



NOISE IMPACT ASSESSMENT

ROSE KILN COURT, READING 11NO. FLEXIBLE EMPLOYMENT UNITS

INDUSTRIALS REIT

MARCH 2022

ROSE KILN COURT, READING
11NO. FLEXIBLE EMPLOYMENT UNITS
NOISE IMPACT ASSESSMENT

Our Ref: 5690_001R_2-0_CW



Client: **Industrials REIT**
3rd Floor
180 Great Portland St
London
W1W 5QZ

Report by: **Anderson Acoustics Limited**
3 Trafalgar Mews
15-16 Trafalgar Street
Brighton
BN1 4EZ

www.andersonacoustics.co.uk

T: 01273 696 887

Date: **25 March 2022**

Project No: **5690**
Status: **FINAL**

Author **Jamie Easton**
Acoustic Consultant
MSc AMIOA

25 March 2022

Reviewed **Chris Wood**
Associate Director
MSc MIOA

25 March 2022

Approved **Chris Wood**
Associate Director
MSc MIOA

25 March 2022

This document has been prepared using all reasonable skill and care. Anderson Acoustics Ltd accepts no responsibility or liability for any third party data presented in this report, or used for the basis of drawing any conclusions. This document is confidential to the named client above and Anderson Acoustics Ltd accepts no responsibility or liability resulting from third party use of this document or for a purpose other than for which it was commissioned.

REVISION HISTORY

Version	Comments	Date	Changes made by	Approved by
1-0	First issued version	22.03.2022	JE	CW
2-0	Revised to respond to planner comments	25.03.2022	CW	CW

CONTENTS

1	INTRODUCTION	5
2	THE SITE, NEAREST RECEPTORS AND PROPOSED DEVELOPMENT	6
3	ASSESSMENT GUIDANCE AND CRITERIA	8
4	BASELINE SOUND LEVEL SURVEY	12
5	NOISE IMPACT ASSESSMENT	19
6	SITE MANAGEMENT CONTROLS	27
7	SUMMARY	28
8	REFERENCES	29

APPENDICES

APPENDIX A	GLOSSARY OF ACOUSTICS TERMINOLOGY
APPENDIX B	NOISE POLICY AND CRITERIA
APPENDIX C	ATTENDED SURVEY DATA

1 INTRODUCTION

Anderson Acoustics Ltd has been commissioned by Industrials REIT to undertake a noise impact assessment in support of an application for the development of 11 multi-let industrial (MLI) units with 86 parking spaces and five accessible parking spaces at the site known as Rose Kiln Court, Rose Kiln Lane, Reading RB2 0BY. It is understood that permission is to be sought to allow the proposed units to operate for 24 hours a day, 7 days a week.

Accordingly, this report presents the details of a noise impact assessment in accordance with the guidance in BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

As such, sound level monitoring has been undertaken to determine the existing acoustic conditions in the vicinity of the nearest dwellings, which have been compared to calculations of the possible sound levels from the operation of the proposed scheme.

It should be noted that, at this planning stage, this report contains a number of assumptions regarding the activities and noise control associated with the proposed scheme (whilst, in any case, there will always be a degree of range and flux in terms of the use of such a site and its various units during its operational life). It is considered, however, that the assessment is sufficient to demonstrate how the scheme could work in principle, and thus for planning permission to be granted, subject to suitable noise-related conditions.

Descriptions of the site, the nearest noise-sensitive receptors and the proposed development are given in **Section 2**.

Relevant policy and environmental noise criteria have been presented and briefly discussed in **Section 3**.

The methodology and results of the baseline sound level monitoring undertaken at the site are given in **Section 4**.

The noise impact assessment, including calculations, is presented in **Section 5**.

The report is summarised in **Section 6**.

2 THE SITE, NEAREST RECEPTORS AND PROPOSED DEVELOPMENT

2.1 The Existing Arrangements

The site is located between Rose Kiln Lane and the A33, as shown in Figure 2-1, towards the south of Reading. The wider area is made up of a mix of existing commercial/industrial premises and residential properties, but where the road traffic on the A33 is very much the dominant sound source.

Currently, a two-storey office building with associated carpark is located at the development site.

It can be seen from Figure 2-1 that residential receptors are located to the north (Laud Close) and west (Admirals Court). Figure 2-2 overleaf displays 3D views of these dwellings. It can also be seen that Cadogan House is located to the south of the site, for which permission has been granted in January 2019 for conversion to residential use. We understand that works were commenced albeit it is unclear whether these were completed to allow the building to be put into residential use prior to the expiry of the consent. For the purposes of this assessment, we take a cautious approach and assume the implementation of that residential consent and the associated mitigation works. The residential use of this building has therefore been considered as part of the assessment.

The next nearest buildings, which include the Matalan store to the west, are commercial/industrial in nature, and not considered sufficiently noise-sensitive in the context of the proposed scheme in order to warrant assessment. Whilst, in any case, the BS 4142 assessment methodology applies to dwellings only.

Figure 2-1: Site location



Source: Google Maps (as annotated by Anderson Acoustics)

Figure 2-2: 3D View of residential areas (as detailed above)



Source: Google Maps

2.2 The Proposed Arrangements

Figure 2-3 details the proposed site layout. The existing commercial building is to be demolished to make way for 11 double-height units in two blocks, and associated parking (86 spaces) and space for turning movements and deliveries. The units are intended for flexible employment uses, including B2 (general industrial)/B8 (distribution or storage) and Eg(iii) (light industrial). The units would range in floorspace from 256 m² to 526 m², with an aggregate floorspace of 4080 m². The existing access via Rose Kiln Lane will be retained.

Details of the assumed activities are presented in **Section 4**.

Figure 2-3: Proposed site layout, 3D rendition of Block B and front and rear elevations of Block B



Source: Pozzoni (all images)

3 ASSESSMENT GUIDANCE AND CRITERIA

Reading Borough Council (RBC) requirements and associated assessment guidance (i.e. BS 4142) are summarised below. These have been considered in conjunction with the Government's overarching planning principles with respect to noise including: Noise Policy Statement for England [1]; National Planning Practice Framework [2]; and Planning Practice Guidance – Noise [3], which are summarised in **Appendix A** along with a description of relevant acoustic terminology. Broadly speaking, however, key to the successful assessment and implementation of the scheme will be the application of BS 4142 and adhering to the Council's requirements are far as necessary and practicable.

3.1 Reading Borough Council Local Plan

The Reading Borough Council Local Plan 2019 [4] Policy EN17 provides the following detail regarding *Noise Generating Equipment*:

"Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor."

Further, Paragraph 4.2.96 details:

"Where the plant noise rating level does not meet this standard, the background noise will increase. When subsequent new plant is added it will be assessed against this higher background level which results in an increasing benchmark against which subsequent new plant is introduced. This leads to an incremental increase in the noise in an area each time new plant is introduced ('background creep'). This policy standard has been applied by Reading Borough Council for a number of years and experience has demonstrated it to be achievable in most cases. In addition, noise control technology is improving, therefore further increasing the achievability of this standard."

Whilst the above is not entirely unusual, and presumably based on an historical interpretation of the guidance in BS 4142, it isn't strictly in keeping with the relevant guidance within the latest version of the Standard, which allows for assessment on a case-by-case basis, accounting for situation-specific context. Whilst it is also potentially contrary to national policy, which allows for flexibility in terms of criteria and degree of impact within the context of Government policy on sustainable development.

It is therefore considered appropriate to aim to meet the requirement of Policy EN17 (i.e. for the site noise to be no greater than 10 dB below the measured background sound level), but, as appropriate, this should be considered in light of the assessment in accordance with BS 4142.

3.2 BS 4142

BS 4142 [5] provides methods for rating and assessing sound/noise of an industrial or commercial nature in relation to residential premises, hence its relevance here. The assessment methodology evaluates the "specific sound level" of each industrial or commercial sound source, corrects for distinguishable features to derive the "rating level", and compares this with the "background sound level".

The advice is that the background sound level ($L_{A90,T}$) should be derived from continuous measurement of normally not less than 15 minute intervals over the period of interest, and that it should not be the lowest level, but representative of typical conditions at the noise-sensitive receiver(s) relevant to the periods of operation.

The specific sound level ($L_{Aeq,T}$) is obtained (by measurement or calculation) over a reference period of 1 hour in terms of the daytime (07:00 to 23:00) and 15 minutes during the night-time (23:00 to 07:00).

The rating level ($L_{A,r,Tr}$) is the specific sound level corrected to account for any acoustic features present in the sound in question, as experienced at the receptor, such as distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.). Where no correction is warranted, the rating level is equal to the specific level.

The “subjective method” to calculate the rating level incorporates the following corrections (particularly appropriate for new sources that cannot be measured in-situ):

- Up to +6 dB due to tonality, subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible.
- Up to +9 dB for impulsivity, subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and
- Up to +3 dB for other acoustic features that are neither tonal nor impulsive, though readily distinctive at the receptor.

An “initial estimate” of the impact of the specific sound is calculated by subtracting the measured background sound level from the rating level. The following advice applies:

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

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur.

Where the initial estimate of the impact needs to be modified due to the context, the assessment should take into account all pertinent factors, including:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

Helpfully, BS 4142 includes some example assessments. In one example, it is concluded that:

“Although the plant noise is somewhat different in character to the residual acoustic environment the rating level of 30 dB is low and will have little impact on residents using their patio during the evening.”

Under similar conditions it is stated:

“In addition to the rating/background sound level comparison...” where “the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows... Other guidance, such as BS 8233, might also be applicable in this instance.”

Another example concludes that:

“...the residual acoustic environment varies considerably with time, which also tends to mask sound from the source, reducing its relative significance...”

An assessment, therefore, is effectively in two parts. The first part results in an initial indication of the impact, which is subsequently considered in terms the context unique to the situation at hand; and where this second part may require consideration of alternative guidance and metrics. Alternatively, the context can be considered upfront and a specific threshold (or set of thresholds) determined accordingly in place of the default values presented in points a) to d) quoted above.

