending on context.
	Assessment of Overall Change in Noise Levels	Greater than 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 5.0 dB

3.0 ASSESSMENT METHODOLOGY

3.1 Noise Modelling Methodology

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

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	DEFRA	LiDAR topographical survey data – 1m DTM
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties, and 4 m for Bungalows.
Barrier heights	Tetra Tech Observations	1.8m existing garden fences. 3.0m fence on the western boundary of the site.
Receptor positions	Tetra Tech	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor facades. 1.5 m height for model grid.
Proposed Plans	AEW Architects	Drawing Title: Proposed Masterplan Drawing Number: 12211-AEW-XX-XX-DR-A-0503 Dated: 20/01/22

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst-case.

3.2 Model Input Data

HGV/LGV Vehicle Movements

It is understood that there will be approximately 233 two-way daily vehicle trips associated with the proposed development. A summary of the assumed maximum hourly HGV/LGV movements is shown in the table below.

Table 3.2 Worst-case HGV/LGV movements

Worst-Case (Peak Inbound Day)	HGV Movements		LGV Movements	
	Daytime (07:00 – 23:00) Worst-case Hour	Night-time (23:00 – 07:00) Worst-case hour	Daytime (07:00 – 23:00) Worst-case Hour	Night-time (23:00 – 07:00) Worst-case hour
Total in	7	7	3	3
Total out	7	0	3	0
Total (in + out)	14	7	6	3

Delivery Noise Data

Noise of a delivery event has been known to vary from site to site by as much as 22 dB L_{Aeq} at 5m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same location have been recorded to vary by as much as 14 dB.

As such, the following worst-case calculations have been based on measurements of HGVs delivering goods. All measurements were undertaken in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to the unloading bay, manoeuvring into position and then pulling away once unloading/loading is complete, together with other sources such as trolleys and reversing beepers. Events are modelled as point sources.

HGV Unloading Event Noise Data

The following calculations have been used to represent this as a point source in the model.

	2 minutes at L_p 63.0 dB at 3 m distance	(vehicle arriving and manoeuvring)
	30 minutes at L_p 73.0 dB at 3 m distance	(vehicle unloading)
	1 minute at L_p 63.0 dB at 3 m distance	(vehicle manoeuvring and leaving)
Daytime $L_{Aeq}(1\text{hour})$	$= 10\log(1/60)(2\text{mins} \times 10^{0.1 \times 63.0\text{dB}} + 30\text{mins} \times 10^{0.1 \times 73.0\text{dB}} + 1\text{min} \times 10^{0.1 \times 63.0\text{dB}})$ $= 70.0 \text{ dB at 3 m distance}$	
	15 minutes at L_p 73.0 dB at 3 m distance	(vehicle arriving and manoeuvring)
Night-time $L_{Aeq}(15\text{mins})$	$= 10\log(1/15)(15\text{mins} \times 10^{0.1 \times 73.0\text{dB}})$ $= 73.0 \text{ dB at 3 m distance}$	
L_{Amax}	$= 89.4 \text{ dB at 3m distance}$	

HGV Movement Noise Data

The following calculations have been used to represent HGVs arriving/existing along the access road. During a worst-case daytime hour period 14 HGVs are predicted to arrive/leave along the access road during the daytime and 7 HGVs in the same period during the night-time. Worst-case noise-levels have been calculated using this data to represent a worst-case in any 1-hour daytime (07:00 – 23:00) period and 15-minute period during the night-time (23:00 – 07:00). This has included as a line source in the model.

	14 x 10 seconds at L_p 63.0 dB at 3m distance (Single HGV vehicle arriving and leaving)	
Daytime $L_{Aeq} (1\text{hour})$	$= 10\log(1/60)(140 \text{ seconds} \times 10^{0.1 \times 63.0\text{dB}})$ $= 48.9 \text{ dB at 3 m distance}$	
	7 x 10 seconds at L_p 63.0 dB at 3m distance (Single HGV vehicle arriving and leaving)	
Night-time $L_{Aeq} (15\text{mins})$	$= 10\log(1/15)(70 \text{ seconds} \times 10^{0.1 \times 63.0\text{dB}})$ $= 51.9 \text{ dB at 3 m distance}$	

LGV Unloading Event Noise Data

The following calculations have been used to represent this as a point source in the model.

2 minutes at L_p 72.0 dB at 3 m distance	(vehicle arriving and manoeuvring)
38 minutes at L_p 67.0 dB at 3 m distance	(vehicle unloading)
1 minute at L_p 69.0 dB at 3 m distance	(vehicle manoeuvring and leaving)

$$\text{Daytime } L_{Aeq}(1\text{hour}) = 10\log(1/60)(2\text{mins} \times 10^{0.1 \times 72.0\text{dB}} + 38\text{mins} \times 10^{0.1 \times 67.0\text{dB}} + 1\text{min} \times 10^{0.1 \times 69.0\text{dB}})$$

$$= 65.8 \text{ dB at 3 m distance}$$

2 minutes at L_p 72.0 dB at 3 m distance	(vehicle arriving and manoeuvring)
13 minutes at L_p 67.0 dB at 3 m distance	(vehicle unloading)

$$\text{Night-time } L_{Aeq}(15\text{mins}) = 10\log(1/15)(2\text{mins} \times 10^{0.1 \times 72.0\text{dB}} + 13\text{mins} \times 10^{0.1 \times 67.0\text{dB}})$$

$$= 68.1 \text{ dB at 3 m distance}$$

$$L_{Amax} = 85.4 \text{ dB at 3m distance}$$

LGV Movement Noise Data

The following calculations have been used to represent LGVs arriving/existing along the access road. During a worst-case daytime hour period 6 HGVs are predicted to arrive/leave along the access road during the daytime and 3 HGVs in the same period during the night-time. Worst-case noise-levels have been calculated using this data to represent a worst-case in any 1-hour daytime (07:00 – 23:00) period and 15-minute period during the night-time (23:00 – 07:00). This has included as a line source in the model.

