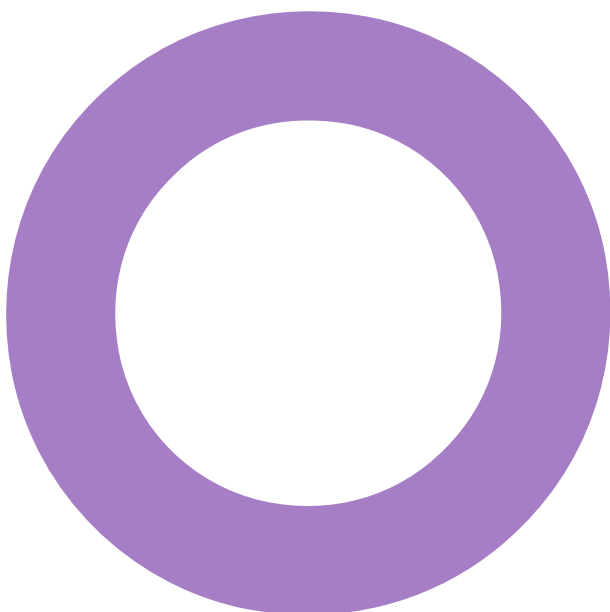


**North Gate House.
Reading.**
**AEW UK Core Plus Property
Fund.**

ACOUSTICS
NOISE IMPACT ASSESSMENT

REVISION 01 – 17 JUNE 2024



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	12/06/2024	Initial issue	JH	AS	JB
01	17/06/2024	Amended applicant name	AS	MF	JB

This document has been prepared for AEW UK Core Plus Property Fund only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 10/15506
Document reference: 1015506-HLE-RP-AC-Noise Impact Assessment-Rev1.docx

Contents.

Audit sheet.	2
1. Introduction.	4
2. Site context.	4
3. Assessment criteria.	5
3.1 National and local policy.	5
3.2 Noise incident on scheme.	5
2.1 Noise from the scheme.	7
3. Acoustic Survey.	7
3.1 Methodology.	7
3.2 Results.	9
4. Plant noise limits.	10
5. Acoustic design statement.	11
5.1 Stage 1.	11
5.2 Stage 2.	11
6. Conclusion.	16
References	17
Local policy.	21
Appendix B: Measurement equipment.	22
Position 1 measurement equipment.	22
Position 2 measurement equipment.	22
Attended measurement equipment.	22
Appendix C: Acoustic survey time history.	23

1. Introduction.

Hoare Lea has been appointed to undertake a noise impact assessment to be submitted as part of a planning application for a change of use of Northgate House, an existing office building (hereafter referred to as 'the site') to residential apartments (hereafter referred to as 'the proposed development'). The proposed development will consist of replacement roof top plant and a reconfiguration of internal layouts. Existing glazing dimensions are to be retained. New building services plant is to be installed on the roof to provide mechanical ventilation and comfort cooling.

The proposed development will be both noise generating and noise sensitive, in terms of planning. The following are included in this report:

- A description of the context on and around the site relative to sound (i.e., the sound climate).
- An overview of the assessment methodology.
- References to the relevant local and national policy, and guidance documents.
- A summary of the acoustic survey conducted, and the results obtained.
- Proposed noise limits for the external mechanical services plant to protect the nearby noise sensitive receptors from adverse impacts.
- An Acoustic Design Statement to assess and facilitate site suitability in terms of noise.

2. Site context.

The current site is occupied by an office block on the corner of Valpy Street and The Forbury. The site is surrounded by commercial uses with the nearest noise sensitive receptor 70 m away. A summary of the site context can be seen in Figure 1 below.