3.3 BS 8223

The core method in BS 4142 (outlined above) compares the sound in question with the background conditions (i.e. part one of an assessment). When it comes to part two – taking into account context – it is in keeping with the BS 4142 guidance to also consider the significance of the absolute level of the commercial/industrial sound. This is typically done in terms of the absolute noise thresholds given in BS 8223:2014 *Guidance on sound insulation and noise reduction for buildings* [6]. This provides guideline values for internal and external noise levels for dwellings.

It states that, “In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4.” This table is reproduced as Table 3-1 below.

Table 3-1: BS 8223 indoor ambient noise levels for dwellings

Activity	Location	07-23 (Daytime)	23-07 (Night-time)
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

For habitable rooms the lower guideline value is 35 dB $L_{Aeq,16h}$ during the daytime period and 30 dB $L_{Aeq,8h}$ during the night-time period. Assuming a partially open window providing 15 dB (during use for cooling, for example), the equivalent external level/limit would be in the order of 50 dB during the daytime period and 45 dB during the night-time period. This is a free-field level unaffected by any façade-reflected sound.

In respect of sound levels within outdoor amenity areas, the guidance in BS 8223 suggests that, “*it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments...*”

BS 8223 does caution that the (internal) guideline values are for sources without a specific character, and that where any such characteristics are present, “*lower noise levels might be appropriate.*” It is likely that sound from the site will be characterful to some extent. Accordingly, some reduction in the standard values would be considered prudent. Either way, external levels of less than 50 dB during the day and 45 dB at night can be seen to be relatively low.

3.4 Summary of Assessment Criteria

Information provided within the Council's Local Plan indicates that "plant noise" should be designed such that the "specific" sound level is controlled to a level at least 10 dB below the measured background sound level.

However, it is noted the guidance in BS 4142 is that the site-specific context should be taken into account, whereby the assessment should take into account all pertinent factors, including: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; and the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

This latter factor is particularly pertinent here in relation to the 2019 Prior Approval consent for conversion of Cadogan House for residential use. As set out earlier, we have taken a cautious approach to assume that it is extant and model its residential usage with reference to the noise control measures that are required by planning condition to mitigate acoustic impacts associated with sound from the A33.

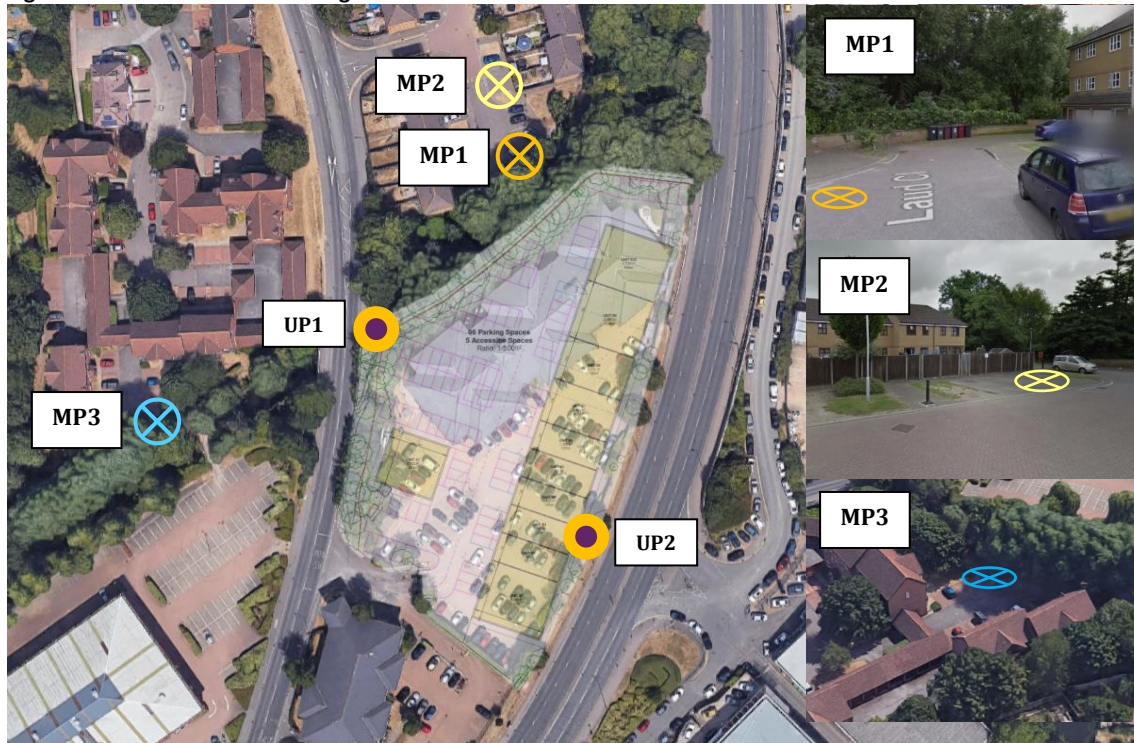
Accordingly, as stated above, it is considered appropriate to aim to meet the requirement of Policy EN17 (i.e. for the site noise to be no greater than 10 dB below the measured background sound level), but where the impact in practice should be considered in light of the situation-specific context. Rather than further define fixed thresholds here, however, the approach has been taken to present the results (in **Section 4**) and discuss them in the context of the guidance above and professional judgement.

4 BASELINE SOUND LEVEL SURVEY

The prevailing acoustic conditions at the site have been determined by detailed environmental sound level monitoring, comprising unattended and attended measurements and on-site observations.

The survey locations are shown in Figure 4-1. As part of previous proposals for the site (for the same applicant), an unattended survey was undertaken over a two-week period at locations UP1 and UP2, between Friday 4th and Thursday 10th June 2021. The measurements were taken under free-field conditions and at heights of approximately 3.0 m and 2.5 m, respectively. Subsequently, to further understand the acoustic conditions in the vicinity of the nearest existing dwellings for the current application, attended measurements were undertaken on Friday 13th/Saturday 14th January 2022. The meter was mounted on a tripod such that the microphone was approximately 1.5 m above the ground and within free-field conditions.

Figure 4-1: Sound level monitoring locations



It is noted that the earlier unattended survey occurred during a period potentially impacted by COVID-19 lockdown restrictions. If anything, however, this would have resulted in lower ambient and/or background sound level conditions, meaning for a worst-case (i.e. more stringent) set of data for the assessment, whereby the results have been used as measurement.

4.1 Instrumentation

All measurements were undertaken by a consultant certified as competent in environmental monitoring, whilst the monitoring equipment conformed to Type 1/Class 1 specification of BS 61672 [7]. A full inventory of the equipment is shown in Table 4-1 below. All equipment's calibration certificates are available on request.

Table 4-1: Unattended survey equipment details

Equipment (ID)	Make & Model	Serial No.	Date Laboratory Calibrated	Calibration Certification Number
"A33" Sound Level Meter (AA-RCDS-08)	Rion NL-31	00640761	27 October 2020	UCRT20/2039
"Rose Kiln Lane" Sound Level Meter (AA-RCDS-14)	Rion NL-31	00341523	27 October 2020	UCRT20/2038
Attended Monitoring Sound Level Meter (AA-DUO-01)	01dB Type DUO	10663	26 February 2020	UCRT20/1245
Calibrator (AA-CAL-08)	Rion NC-74	34304643	24 May 2021	1500367-1

The monitoring equipment used during the survey was calibrated at the start and end of each measurement. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the 12 months preceding the measurements. No significant drift in calibration level was found to have occurred.

4.2 Weather Conditions

- 4.3 The weather conditions during the unattended monitoring (in June 2021) were noted at the time of the site attendance and from the BBC website during the survey. Conditions were dry with little wind throughout, and thus conducive to reliably data. The wind direction switched from primarily north-easterly at the start (on the Friday, Saturday and Sunday), to southerly on the Monday, then south-westerly on the Tuesday, Wednesday and Thursday. Being so close to the A33, however, it's not a location anticipated to be significantly affected by changes in wind direction or, indeed, wind speed or temperature inversion. As shown by the results below, acoustic conditions were consistent day to day and night to night.

The conditions during the attended monitoring (in January 2022) were dry and calm, with temperatures ranging from zero degrees (at night) to 6 degrees during the day. Again, therefore, despite the low temperatures, and given the dominance of the sound from the A33, the conditions were considered conducive to capturing reliable and representative data.

4.4 Unattended Survey Results

The results of the unattended monitoring are presented in graphical form in **Appendix B** and summarised in the tables below.

4.4.1 Unattended Position 1 (Rose Kiln Lane)

Table 4-2: Daily Results Summary (UP1)

Date	Time period	$L_{Aeq,T}$ (dB)	Typical (modal) $L_{A90,15min}$ (dB)
Friday 4 th June 2021	Daytime 12:00 – 23:00	68	54
	Night-time 23:00 – 07:00	61	41
Saturday 5 th June 2021	Daytime 07:00 – 23:00	66	56
	Night-time 23:00 – 07:00	60	42
Sunday 6 th June 2021	Daytime 07:00 – 23:00	66	50
	Night-time 23:00 – 07:00	61	37
Monday 7 th June 2021	Daytime 07:00 – 23:00	67	54
	Night-time 23:00 – 07:00	61	37
Tuesday 8 th June 2021	Daytime 07:00 – 23:00	66	54
	Night-time 23:00 – 07:00	61	37
Wednesday 9 th June 2021	Daytime 07:00 – 23:00	66	54
	Night-time 23:00 – 07:00	61	37
Thursday 10 th June 2021	Daytime 07:00 – 23:00	67	54
Survey Period Summary *	Daytime 07:00 – 23:00	67	54
	Night-time 23:00 – 07:00	61	37

* The $L_{Aeq,T}$ values are the arithmetic average of the values for each day/night. The $L_{A90,15min}$ values are the modal values of all the day/night levels combined.