$$6 \times 10 \text{ seconds at } L_p 69.0 \text{ dB at 3m distance (Single HGV vehicle arriving and leaving)}$$

$$\text{Daytime } L_{Aeq} (1\text{hour}) = 10\log(1/60)(60 \text{ seconds} \times 10^{0.1 \times 69.0\text{dB}})$$

$$= 51.2 \text{ dB at 3 m distance}$$

$$3 \times 10 \text{ seconds at } L_p 69.0 \text{ dB at 3m distance (Single HGV vehicle arriving and leaving)}$$

$$\text{Night-time } L_{Aeq} (15\text{mins}) = 10\log(1/15)(30 \text{ seconds} \times 10^{0.1 \times 69.0\text{dB}})$$

$$= 54.2 \text{ dB at 3 m distance}$$

Car Park Noise Data

Noise levels within the proposed car parks have been based on measurements of a similar commercial premises. Average noise levels have been represented by an area source in the model whilst a maximum instantaneous noise level of a car-door slam have been represented by point sources.

$$L_{Aeq,1\text{hour}} = 54.0 \text{ dB @ 1.5m height}$$

Building Services Plant Noise Data

Although specific manufacturer details are unavailable, point sources have been used in the model to represent the worst-case plant locations associated with the scheme. The maximum sound pressure

levels of the point sources at 3 and 10 metres were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the BS 4142 assessment criteria. Noise emission limits have been specified to ensure that plant noise rating levels are at least 10 dB below the existing night-time background noise level at all surrounding receptors.

Figure 3.1 CadnaA Noise Model



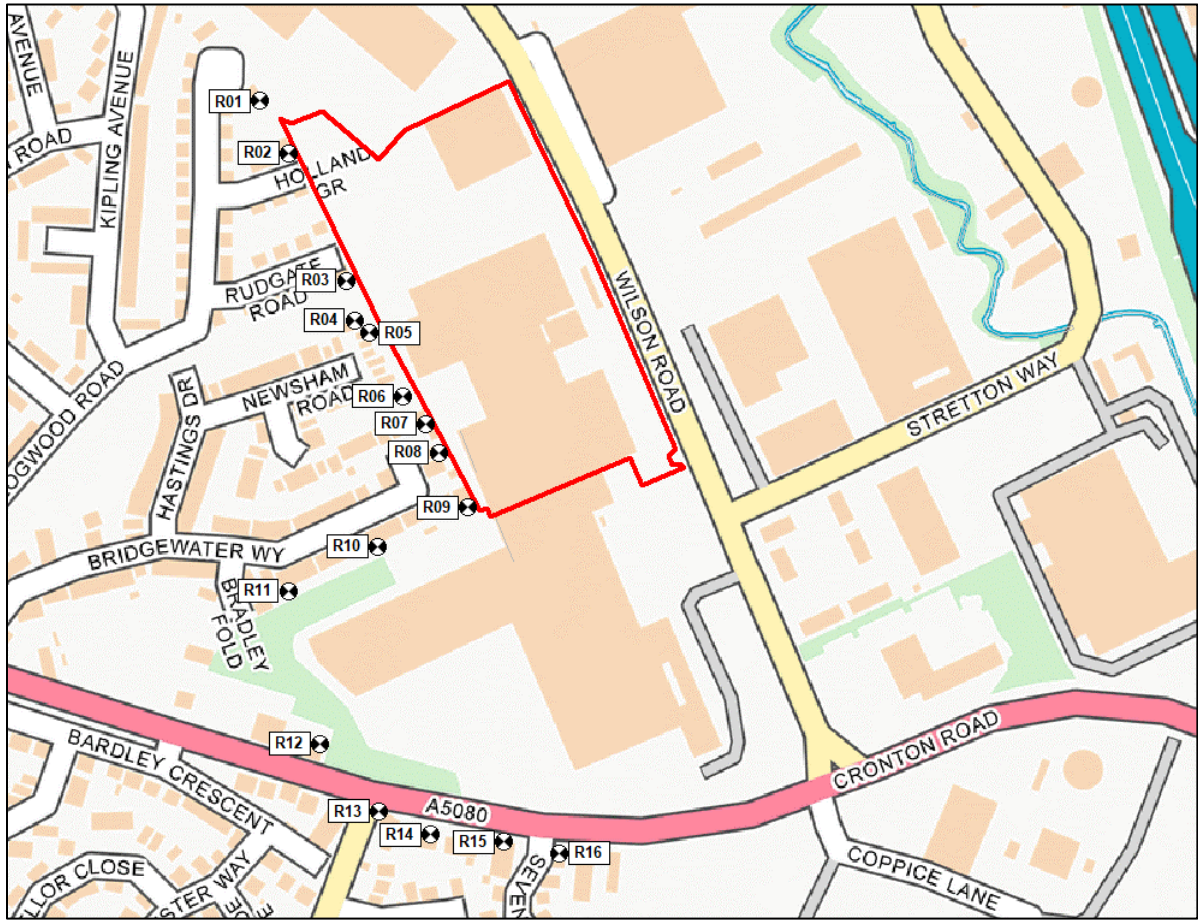
3.3 Sensitive Receptors

Table 3.3 below identifies existing receptor locations that have been assessed to represent worst-case residential receptors with respect to direct noise from the site. The locations of the receptors are shown in Figure 3.2 below.