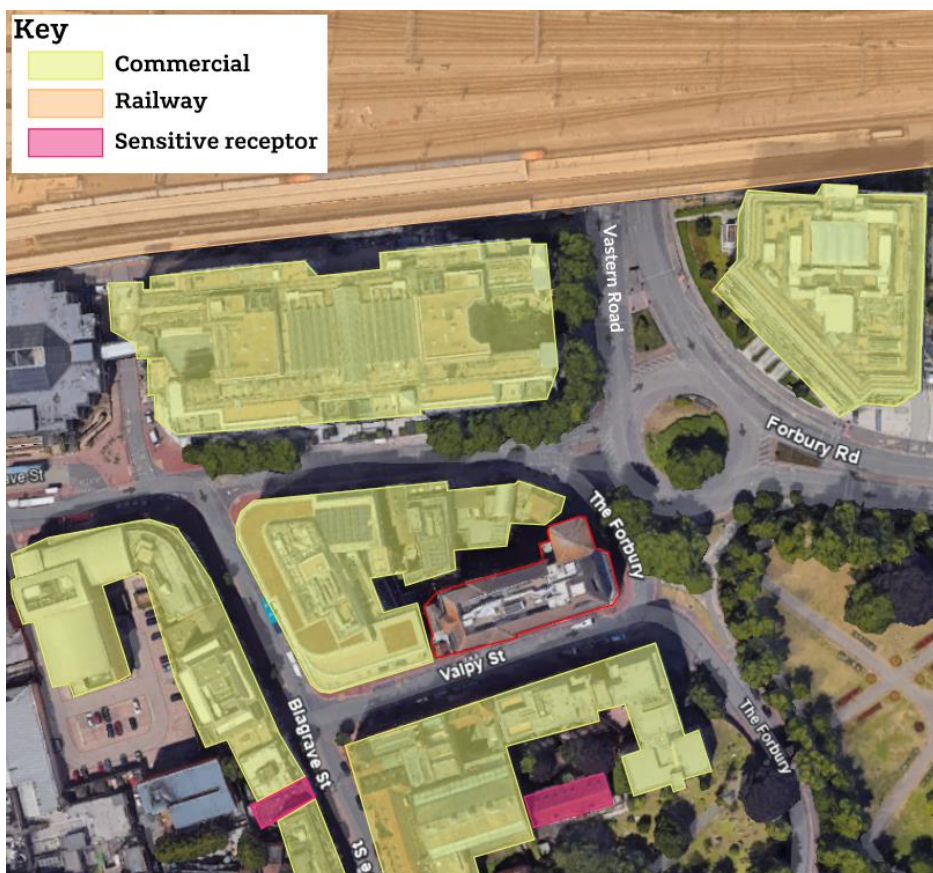


Figure 1 Site context summary.

The sound climate in the area is primarily characterised by road traffic noise. The most dominant roads are Forbury Road, which runs to the east and north of the site, and Vastern Road, which runs to the north east of the site. Road traffic along Valpy Street and Forbury Road contributes to the sound climate to the south and east of the site.

When situated in external areas of the existing site, building mechanical services plant from adjacent offices can be heard during lulls in road traffic noise.

The nearest railway is approximately 120m to the north of the site. Passing trains are frequent along this line serving Reading railway station. Passing trains were audible over the prevailing road traffic noise, particularly when positioned with line of sight to the railway.

It is recommended in the American study ‘*Transit noise and vibration impact assessment. Federal Transit Administration*’¹ that a screening distance for vibration assessments of 60 m from any railway to any residential units be used. Therefore, vibration from the railway line to the north, which is approximately 120m from the site, is not considered warrant assessment. Therefore, no surveys of vibration levels on the Site are to be carried out.

The nearest noise sensitive receptor is a hotel along Blagrove Street. Specifying plant noise limits for this receptor would suitably protect other, more distant and screened, receptors.

3. Assessment criteria.

3.1 National and local policy.

This noise impact assessment serves to demonstrate noise associated with the scheme complies with the requirements of the following national and local policy, summarised in Appendix A.

- Noise Policy Statement for England
- National Planning Policy Framework
- Planning Practice Guidance – Noise
- Reading Borough Local Plan

3.2 Noise incident on scheme.

To assess the impacts of noise from surrounding sources on occupants of the scheme, an Acoustic Design Statement has been generated in accordance with ProPG (Institute of Acoustics, 2017).

The likely internal noise levels have been assessed based on assumed sound insulation values for the proposed development facades. Consideration has been given to ventilation strategy and the impacts of opening windows on façade sound insulation and resultant internal noise levels.

Guideline desirable internal noise level criteria within dwelling spaces are provided within British Standard BS 8233 (BSI, BS8233:2014, 2014) . These criteria are listed below in Table 1.

¹ Hanson, C.E, Towers, D. A, Meister, L. D., 2006, Transit Noise and Vibration Impact Assessment, United States of America Department of Transportation, Federal Transit Association.

Activity	Location	Daytime (07.00 to 23.00)	Night-time (23.00 to 07.00)
Resting	Living room	35 dB LAeq,16 h	-
Dining	Dining room / area	40 dB LAeq,16 h	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16 h	30 dB LAeq,8 h

Table 1: BS 8233 internal noise level criteria

ProPG notes the following with regards to maximum sound levels:

“In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night.”

BS 8233 also advises the following with regards to internal noise levels:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

This is reinforced by the guidance contained in ProPG, which states the following:

“The more often internal LAeq levels start to exceed the internal LAeq target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal LAeq levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.”