The results indicate daily free-field ambient sound levels ranging between 66 and 68 dB $L_{Aeq,T}$ for the daytime period, and 60 and 61 dB $L_{Aeq,T}$ for night-time period. The modal 15-minute background sound levels, which are considered representative of the “typical” conditions, can be seen to range from 50 to 56 dB $L_{A90,15min}$ during the day and from 37 to 42 dB $L_{A90,15min}$ during the night.

As shown in the figures below, the overall modal values have been determined to be 54 $L_{A90,15min}$ and 37 $L_{A90,15min}$ for the daytime and night-time period, respectively.

Figure 4-2: Background sound levels during daytime periods (UP1)

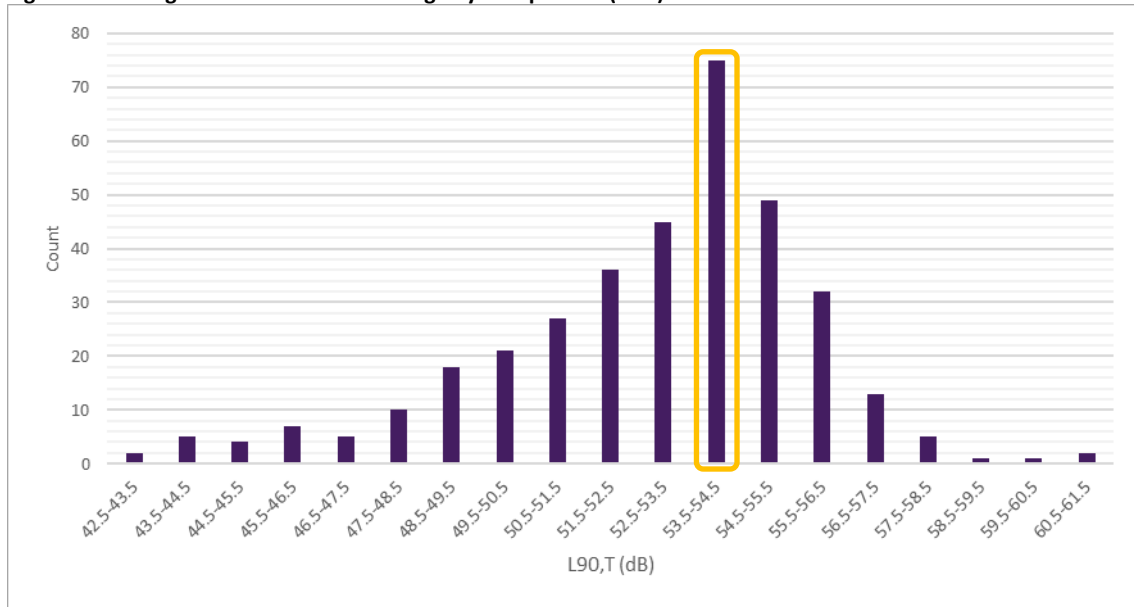
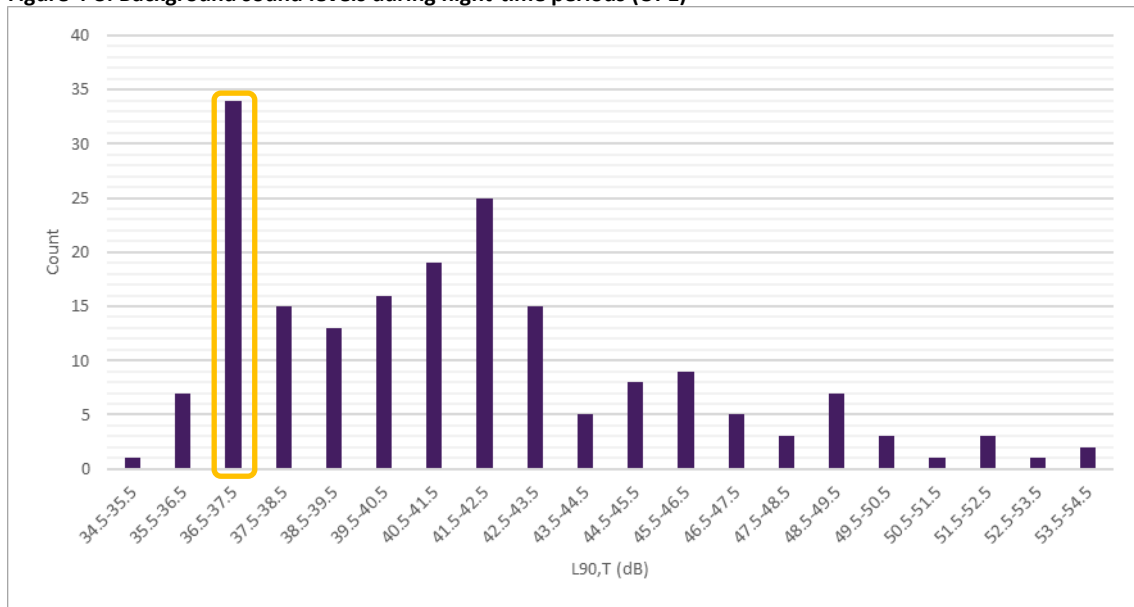


Figure 4-3: Background sound levels during night-time periods (UP1)



4.4.2 Unattended Position 2 (A33)

Table 4-3: Daily Results Summary (UP2)

Date	Time period	$L_{Aeq,T}$ (dB)	Typical (modal) $L_{A90,15min}$ (dB)
Friday 4 th June 2021	Daytime 12:00 – 23:00	75	50
	Night-time 23:00 – 07:00	69	41
Saturday 5 th June 2021	Daytime 07:00 – 23:00	75	57
	Night-time 23:00 – 07:00	68	38
Sunday 6 th June 2021	Daytime 07:00 – 23:00	74	50
	Night-time 23:00 – 07:00	69	38
Monday 7 th June 2021	Daytime 07:00 – 23:00	75	57
	Night-time 23:00 – 07:00	69	38
Tuesday 8 th June 2021	Daytime 07:00 – 23:00	75	56
	Night-time 23:00 – 07:00	69	41
Wednesday 9 th June 2021	Daytime 07:00 – 23:00	75	56
	Night-time 23:00 – 07:00	69	38
Thursday 10 th June 2021	Daytime 07:00 – 23:00	75	60
Survey Period Summary *	Daytime 07:00 – 23:00	75	56
	Night-time 23:00 – 07:00	69	38

* The $L_{Aeq,T}$ values are the arithmetic average of the values for each day/night. The $L_{A90,15min}$ values are the modal values of all the day/night levels combined.

The results indicate daily free-field ambient sound levels ranging between 74 and 75 dB $L_{Aeq,T}$ for the daytime period, and 68 and 69 dB $L_{Aeq,T}$ for night-time period. The modal 15-minute background sound levels, which are considered representative of the “typical” conditions, can be seen to range from 50 to 60 dB $L_{A90,15min}$ during the day and from 38 to 41 dB $L_{A90,15min}$ during the night.

The overall modal values have been determined to be 56 $L_{A90,15min}$ and 38 $L_{A90,15min}$ for the daytime and night-time period, respectively. These are compared to 54 dB and 37 dB determined for the Rose Kiln Lane position (UP1), indicating that, regardless of proximity to the A33, the typical background sound levels are reasonably consistent.

It should be noted that the above values were obtained on site and not outside the dwellings, hence the attended measurements presented below. The benefit of the unattended measurements is that they were continuous over a number of days, thus indicating any day to day and night to night trends. Where, as to be expected, the ambient (L_{Aeq}) conditions were very consistent indeed; and whilst a larger range is shown in the background sound levels in terms of the modal $L_{A90,15min}$ values, actually, these were also typically very consistent.

4.5 Attended Monitoring

Daytime, evening and night-time attended monitoring was undertaken in January 2022 at the nearest residential premises to determine the potential variation between sound levels at the nearest residential locations and those measured at UP2.

Table 4-4 summarises the results of the attended measurements. Three 15-minute measurements were undertaken at each location to sample the day, evening and night-time ambient and background sound levels, as well as to make observations to understand the acoustic environment at each location.

Table 4-4: Attended Measurement Summary

Measurements Location	Assessment Period	Start Time	L _{Aeq,15min} dB	L _{A90,15min} dB
MP1	Daytime	13/01/2022 12:14	61	55
	Evening	13/01/2022 21:52	58	53
	Night-time	14/01/2022 02:02	51	49
MP2	Daytime	13/01/2022 13:08	60	54
	Evening	13/01/2022 22:09	57	52
	Night-time	14/01/2022 02:18	51	50
MP3	Daytime	13/01/2022 12:47	55	49
	Evening	13/01/2022 22:31	56	48
	Night-time	14/01/2022 02:38	48	42