Table 3.3 Existing Receptor Locations

Ref.	Description	Use Classification	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 Crompton 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 3.2 Sensitive Receptor Locations



Not to scale
OS Licence No. AL553611

4.0 NOISE SURVEY

4.1 Noise Survey Methodology

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

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.

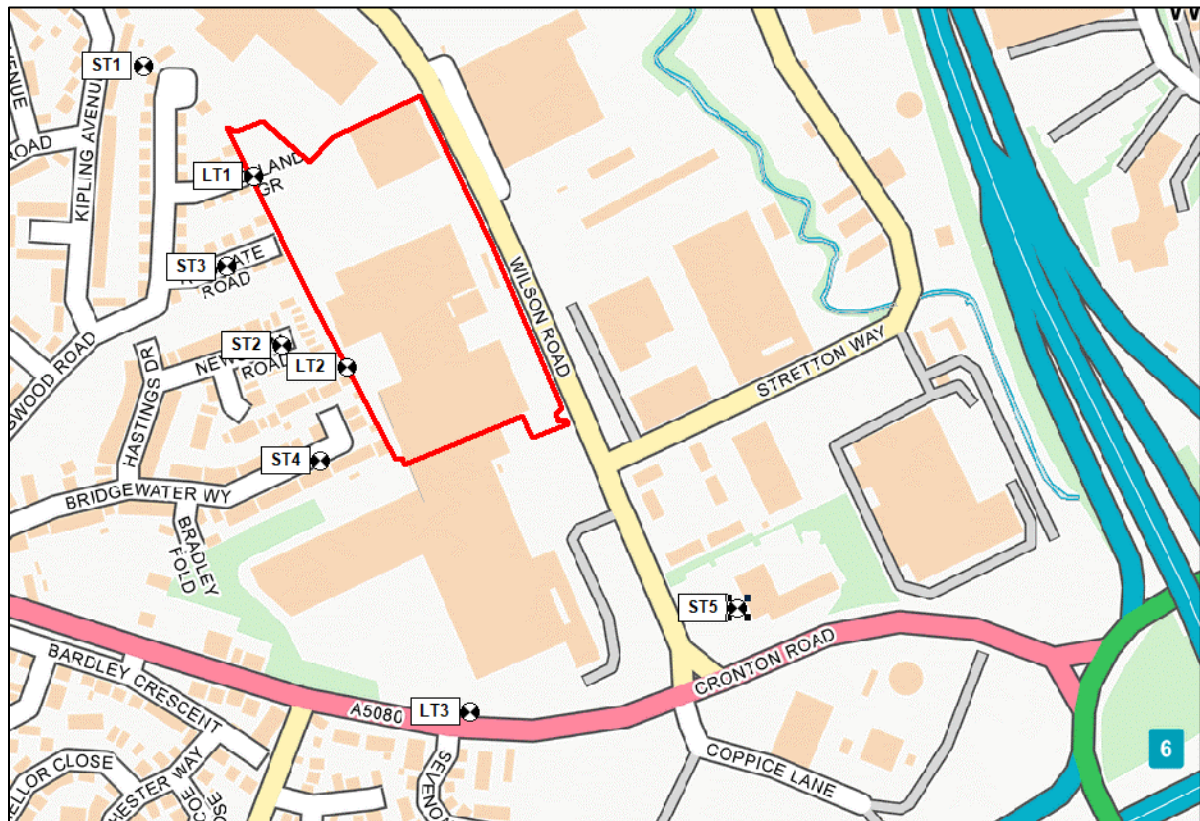
A baseline monitoring survey was undertaken at eleven locations (as specified in the following table and shown in Figure 4.1) from Friday 28th May 2021 to Wednesday 2nd June 2021. Attended short term measurements were undertaken at five locations during day, evening and night-time periods with three 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



Not to scale
OS Licence No. AL553611

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

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
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

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)
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

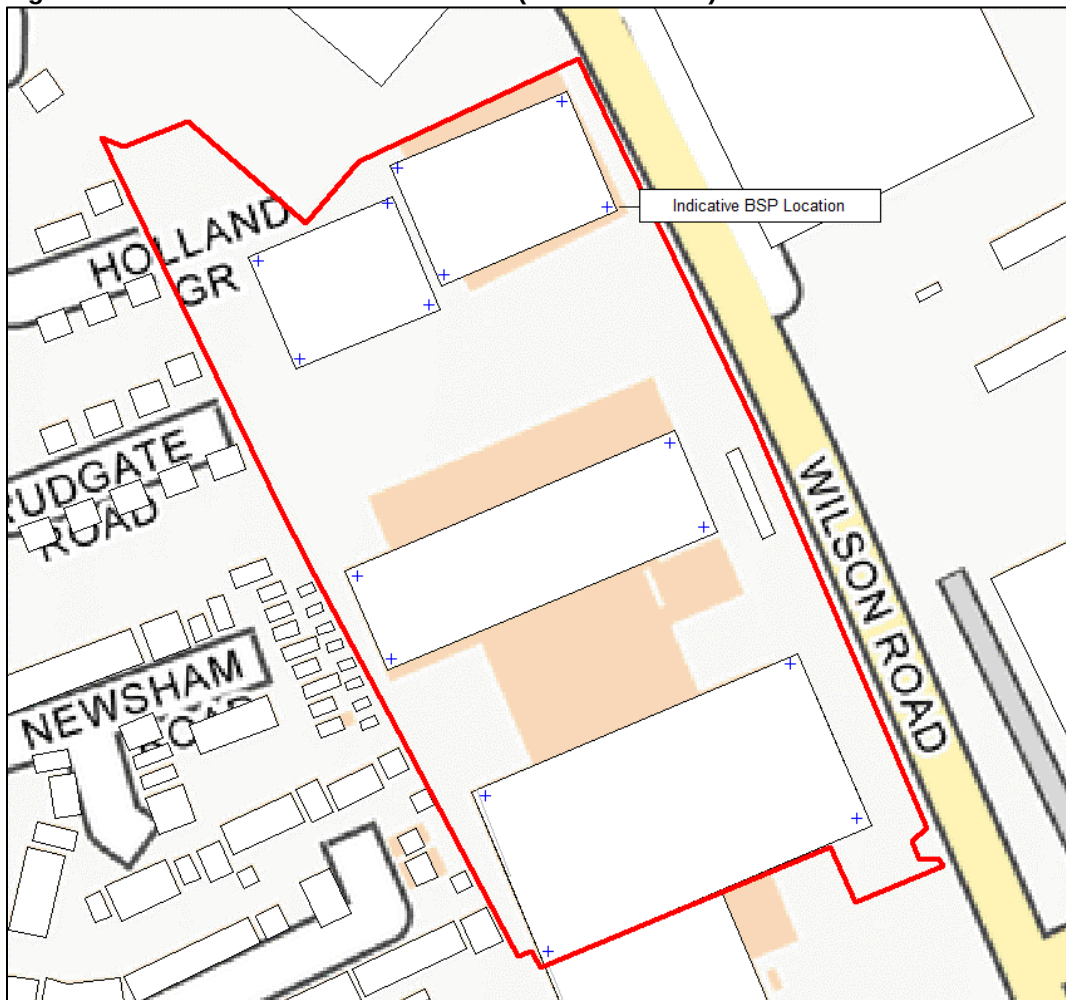
All values are sound pressure levels in dB re: 2×10^{-5} Pa