Acoustic requirements should be considered on balance with other needs. Designs should not force occupants to choose between unsuitably high levels of noise and overheating. Therefore, where strategies for ventilation and management of overheating compromise compliance with the internal noise level criteria in Table 1, consideration should be given to the suitability of the strategy, levels of exceedance and proportions of time occupants are likely to be subject to risks of overheating. Acoustic, Ventilation and Overheating (Acoustics & Noise Consultants, 2020) states the following:

“A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur.”

As a minimum, during the night-time, for an overheating mitigation strategy to be compliant with Approved Document O (HM Government, 2021) of Building Regulations internal noise levels with windows open should not exceed the following:

1. 40 dB LAeq,T, averaged over 8 hours (between 11pm and 7am)
2. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

In terms of external noise levels, as noted in ProPG, British standard BS 8233 states that “the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr”. Nevertheless, BS 8233 notes that guideline values may not always be achievable and, where developments are desirable, the lowest practicable noise levels in these external amenity spaces should be targeted. These thresholds relate to likely annoyance and do not necessarily ensure a positive sound climate.

The sound climate has also been considered in terms of soundscape and any notable contributions from positive sound sources.

2.1 Noise from the scheme.

BS 4142 (BSI, BS4142, 2014) provides guidance for assessing commercial operations and fixed building services plant noise. The British Standard provides a method for rating the likely significance of impact from industrial and commercial operations based on subtracting the pre-existing background sound level ($L_{A90,T}$) from the rating level ($L_{A,r,T,r}$).

The standard does not give a definitive method for determining the background sound level but instead, as a commentary, states that *“the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”*.

Clause 8.1.4, which discusses the monitoring duration, states *“there is no “single” background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed.”* As a note to this clause the following commentary is given on obtaining a representative background sound level:

“To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.”

The rating level is defined as the specific source noise level in question (either measured or predicted) with graduated corrections for tonality (up to +6 dB), impulsivity (up to +9 dB), intermittency (+3 dB) and other sound characteristics (+3 dB) which may be determined either subjectively or objectively, if necessary.

The likely impacts of an industrial or commercial sound source is defined based on the following criteria, following subtraction of the pre-existing background sound level ($L_{A90,T}$) from the rating level ($L_{A,r,T,r}$):

- A difference of around +10 dB is likely to be an indication of a significant adverse impact, depending on context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context; and
- A difference of +0 dB or less is an indication of the specific sound source having a low impact, depending on the context.

Various references to context are made throughout BS 4142. This numerical assessment method provides an indication of the likely impacts. However, the impacts should be contextualised to provide a robust assessment.

Noise limits for external building services plant serving the scheme have been derived based on BS 4142 guidance, and the Reading Borough Council planning policy requirement that the rating level be 10 dB below the existing background level at the nearest noise sensitive receptor.

3. Acoustic Survey.

3.1 Methodology.

An environmental acoustic survey has been conducted to quantify the existing sound climate around the site and to calibrate a noise model.

The measurement positions are shown in Figure 2 below.