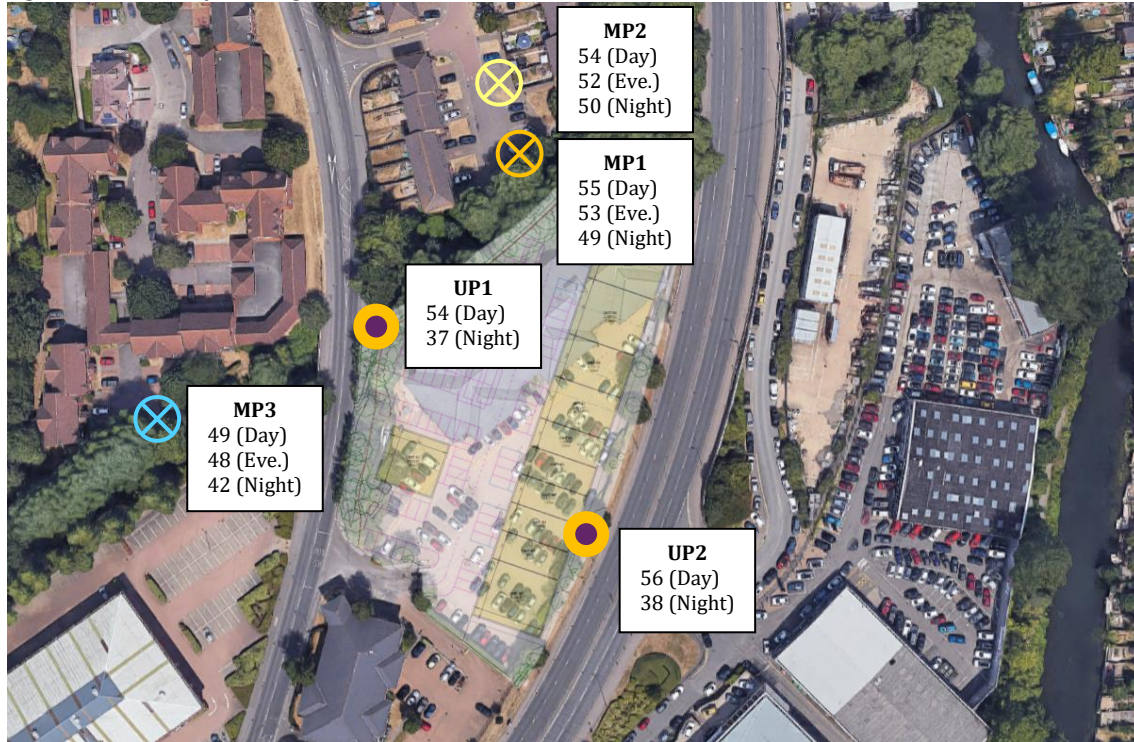
During the measurements it was noted that the A33 was dominant at each location. Road traffic from Rose Kiln Lane was also noted to be audible, but to a lesser extent. As expected, road traffic from both roads was noted to be reduced during the night-time period. It was also noted that sound from the watercourse (Holy Brook) was audible, ranging from clearly audible at MP1 to slightly audible at MP2 and MP3.

The results indicate that sound levels at MP1 and MP2 varied by no more than 1 dB during each assessment period. Attended measurements at these locations indicate that daytime measurements undertaken UP1 can be considered as representative; however, attended night-time sound levels were approximately 12 dB higher than those measured at UP1. Attended measurements at MP3 were 7 to 8 dB lower than those measured at UP1 during the daytime/evening period, and 4 dB higher than those measured during the night-time period.

4.6 Summary of Background Sound Levels

The typical background sound levels determined from the unattended monitoring and the brief levels measured during the attended monitoring are presented in Figure 4-4 below.

Figure 4-4: Summary of background sound levels



As noted previously, it can be seen that the daytime levels across the various positions are reasonably consistent, with the exception of MP3, where a notably lower level was measurement, presumably due to the greater distance from not only the roads but waterfall element of the Holy Brook watercourse.

Whilst, also as noted, conversely the night-time levels are not consistent between the unattended and attended positions, with the latter being notably higher. This could be due to a number of factors, with the unattended measurements undertaken during some degree of lockdown conditions and the attended measurements being for a brief period only, whilst the sound from the watercourse may have been reduced during the summer survey period, as opposed to the more recent winter-period.

On balance, it is considered reasonable to adopt the following background sound levels:

Table 4-5: Adopted Background Sound Levels, dB LA90,15min

Assessment Location	Daytime Period (07-23)	Night-time Period (23-07)
Laud Close dwellings	54	40
Admirals Court dwellings	49	40
Cadogan House dwellings	49	40

5 NOISE IMPACT ASSESSMENT

Since it is not possible to say the exact activities associated with each unit, assumptions have been made to assess the potential noise impact of operations at the development site. Accordingly, a range of assessment scenarios have been modelled to allow for representative assessment of activities that are expected to be associated with Eg(iii) and B2/B8 uses.

5.1 Activities and Assessment Scenarios

5.1.1 Activities within the Units

As presented in **Section 2**, the units will range in size, with the smaller units being roughly half the size of the smaller spaces. However, given that even the larger units are on the small side (for industrial premises), with the site also being relatively small, the unit sizes do not necessarily dictate their use, nor their potential to generate noise. Indeed, whilst Class Eg(iii) is defined as “any industrial process, being a use, which can be carried out in any residential area without detriment to the amenity of that area by reason of noise...”, this doesn’t rule out sound being generated externally altogether, with a range of uses (from showrooms to MOT centres) being associated with such units, with some perhaps being “quiet” most of the time, but with occasional large deliveries, and others being generally active, but with little of note occurring externally.

Accordingly, it has been considered appropriate to adopt the following two assessment scenarios:

- 1a – All units operating with an internal sound level of 63 dBA.
- 1b – 4no. units operating with an internal noise level of 72 dBA.

These are based on the assumption that not all units will be “noisy” at the same time, but where they could be “active” to some extent at the same time. The level of 63 dBA, which is the reverberant level within the units, is equivalent to several people speaking with raised voices. The level of 72 dBA is based on changing tyres within a vehicle servicing centre (as if the activity occurs for the full 1-hour (day) and 15-minute (night) assessment periods).

Further to which, it is assumed the shutter doors will be open during the daytime period (as if for cooling during summer months), but closed at night.

To account for the attenuation of the internal activity sound level by the units’ envelope construction, sound reduction performances for proposed elements detailed within Table 5-1 have been used. It has been assumed that internal activities will halt during deliveries where roller shutter doors are required to be open.

Table 5-1: Assumed Sound Reduction Index (SRI) of Building Elements

Element	SRI per Octave Band Frequency, dB								dB R _w
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Masonry Wall (100 mm)	34	37	37	37	45	54	59	59	44
Insulated Steel Cladding (east facing façade & Roof)	13	17	21	26	26	26	42	52	24
Roller Shutter *	4	6	9	14	19	24	29	29	18
Glazed Areas (6/12/6 double glazing)	19	20	19	29	38	34	45	44	31

* Sound reduction performance has been based on a steel sheet of 1 mm thickness

5.1.2 Deliveries

In keeping with the size of the site and units, it is anticipated that large lorry movements will be limited, with deliveries or collection primarily via small vans. Likewise, car movements are also likely to be reasonably limited. We would also consider it unlikely that the unit occupants would make regular use of a forklift truck; however, it's possible occasional large deliveries would entail a forklift truck, as supplied and operated by the delivery driver. Such events are likely to represent the worst-case scenario in terms of external activities. Predicted traffic data for the site provided by Motion Consultants Ltd. has been used to determine the number of movements during the assessment period.

Based on data in our records, the sound levels associated with the above are presented in Table 5-2.

Table 5-2: Activity sound levels

Scenario	Activity	$L_{Aeq,T}$ (distance from source)	Assumed duration, T
2	Lorry arriving and manoeuvring	72 dB (at 10 m)	30 s
	Door slam	65 dB (at 10 m)	1 s
	Unloading with electric forklift truck	51 dB (at 10 m)	10 min (outside)
	Lorry starting up and driving away	68 dB (at 10 m)	30 s
3	Van arriving and manoeuvring	54 dB (at 10 m)	30 s (per van)
	Van starting up and driving away	59 dB (at 10 m)	10 s (per van)

5.1.3 Carpark Activity

Further to the above will be the use of the parking spaces, and so this has been considered based on the following assumptions. In the worst-case 1-hour period (in keeping with the BS 4142 daytime assessment reference period), it is assumed that 20 cars will arrive, and 20 cars will depart, using spaces evenly distributed.

The assumed source levels are detailed in Table 5-3. It has also been assumed that during the worst-case 15-minute period during the night-time, car movements will reduce to five movements, using spaces evening distributed within the carpark.

Table 5-3: Carpark Activity Sound Levels

Activity	$L_{Aeq,T}$ (distance from source)	Assumed duration, T
Car pass-by	58 dB (at 10 m)	2 s
Car reversing	61 dB (at 10 m)	10 s
Car accelerating away	62 dB (at 10 m)	3 s
Car door slam	65 dB (at 10 m)	1 s

5.1.4 External Fixed Plant

At this stage, no assessment has been undertaken in terms of fixed plant, such as air source heat pumps, condensers or ventilation flues etc. The need for which is anticipated to be limited – perhaps one such item/source per unit – and which are unlikely to be significant in the scheme of things. Indeed, the natural location for such items/sources will be to the rear of the units, which for both Blocks A and B will be “road” side, with 10 out of the 11 units within Block B, whereby the items/sources would be facing the A33 and not the dwellings. In other words, it is anticipated that no noise assessment is required in terms of such plant.

5.2 Calculations and Modelling

A 3D computer noise model of the site and surrounding area has been constructed using the proprietary software, CadnaA. The open source OpenStreetMap data were imported in the first instance to initiate the model in the correct geographical location, which included the footprint of some existing buildings. The additional required existing buildings were digitised by hand, with a global height of 8 m applied to the houses. Building heights, however, are not critical to this particular model.

The Proposed Site Plan for the site was then imported as a scaled image and the units digitised by hand. All existing buildings are assigned as acoustically reflective and the model set account for two orders of reflections. All ground is set as acoustically hard (i.e. reflective), as worst-case.

The sound levels presented in Table 5-2 and Table 5-3 have been time-averaged to determine the equivalent 1-hour levels for the daytime assessment, and 15-minute levels for the night-time assessment (in accordance with the BS 4142 methodology).

The model was run to calculate the sound levels at the nearest dwellings in accordance with the procedures within ISO 9613 [8]. Calculation points were entered into the model within gardens and 1 m from the façades of the nearest dwellings. Heights of 1.5 m above ground level were used for the garden locations and 1.5, 4.5 and 7.5 m for the dwelling façade locations, as relevant. The model is set such that any reflected sound from the buildings' façades is excluded from the 1 m distant calculation points, such that they are equivalent to free-field levels. This means that they are directly comparable to the free-field survey data.