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 hemispherical radiation) at the point source. When the sound pressure levels are set as shown in Table 5.1 (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 5.2. 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 Indicative Plant Location (1m above roof)



Not to scale
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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 OR 37.5 dB(A) at 10 m	49.0 dB(A) at 3 m OR 38.5 dB(A) at 10 m

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

*Different plant configurations could apply depending on a number of variables, including operating periods and location of plant, which would be established during the detailed M&E design

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 below.

Figure 5.2 Existing Daytime Background Noise Level – Statistical Analysis LT1

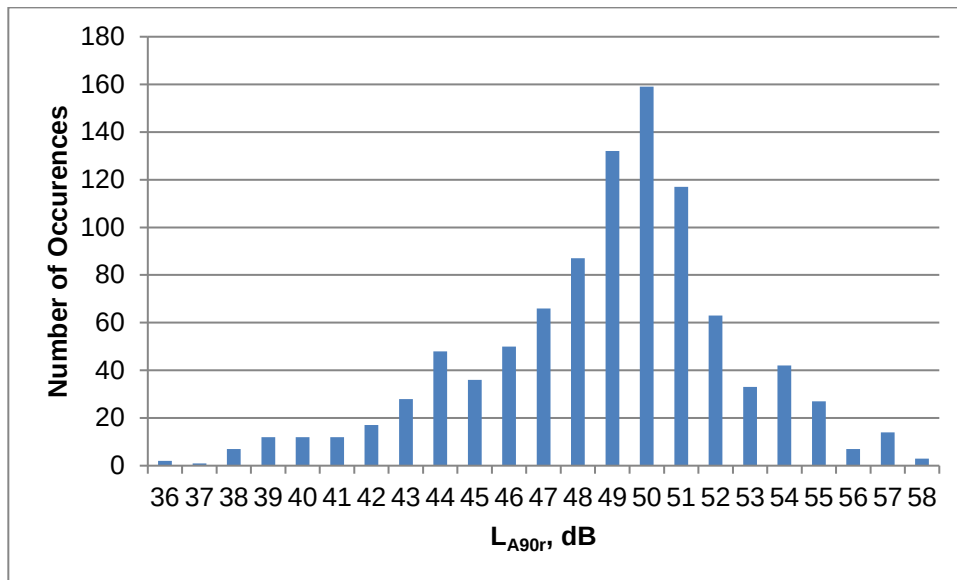


Figure 5.3 Existing Night-time Background Noise Level – Statistical Analysis LT1

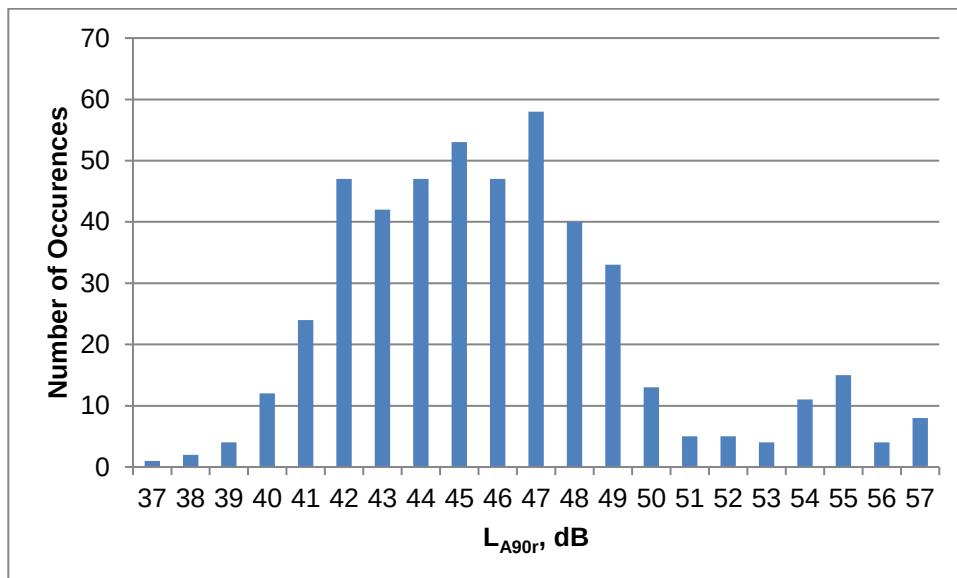


Figure 5.4 Existing Daytime Background Noise Level – Statistical Analysis LT2

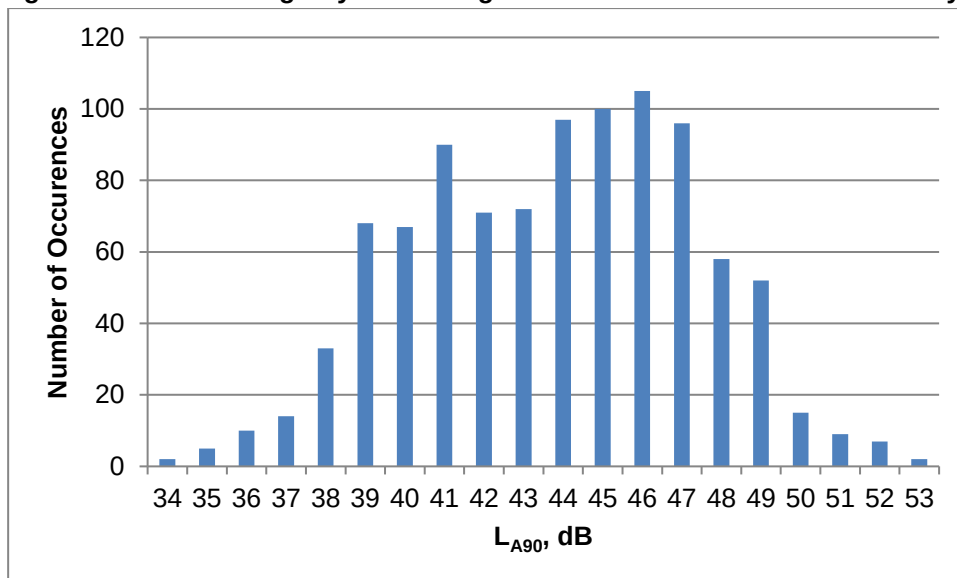


Figure 5.5 Existing Night-time Background Noise Level – Statistical Analysis LT2

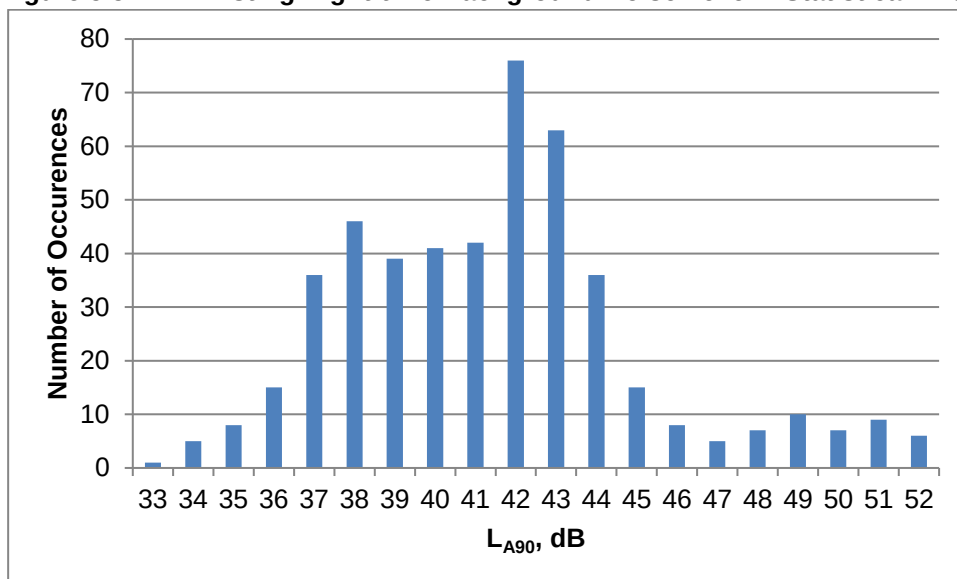


Figure 5.6 Existing Daytime Background Noise Level – Statistical Analysis LT3

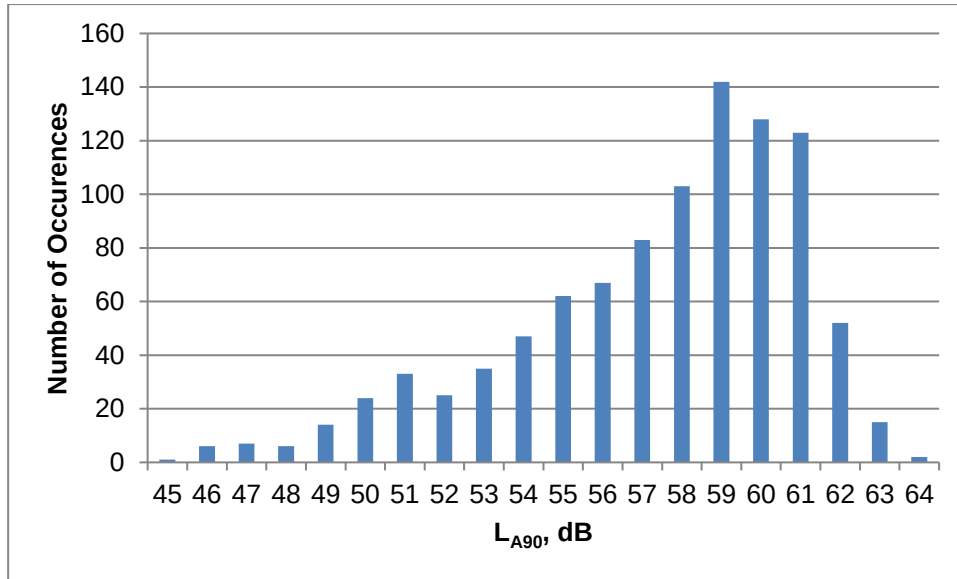


Figure 5.7 Existing Night-time Background Noise Level – Statistical Analysis LT3

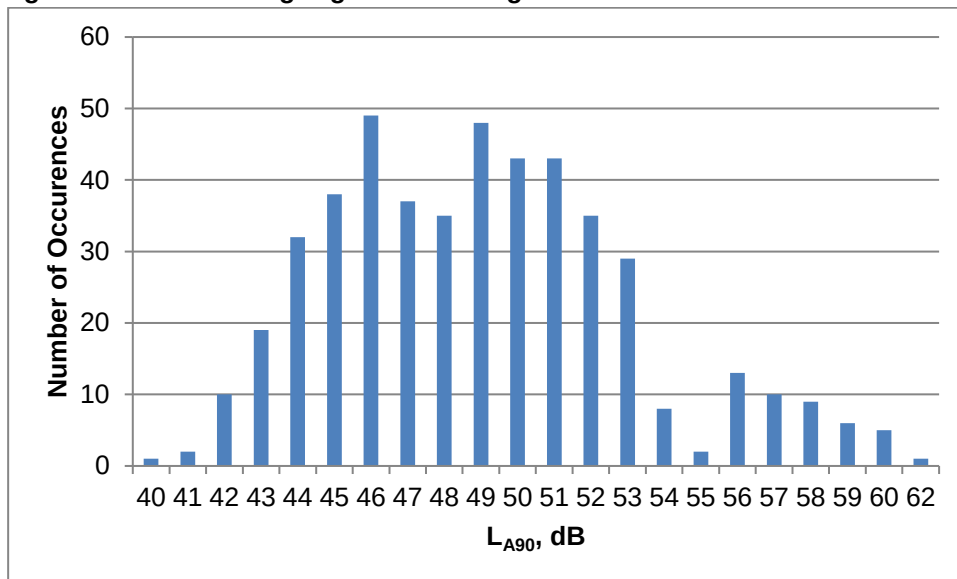


Table 5.2 BS 4142 Proposed BSP Assessment

Location	Existing Measured Background L _{A90}		Rating level from plant (L _{A,Tr})		BS 4142 Score		Monitoring Location Used
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	
R01	50	42	21	23	-29	-19	LT1
R02	50	42	24	26	-27	-16	LT1
R03	50	42	24	26	-26	-16	LT1
R04	41	42	25	27	-16	-15	LT2
R05	41	42	28	31	-13	-11	LT2
R06	41	42	27	29	-14	-13	LT2
R07	41	42	26	28	-15	-15	LT2
R08	41	42	28	31	-14	-12	LT2

Location	Existing Measured Background L_{A90}		Rating level from plant ($L_{A,Tr}$)		BS 4142 Score		Monitoring Location Used
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	
R09	41	42	31	32	-10	-10	LT2
R10	47	39	18	20	-29	-19	ST4
R11	47	39	14	16	-33	-23	ST4
R12	58	46	9	12	-49	-34	LT3
R13	58	46	11	12	-48	-34	LT3
R14	58	46	10	12	-48	-34	LT3
R15	58	46	13	15	-45	-31	LT3
R16	58	46	13	14	-45	-32	LT3

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.

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

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	33.4	18.4	3.4	35
R02	33.1	18.1	3.1	35
R03	41.1	26.1	11.1	35
R04	39.7	24.7	9.7	35
R05	41.1	26.1	11.1	35
R06	39.9	24.9	9.9	35
R07	41.6	26.6	11.6	35
R08	41.2	26.2	11.2	35
R09	30.6	15.6	0.6	35
R10	23.7	8.7	0.0	35
R11	21.6	6.6	0.0	35