5.3 Calculated Sound Levels

The calculated sound level contours for each scenario are presented in Table 5-4 and Table 5-5. The latter, which starts overleaf and continues for three pages, presents the sound level contours based on a height of 1.5 m above the ground. In addition to these contours, the highest predicted sound levels at the calculation points are presented in Table 5-4. These show the spread of sound from the site as per the adopted scenarios.

When reviewing the contour plots, it should be borne in mind that they only show sound from the site, and not from any other background or ambient sources.

Table 5-4: Calculated Specific Sound Levels, dB $L_{Aeq,T}$ (free-field)

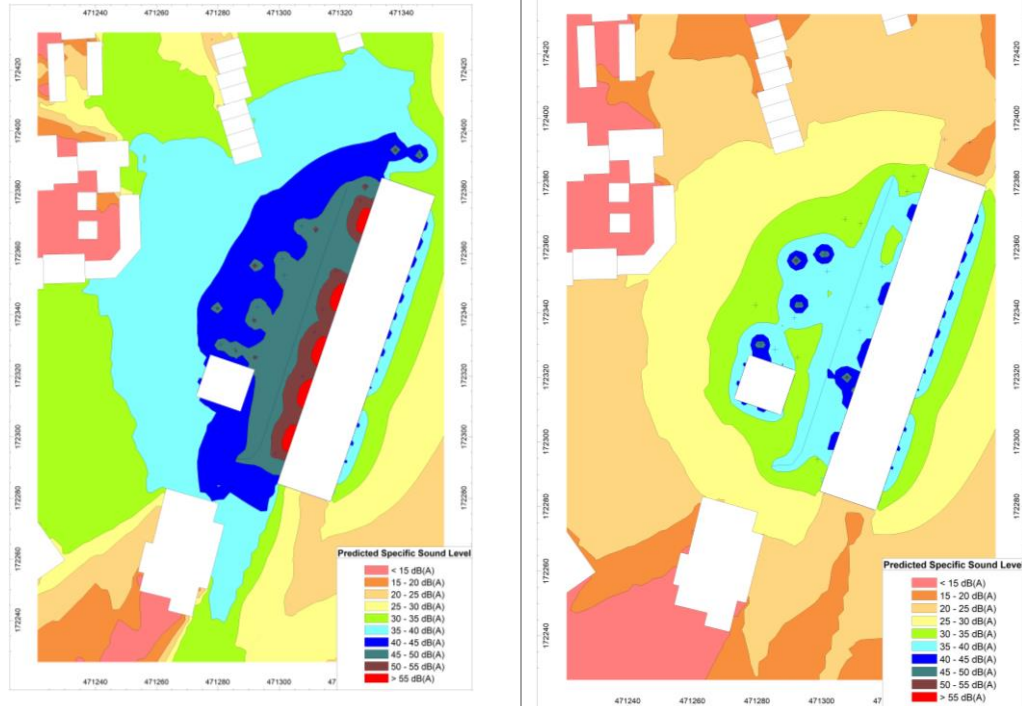
Calculation Point	Scenario (Daytime/Night-time)				
	1a+CP	1b+CP	2	3	CP only
Laud Close	37/30	42/31	33/32	25/21	30/23
Admiral Court	35/28	40/29	31/27	24/21	27/22
Cadogan House	41/32	45/34	41/36	34/32	31/24
1a	All units with internal reverberant level of 63 dBA, with shutter doors open during the day, closed at night.				
1b	4no. units with internal reverberant level of 72 dBA, with shutter doors open during the day, closed at night.				
2	Daytime: 2no. lorries arriving, being manoeuvred, unloaded and being driven away. Night-time: 1no. lorry arriving, being manoeuvred, unloaded and being driven away.				
3	Daytime: 2no. vans arriving, being manoeuvred, unloaded and being driven away. Night-time: 1no. van arriving, being manoeuvred, unloaded and being driven away.				
CP	Daytime: Carpark – 40no. car movements using spaces evenly distributed within the car park. Night-time: Carpark – 5no. car movements using spaces evenly distributed within the carpark.				

At this stage, the calculated sound levels are equivalent to “specific sound levels” in accordance with BS 4142, without any applicable feature correction having been applied (although, the need for correction is generally limited, as set out in **Section 5.5**). By way of initial context they are all below the adopted daytime and night-time background sound levels (see Table 4-5), with the exception of Scenario 1a at night at Cadogan House. This is considered further below.

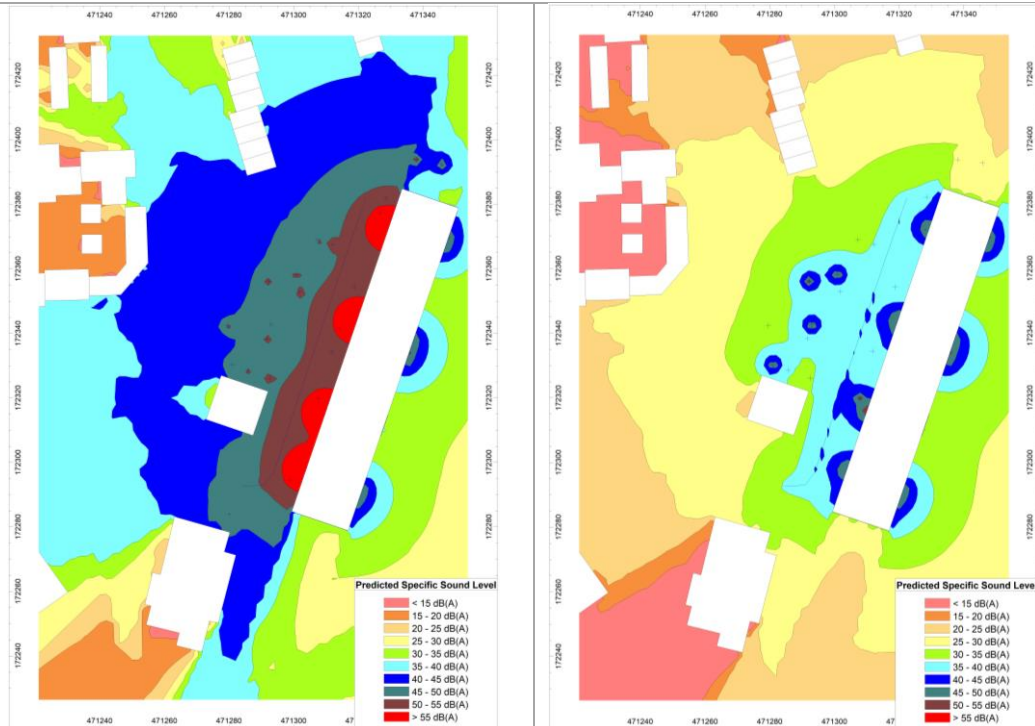
Table 5-5: Sound Level Contours of Assessment Scenarios

Daytime Period (07:00 to 23:00) Night-time Period (23:00 to 07:00)

1a – All units operating with an internal sound level of 63 dBA (shutters closed)



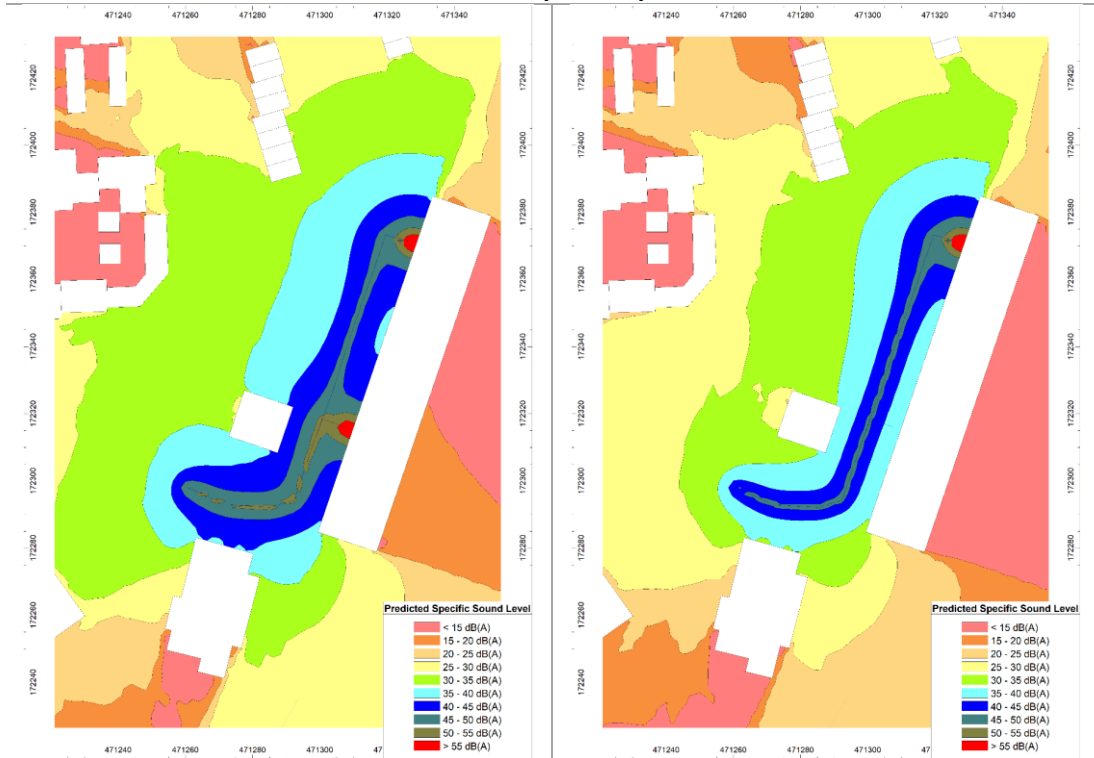
1b – 4no. units operating with an internal noise level of 72 dBA