R12	23.6	8.6	0.0	35
R13	24.4	9.4	0.0	35
R14	24.3	9.3	0.0	35
R15	26.9	11.9	0.0	35
R16	26.7	11.7	0.0	35

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

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

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	34.7	19.7	4.7	30
R02	37.6	22.6	7.6	30
R03	47.3	32.3	17.3	30

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R04	45.0	30.0	15.0	30
R05	46.2	31.2	16.2	30
R06	47.0	32.0	17.0	30
R07	48.3	33.3	18.3	30
R08	48.0	33.0	18.0	30
R09	33.0	18.0	3.0	30
R10	27.5	12.5	0.0	30
R11	25.4	10.4	0.0	30
R12	27.1	12.1	0.0	30
R13	27.3	12.3	0.0	30
R14	27.0	12.0	0.0	30
R15	30.6	15.6	0.6	30
R16	29.2	14.2	0.0	30

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

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

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	44.2	29.2	14.2	45
R02	47.1	32.1	17.1	45
R03	59.5	44.5	29.5	45
R04	57.5	42.5	27.5	45
R05	58.2	43.2	28.2	45
R06	58.6	43.6	28.6	45
R07	60.7	45.7	30.7	45
R08	60.0	45.0	30.0	45
R09	40.7	25.7	10.7	45
R10	37.0	22.0	7.0	45
R11	34.4	19.4	4.4	45
R12	35.9	20.9	5.9	45
R13	35.3	20.3	5.3	45
R14	35.0	20.0	5.0	45
R15	38.7	23.7	8.7	45
R16	37.2	22.2	7.2	45

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

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

In order to achieve the criteria specified in BS 8233:2014, mitigation measures are outlined in Section 6.0 below.