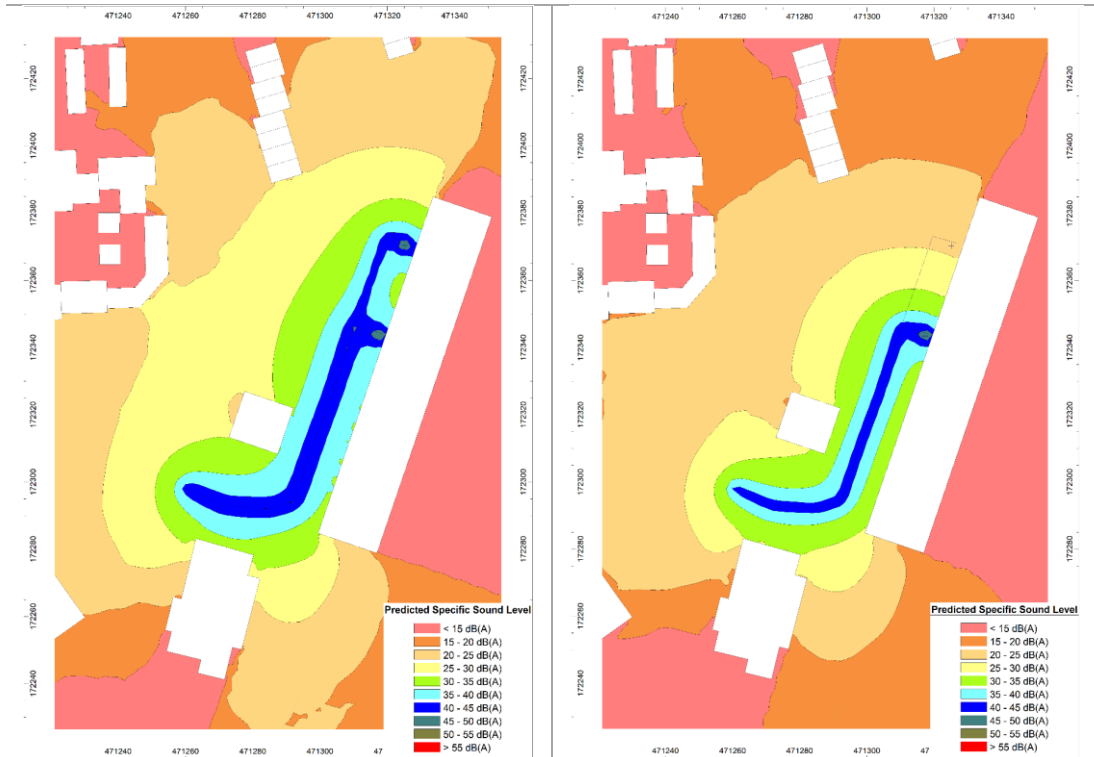
Daytime Period (07:00 to 23:00)

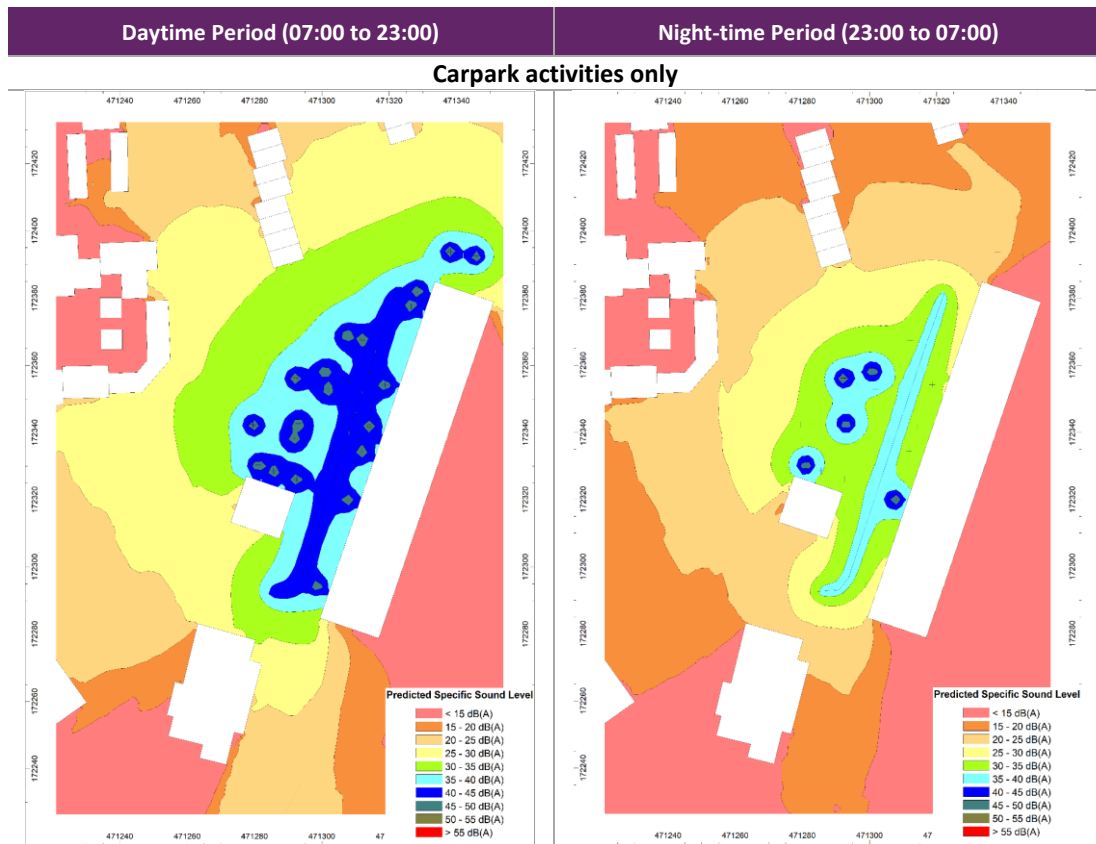
Night-time Period (23:00 to 07:00)

2 – Lorry delivery



3 – Van deliveries





5.4 Assessment

In the first instance, it is appropriate to compare the calculated specific sound levels (Table 5-4) with the adopted background sound levels (Table 4-5), as presented in Table 5-6.

Table 5-6: Comparison of Highest Specific Sound Levels with the Background Sound Level

Assessment Location	Difference between Specific Background Sound Levels (Daytime/Night-time)				
	1a+CP	1b+CP	2	3	CP only
Laud Close dwellings	-17/-10	-12/-9	-21/-8	-29/-19	-24/-17
Admirals Court dwellings	-14/-12	-9/-11	-18/-13	-25/-19	-22/-18
Cadogan House dwellings	-8/-8	-4/-7	-8/-4	-15/-8	-18/-16

As stated earlier, it can be seen that all levels are below the adopted background sounds levels.

In terms of the Council's criterion in the form of Policy EN17 (where the site noise should be no greater than 10 dB below the measured background sound level), it can be seen that this ambitious objective would not be strictly complied with under the following scenarios:

- Cadogan House dwellings: 1a+CP, 1b+CP & 2 (day and night) and 3 (night only).

It is important to note that such an approach (beyond comparison with the background levels, that is), doesn't necessarily provide a full appreciation of context, and this is particularly relevant in this location in terms of Cadogan House.

The residential use of Cadogan House is reliant upon acoustic mitigation measures (to modern standards) to provide protection against sound from the A33 and Rose Kiln Lane, whilst there are also additional contextual factors to consider in terms of the other locations.

In terms of an initial assessment in terms of BS 4142, the following statement in the Standard is generally applicable:

"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

Since in all cases the levels are well below the background sound levels, regardless of any character correction, which would be limited to no more than around 3 dB, the impact would be low at most. Indeed, no or negligible impact is anticipated for the most part.

5.5 Context and Final Appraisal

As per the guidance in BS 4142, where the initial estimate of the impact needs to be modified due to the context, the assessment should take into account all pertinent factors, including:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

And where BS 4142 includes the following statements from example scenarios:

"Although the plant noise is somewhat different in character to the residual acoustic environment the rating level of 30 dB is low and will have little impact on residents using their patio during the evening."

"In addition to the rating/background sound level comparison..." where "the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows... Other guidance, such as BS 8233, might also be applicable in this instance."

It is shown above that, at face value, the greater potential for noise impact is in terms of Cadogan House (day and night). Furthermore, whilst some of the existing dwellings will be subject to similar sound levels from the A33 as Cadogan House, by virtue of their age we would not seek to rely upon any assumption of the same degree of sound insulation to that the future occupants of Cadogan House would have in accord with the requirements of the 2019 approval. It is therefore considered appropriate to consider the two sets of dwellings separately, as below.

5.5.1 Existing Dwellings (Laud Close and Admirals Court)

The initial appraisal presented above indicates that, based on the assumed activities and calculated levels, the worst-case night-time rating levels would be below the adopted background sound levels, thus indicating the noise impact would be low at most.

In terms of the absolute sound levels, it is presented in **Section 3.3** in relation to the guidance in BS 8233 that external sound levels at night of below 45 dB can be seen to be relatively low. And where it can be seen from Table 5-4 that the highest calculated specific sound level is 32 dB, which would mean the resultant sound level within the dwellings, with a window partially open, would be below the relevant default target for bedrooms of 30 dB (even accounting for any acoustic feature associated with the development).

Whilst, in terms of existing ambient ($L_{Aeq,T}$) sound levels, it can be seen from Table 4-4 that the lowest level measured was 48 dB (at MP3, Admirals Court), which, although a snapshot, is 16 dB above the highest calculated level, which is a strong indication that the sound from site will be masked to some extent by sound from the A33 etc.

Accordingly, regardless of the sound insulation that the existing dwellings benefit from, the impact from even the worst-case sound levels assumed for the operation of the proposed scheme is expected to be low, at most.