For indicative purposes, the daytime noise contour plot (inclusive of all potential noise sources) is presented in Figure 5.2.

Figure 5.2 Noise Contour Plot Daytime ($L_{Aeq,1hour}$)



Not to scale
OS Licence No. AL553611
Contour Plot at 1.5m height

5.3 Cumulative Noise Assessment – Change in Noise Levels

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. The difference between the 'existing' ambient noise level and the predicted 'worst-case proposed' noise level is presented in the tables below.

Table 5.6 Difference between Baseline and Proposed Scenarios (Daytime)

Location	Measured Baseline $L_{Aeq,15mins}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Commercial Units L_{Aeq} 16 hour
R01	52.6	52.7	0.1
R02	52.6	52.6	0.0
R03	52.6	52.9	0.3
R04	48.2	48.8	0.6
R05	48.2	49.0	0.8
R06	48.2	48.8	0.6
R07	48.2	49.1	0.9
R08	48.2	49.0	0.8
R09	48.2	48.3	0.1
R10	50.4	50.4	0.0
R11	50.4	50.4	0.0
R12	66.7	66.7	0.0
R13	66.7	66.7	0.0
R14	66.7	66.7	0.0
R15	66.7	66.7	0.0
R16	66.7	66.7	0.0

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

Table 5.7 Difference between Baseline and Proposed Scenarios (Night-time)

Location	Measured Baseline $L_{Aeq,15mins}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Commercial Units L_{Aeq} 16 hour
R01	51.1	51.2	0.1
R02	51.1	51.3	0.2
R03	51.1	52.6	1.5
R04	46.5	48.8	2.3
R05	46.5	49.4	2.9
R06	46.5	49.8	3.3
R07	46.5	50.5	4.0
R08	46.5	50.3	3.8
R09	46.5	46.7	0.2
R10	56.3	56.3	0.0
R11	56.3	56.3	0.0
R12	60.3	60.3	0.0
R13	60.3	60.3	0.0
R14	60.3	60.3	0.0
R15	60.3	60.3	0.0
R16	60.3	60.3	0.0

All values are sound pressure levels in dB 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. 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 Lowest

Observed Adverse Effect Level. 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.

6.0 MITIGATION

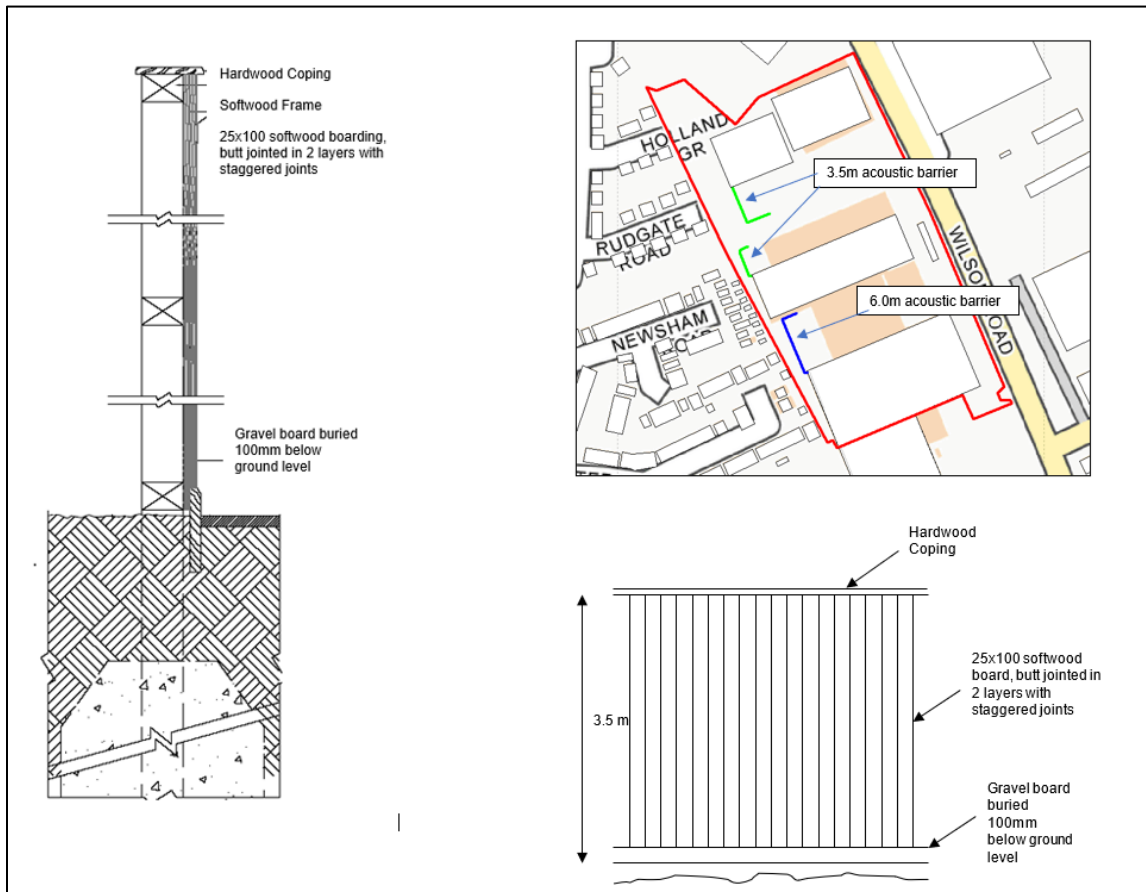
6.1 Noise Mitigation

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:

- 6.0m high, 60m long acoustic barrier along the western side of the service yard for Unit C.
- 3.5m high, 30m long acoustic barrier along the western side of the forecourt for Unit F.
- 3.5m high, 50m long acoustic barrier along the western side of the service yard for Unit G.