5.5.2 Cadogan House

The same conclusion (i.e. worst case scenario resulting in a low impact at most) would apply to Cadogan House if no consideration is given to the mitigation that is sought by the governing consent. However, Condition 4 of the Prior Approval Notice (ref. 182166) requires compliance with the recommendations of the submitted Noise Assessment report. By consequence, the occupants will also benefit from mechanical ventilation and a high degree of sound insulation, meaning that there should be no need to open windows for ventilation and/or cooling.

Accordingly, and in keeping with the guidance in BS 4142, it is appropriate to rely upon the designed acoustic environment that would be achieved through that mitigation previously modelled and then controlled by planning condition. In basic terms, this means that a higher sound insulation can be assumed than that achieved in the scenario of a partially open window. The consequence is that the equivalent internal sound levels will be even further below the relevant target for bedrooms.

With reference to the daytime acoustic environment, it is important to consider the local context where the highest calculated level of 45 dB is well below the default target for external amenity areas of 50 dB. Importantly, it is also well below the measured ambient levels as referenced by a level of 64 dB presented in the 2017 Noise Assessment report for the conversion of Cadogan House to residential use. The same logic applies to the consideration of acoustic effects upon the other existing dwellings, albeit with lower ambient levels measured (49-55 dB), as presented in Table 4-4.

Accordingly, no impact from even the worst-case sound levels assumed for the operation of the proposed development is expected.

6 SITE MANAGEMENT CONTROLS

This assessment has modelled the use of the proposed buildings for multi-let employment on a 24/7 basis, based on assumptions of noise sources associated with use of the buildings.

For clarity, it is assumed that best practice will be followed for all activities/operations, as discussed below, in order to limit the potential for noise impact at nearby receptors. Accordingly, the following Site Management Controls are recommended:

- All rear/emergency access doors to units to be kept closed except for access or emergencies. During the summer, it would be acceptable for the front roller shutter doors to be open for ventilation, which has been accounted for in the assessment.
- Where night operations are required, special care and attention is to be paid to the noise produced. Engines should be switched off wherever possible and yard activity kept to a minimum between the hours of 23:00 and 07:00.
- Roller shutter doors should remain closed at night except for access.
- Plant and equipment should be well maintained to ensure optimal running without causing unduly high noise levels.
- Employees should be reminded that they are operating in proximity to residential dwellings and should keep external noise to a minimum.

Subject only to the adoption of the Site Management Controls outlined above, therefore, the analysis indicates that there should be no adverse noise impact upon existing residential receptors due to the proposed operations. As such, noise should not be a determining factor in the determination of the planning application, and no other controls (such as the use of physical measures or hours restrictions for operation or servicing) are considered necessary to make the development acceptable in planning terms.

7 SUMMARY

Anderson Acoustics has undertaken a noise impact assessment of the proposed commercial development at Rose Kiln Court, Reading, to support the planning application. The scheme includes 11no. commercial units, with associated parking and landscaping, which will replace the existing office building and associated parking.

The units are intended for flexible employment uses, including B2 (general industrial)/B8 (distribution or storage) and Eg(iii) (light industrial), ranging in floorspace from 256 m² to 526 m², with an aggregate floorspace of 4080 m². The existing access via Rose Kiln Lane will be retained.

The existing acoustic conditions in the vicinity of the nearest dwellings have been determined and compared to calculations of the likely sound levels from the operation of the proposed units under several assumed scenarios. The assessment is primarily based on the guidance in BS 4142, with reference to other relevant guidance, including consideration of Reading Borough Council's Local Plan and associated Policy ENV17.

Policy ENV17 states that "Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor." It is presented, however, that the above is not strictly in keeping with the relevant guidance within the latest version of the Standard, which allows for assessment on a case-by-case basis, and more fully accounting for situation-specific context. We feel that a more contextualised approach is important and should be encouraged.

Based on the assumed scenarios (see **Section 5.4**), which should account for likely worst-case conditions (day and night), the Policy ENV17 criterion would be challenging to apply without consideration of local context. However, even the highest levels are below the adopted background sound levels, whereby the initial indication in terms of the wording within the current BS 4142, subject to consideration of context, is that there could be a low noise impact at most.

Accordingly, consideration of context is presented in **Section 5.5**, where it is shown that for both the existing dwellings and those associated with the residential conversion of Cadogan House consistent with that approval, not only would the resultant internal levels be below the default requirement for bedrooms, but well below the measured ambient sound levels (due to sound from the A33 and Rose Kiln Lane in particular).

Accordingly, the impact from even the worst-case sound levels assumed for the operation of the proposed scheme is expected to be low, at most.

In terms of the wording within the national policy documentation, therefore (see **Appendix B**), **it is considered that there would be, at most, No Observed Adverse Effect (NOAE), whereby "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."**

Therefore, it is considered that noise need not be a barrier to granting planning permission, subject to the imposition of a suitable noise condition to reflect the modelling that has underpinned this assessment. We would, therefore, recommend the following draft condition wording, which we would be content to be imposed on any subsequent consent:

The development permitted by this planning permission shall be carried out in accordance with the recommendations set out within the Noise Impact Assessment (5690_001R_2-0_CW) produced by Anderson Acoustics. The Site Management Controls proposed shall be implemented prior to the first use of the development and shall be adopted at all times thereafter.

8 REFERENCES

- [1] Department for Environment, Food and Rural Affairs, "Noise Policy Statement for England," DEFRA, London, 2010.
- [2] C. & L. G. Ministry of Housing, "National Planning Policy Framework," London, 2019.
- [3] Ministry of Housing, Communities & Local Government, "Planning Practice Guidance - Noise," 2019. [Online]. Available: <https://www.gov.uk/guidance/noise--2>. [Accessed 2020].
- [4] Reading Borough Council, *Reading Borough Local Plan 2019*, Reading Borough Council, 2019.
- [5] British Standards Institution, *BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound*, London: BSI, 2014.
- [6] British Standards Institution, *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings*, London: BSI, 2014.
- [7] British Standards Institution, *British Standard 61672 - Electroacoustics. Sound level meters. Specifications*, London: BSI, 2013.
- [8] British Standards Institution, *ISO 9613-2:1996 - Acoustics. Attenuation of sound during propagation outdoors - General method of calculation*, London: BSI, 1996.

APPENDIX A

GLASSARY OF ACOUSTICS TERMINOLOGY

Introduction to Acoustics, Sound and Noise

The word 'acoustic' is derived from the Greek words 'akoustikos' (meaning "of or for hearing, ready to hear") and 'akoustos' (meaning "heard, audible").

Acoustics is the branch of physics concerned with the properties of sound, including ultrasound, infrasound and vibration. A scientist or engineer who works in the field of acoustics is an acoustician or acoustic engineer.

Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response, and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.¹ Care has been taken in this document to use the most relevant of these terms (whereby 'sound' is used predominantly); however, in most reference documents, and, indeed, generally, 'sound' and 'noise' are used interchangeably. Consequently, just because the term 'noise' is used doesn't necessarily mean a negative effect exists or will occur, and the context of the accompanying text should be taken into account.

Human hearing is able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble), and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify sound in a manner that approximates the response of the human ear, a weighting mechanism is used, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

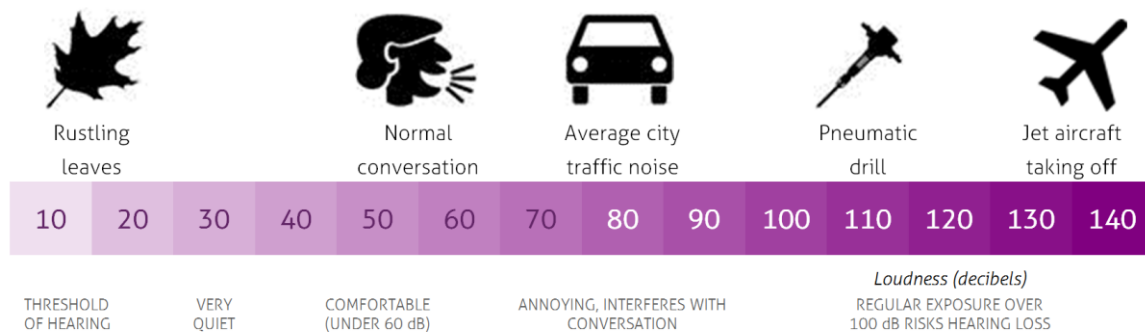
The weighting mechanism that best corresponds to the response of the human ear (though not necessarily perfectly) is the 'A'-weighting scale. This is widely used for environmental sound measurement, and the levels are denoted as dBA, dB(A) or L_{Aeq} , L_{A90} etc. according to the metric being measured or determined (see the Definitions over leaf).

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dBA increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dBA is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. Where other changes occur (associated with the change in sound level), such as additional vehicle movements on a road, which can be seen, then these may result in changes in sound level being more noticeable than they might otherwise be.

Further to such visual clues, and any other non-acoustical factors that affect people's response (such as personal characteristics, and social, residential or environmental factors), the subjective response to a sound is dependent not only upon the sound pressure level and component frequencies, but also its intermittency. Consequently, various metrics have been developed to try and correlate people's attitudes to different sounds with the sound level and its fluctuations. The metrics used in this document, as per the relevant guidance, are defined overleaf.

¹ Taken from the Foreword to BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*.