Acoustic barriers will be of a close boarded construction with a minimum mass per square metre of 10 Kg/m². The location of the acoustic barrier is shown in Figure 6.1.

Figure 6.1 Example 2.0m Acoustic Barrier Detail



The results of the Noise Intrusion Assessment including the mitigation described above are presented in the tables below.

6.2 Noise Intrusion Assessment – Including Mitigation

Table 6.1 Daytime Noise Intrusion Levels L_{Aeq} 1 hour – Including Mitigation

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	32.4	17.4	2.4	35
R02	32.8	17.8	2.8	35
R03	39.6	24.6	9.6	35
R04	38.2	23.2	8.2	35
R05	39.2	24.2	9.2	35
R06	37.3	22.3	7.3	35
R07	38.0	23.0	8.0	35
R08	38.6	23.6	8.6	35
R09	30.6	15.6	0.6	35
R10	23.6	8.6	0.0	35
R11	21.3	6.3	0.0	35
R12	23.4	8.4	0.0	35
R13	24.2	9.2	0.0	35
R14	24.1	9.1	0.0	35
R15	26.7	11.7	0.0	35
R16	26.6	11.6	0.0	35

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

Table 6.2 Night-time Noise Intrusion Levels L_{Aeq} 15mins – Including Mitigation

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	33.7	18.7	3.7	30
R02	36.6	21.6	6.6	30
R03	44.7	29.7	14.7	30
R04	43.8	28.8	13.8	30
R05	44.2	29.2	14.2	30
R06	42.3	27.3	12.3	30
R07	42.5	27.5	12.5	30
R08	42.5	27.5	12.5	30
R09	32.8	17.8	2.8	30
R10	27.4	12.4	0.0	30
R11	25.0	10.0	0.0	30
R12	26.8	11.8	0.0	30
R13	27.0	12.0	0.0	30
R14	26.8	11.8	0.0	30
R15	30.3	15.3	0.3	30
R16	29.1	14.1	0.0	30

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

Table 6.3 Night-time Noise Intrusion Levels L_{Amax} (Night-time) – Including Mitigation

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R01	57.8	42.8	27.8	45

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows-open	Internal L_{Aeq} with windows-closed	Criteria L_{Aeq}
R02	52.6	37.6	22.6	45
R03	45.9	30.9	15.9	45
R04	50.6	35.6	20.6	45
R05	50.5	35.5	20.5	45
R06	52.7	37.7	22.7	45
R07	55.1	40.1	25.1	45
R08	54	39.0	24.0	45
R09	40.9	25.9	10.9	45
R10	36.3	21.3	6.3	45
R11	33	18.0	3.0	45
R12	34.3	19.3	4.3	45
R13	35.2	20.2	5.2	45
R14	35	20.0	5.0	45
R15	38.7	23.7	8.7	45
R16	37.3	22.3	7.3	45

All values are sound pressure levels in dB 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 daytime noise contour plot (inclusive of all potential noise sources) is presented in Figure 6.2.

Figure 6.2 Noise Contour Plot Daytime ($L_{Aeq,1hour}$) – Including Mitigation



Not to scale
OS Licence No. AL553611
Contour Plot at 1.5m height

6.3 Cumulative Noise Assessment – Change in Noise Levels (Including 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 Difference between Baseline and Proposed Scenarios (Daytime) – Including Mitigation

Location	Measured Baseline $L_{Aeq,15mins}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Commercial Units $L_{Aeq,16 hour}$
R01	52.6	52.6	0.0
R02	52.6	52.6	0.0
R03	52.6	52.8	0.2
R04	48.2	48.6	0.4
R05	48.2	48.7	0.5
R06	48.2	48.5	0.3

R07	48.2	48.6	0.4
R08	48.2	48.7	0.5
R09	48.2	48.3	0.1
R10	50.4	50.4	0.0
R11	50.4	50.4	0.0
R12	66.7	66.7	0.0
R13	66.7	66.7	0.0
R14	66.7	66.7	0.0
R15	66.7	66.7	0.0
R16	66.7	66.7	0.0

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

Table 6.5 Difference between Baseline and Proposed Scenarios (Night-time) – Including Mitigation

Location	Measured Baseline $L_{Aeq,15mins}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Commercial Units $L_{Aeq,16\text{ hour}}$
R01	51.1	51.2	0.1
R02	51.1	51.3	0.2
R03	51.1	52.0	0.9
R04	46.5	48.4	1.9
R05	46.5	48.5	2.0
R06	46.5	47.9	1.4
R07	46.5	48.0	1.5
R08	46.5	48.0	1.5
R09	46.5	46.7	0.2
R10	56.3	56.3	0.0
R11	56.3	56.3	0.0
R12	60.3	60.3	0.0
R13	60.3	60.3	0.0
R14	60.3	60.3	0.0
R15	60.3	60.3	0.0
R16	60.3	60.3	0.0

All values are sound pressure levels in dB 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. 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 CONCLUSIONS OF NOISE ASSESSMENT

This report presents the findings of a noise assessment undertaken to support 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.

Therefore, the proposed development is not expected to have an adverse impact on health or quality of life, and proposals are considered to meet the requirements of the NPPF.

APPENDICES

APPENDIX A – ACOUSTIC TERMINOLOGY AND ABBREVIATIONS

An explanation of the specific acoustic terminology referred to within this report is provided below.

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 12 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.

An explanation of abbreviations used within this report is provided below.

CADNA – Computer Aided Noise Abatement
DMRB – Design Manual for Roads and Bridges
HGV – Heavy Goods Vehicle
UDP – Unitary Development Plan
UKAS – United Kingdom Accreditation Service

APPENDIX B – REPORT CONDITIONS

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