Figure A-1: Typical noise levels



Definitions

- Airborne sound: Sound that reaches the point of interest by propagation through air.
- Ambient sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.
- A-weighting, dB(A): The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
- Background sound: Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
- Calibration: The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
- Context: The circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood. When considering context, pertinent factors include: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; evidence on human response to the sound; and the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.
- Decibel (dB): A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds (s_1 and s_2) is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20 \mu\text{Pa}$.
- Dwelling: A building used for living purposes. A mobile home used for permanent living should be included in an assessment. If calculations are being conducted for compensation purposes, then some mobile homes are dealt with under the Highways Noise Payments and Moveable Homes Regulations.
- Façade/ Façade Level: At a distance of 1 m in front of a large sound reflecting object such as a building façade. According to BS 8233:2014, "Façade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the façade." The Calculation of Road Traffic Noise (1988) uses 2.5 dB, whilst BS 5228-1:2009+A1:2014 recommends 3 dB. Owing to the latter examples, together with other historical documents, it is more usual to apply 3 dB.
- Fast time-weighting (F): Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 *Electroacoustics. Sound level meters. Pattern evaluation tests*.
- IOA: The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and

the British Acoustical Society (a daughter society of the Institution of Mechanical Engineers). It is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.

- $L_{AF10,T}$: The A-weighted sound pressure level exceeded for 10% of the time over the period, T, measured using fast time-weighting (F), see below. It can be considered to be the “average maximum” sound level, and is generally used to describe road traffic sound.
- $L_{AF90,T}$: The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F). Generally used to describe the ‘background’ sound conditions.
- L_{AFmax} : The maximum A-weighted sound pressure level during a given time period. L_{max} is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).
- $L_{eq,T}$: A sound level index called the equivalent continuous sound level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded. Where the value is A-weighted, it will be presented ‘ $L_{Aeq,T}$ ’ or ‘dBA $L_{eq,T}$ ’, otherwise it should be an un-weighted (or linear) value.
- L_p : See Sound Pressure Level.
- L_w : See Sound Power Level.
- Percentile Level: The sound pressure level exceeded for N% of a specified time interval, see $L_{AF90,T}$ etc.
- Point source: A sound source whose dimensions are small compared to the propagation distances involved. Due to the Inverse Square Law, the sound level pressure level decreases by 6 dB every time the distance between the measurement point and the source is doubled.
- R: See Sound Reduction Index.
- Rating Level, $L_{Ar,T}$: The equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$, see also Specific Level) of the sound, plus any adjustment for the characteristic features of the sound.
- Residual Sound: ambient sound remaining at the assessment location when the specific sound source is suppressed (or absent) to such a degree that it does not contribute to the ambient sound.
- Sound Level Metrics, Indices or Parameters: Sound levels usually fluctuate over time, so it is often necessary to consider an average or statistical sound level. This can be done in several ways, so a number of different metrics have been defined, according to how the averaging or statistics are carried out.
- Sound power level, L_w : Sound power measured on a decibel scale, relative to a reference value of 10^{-12} W.
- Sound power: The sound energy radiated per unit time by a sound source. Measured in Watts (W).
- Sound pressure level (sound level), L_p : The sound level is the sound pressure relative to a standard reference pressure of 20 μ Pa (20×10^{-6} Pascals) on a decibel scale.
- Sound pressure: Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
- Sound reduction index (SRI), R: Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.
- Soundscape: Acoustic environment as perceived or experienced and/or understood by a person or people, in context.
- Specific sound level, $L_s = L_{Aeq,T_r}$: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
- Specific sound source: Sound source being assessed.

APPENDIX B

NATIONAL NOISE POLICY

Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published by the Government in March 2010 (with no updates at the time of writing). It is the overarching statement on noise policy for England, and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy, which is to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

Which is supported by the following noise policy aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.”*

When discussing the meaning of “significant adverse” and “adverse” within an Explanatory Note the NPSE states:

“There are two established concepts from toxicology that are currently being applied to noise impacts for example, by the World Health Organisation. They are

“NOEL – No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

“LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.”

To which the NPSE added the following related concept:

“SOAEL – Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.”

The Explanatory Note continues: *“It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed above. Logically, it starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL, when *“all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”* The final aim envisages proactive management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

National Planning Policy Framework

First published in 2012, and most recently updated in July 2021, the National Planning Policy Framework (NPPF) sets out the Government's planning policies for England, and how these are expected to be applied. The NPPF superseded Planning Policy Guidance Note (PPG) 24: Planning and noise (PPG 24), amongst other PPG's and Planning Policy Statements (PPSs). In contrast to these documents, the NPPF itself is generic, and reference to specific topics, e.g. noise, is limited. However, since its initial publication, the NPPF is now supported by additional guidance, which is presented subsequently below.

Noise is referenced within the NPPF as follows. These are effectively the policies on noise.

- "174. Planning policies and decisions should contribute to and enhance the natural and local environments by:...[a number of points including]...*
- 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 life⁶⁰;*
 - 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..."*

Reference number 60 of the above quotation points to the Explanatory Note to the Noise Policy Statement for England (NPSE).

The following policy is also relevant to noise.

- "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."*

As mentioned above, in addition to the NPPF, the Government has published accompanying web-based planning guidance for a number of categories, including noise (see below).

Planning Practice Guidance

In March 2014, the Department for Communities and Local Government (DCLG) launched the Planning Practice Guidance web-based resource. This now forms part of the NPPF, referred to as *"relevant planning practice guidance"*, which includes guidance on the category of "noise". The guidance is often referred to as PPG-Noise, PPG-N or PPG(N). It was last updated in July 2019.

In keeping with the NPSE and NPPF, no values (in dB) are presented; however, plenty of guidance is provided as to the issues to consider in assessing noise and determining suitable thresholds. Whilst, in keeping with this report, reference is made to BS 8233.

A “noise exposure hierarchy table” is provided, which summarises the noise exposure hierarchy based on the likely average response of those affected, and is reproduced below. It includes “examples of outcomes” relevant to the NOEL, LOAEL and SOAEL effect thresholds described in the NPSE. These outcomes are in descriptive form; there is no numerical definition of the NOEL, LOAEL and SOAEL.

Table B-1: Noise exposure hierarchy table (as per PPG-Noise)

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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			
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			
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

It is left to other guidance documents and professional opinion to determine thresholds where required, as discussed in the main body of the report.

APPENDIX C

UNATTENDED SURVEY DATA

Figure C-1: Unattended Noise Monitoring Location (Rose Kiln Lane, UP1)

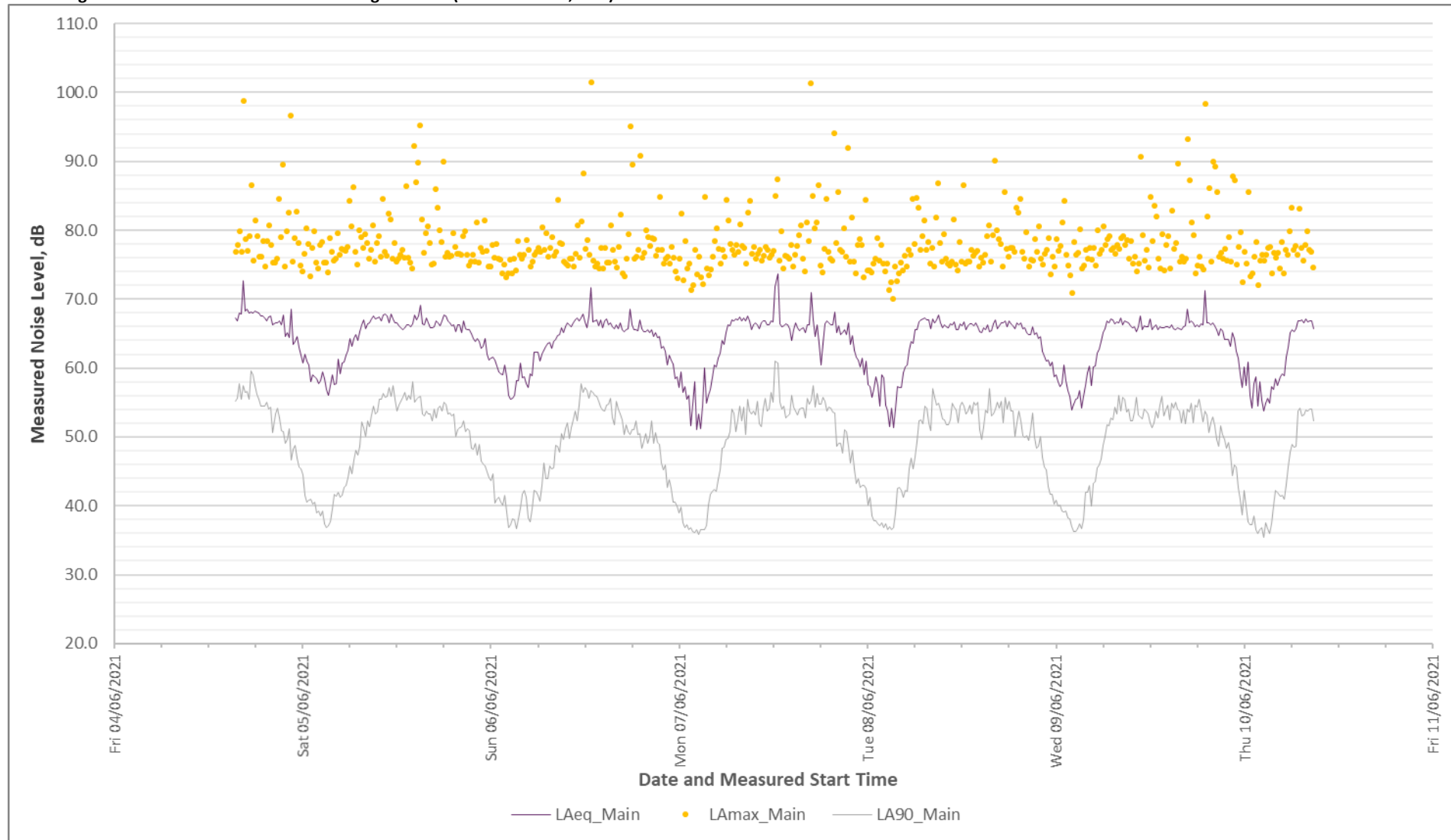


Figure C-2: Unattended Noise Monitoring Location (A33, UP2)