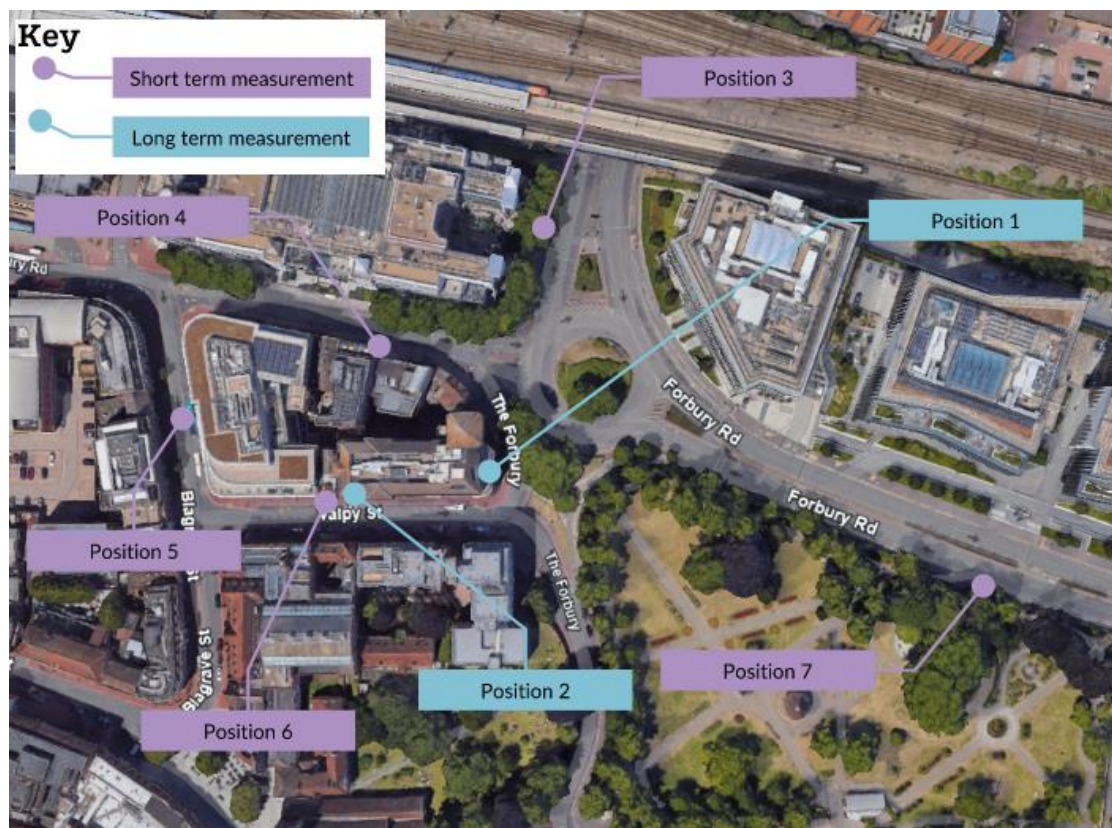


Figure 2: Acoustic survey measurement positions.

Long term survey measurements were undertaken at Position 1 from Tuesday 21st May 2024 to Tuesday 27th May 2024. Long term survey measurements were undertaken at Position 2 from Tuesday 21st May 2024 to Tuesday 28th May 2024.

The purpose of measuring at Position 1 was to capture the road traffic noise contributions from Forbury Road and Vastern Road, and railway noise from the nearby railway to the north of the site. The measurements at Position 1 were instantaneous sound pressure levels, which have been used to derive 1-minute duration ambient sound levels ($L_{Aeq,1 \text{ min}}$), maximum sound levels ($L_{Amax(fast),1 \text{ min}}$), and 15-minute duration background sound levels ($L_{A90,15 \text{ min}}$) in post processing. Measurements were made at one-third octave band resolution.

The purpose of measuring at Position 2 was to capture noise contributions from Valpy Street and to quantify the background sound climate. The dominant noise source at this position was road traffic along Valpy Street and road traffic along Forbury Road. The measurements at Position 2 included continuous 15-minute duration samples of broadband A-weighted ambient sound levels ($L_{Aeq,15 \text{ min}}$), maximum sound levels ($L_{Amax(fast),15 \text{ min}}$), and background sound levels ($L_{A90,15 \text{ min}}$). The measurements also recorded instantaneous sound pressure levels. Measurements were made at one-third octave band resolution.

Measurement equipment at Position 1 and Position 2 was installed on a 4th floor balcony with line of sight to the roads below.

Weather conditions were not measured on site but were monitored remotely. Light rain was reported at the start and end of the survey.

The survey equipment was field calibrated immediately before and immediately after the measurement period; no significant drift in level was found to have occurred.

Details of the measurement instrumentation used is included in Appendix B.

3.2 Results.

A time history of result at Position 1 and Position 2 are included in Appendix C.

The sound level measurements made at Position 1 and Position 2 are summarised in Table 2 and Table 3.

Date	Daytime ambient noise level (07:00 to 23:00)	Night-time ambient noise level (23:00 to 07:00)	Night-time 10 th highest maximum noise event. (23:00 to 07:00)
Tuesday 21st May 2024	65 dB LAeq,7 hour 15 minutes	59 dB LAeq,8 hour	72 dB LAFmax,1 min
Wednesday 22nd May 2024	66 dB LAeq,16 hour	59 dB LAeq,8 hour	74 dB LAFmax,1 min
Thursday 23rd May 2024	66 dB LAeq,16 hour	60 dB LAeq,8 hour	75 dB LAFmax,1 min
Friday 24th May 2024	66 dB LAeq,16 hour	60 dB LAeq,8 hour	75 dB LAFmax,1 min
Saturday 25th May 2024	65 dB LAeq,16 hour	60 dB LAeq,8 hour	76 dB LAFmax,1 min
Sunday 26th May 2024	64 dB LAeq,16 hour	58 dB LAeq,8 hour	74 dB LAFmax,1 min
Monday 27th May 2024	62 dB LAeq,5 hour 30 minutes	N/A	N/A

Table 2: Measured sound levels at Position 1.

Date	Daytime ambient noise level (07:00 to 23:00)	Night-time ambient noise level (23:00 to 07:00)	Night-time 10 th highest maximum noise event. (23:00 to 07:00)
Tuesday 21 st May 2024	62 dB LAeq,7 hour 15 minutes	56 dB LAeq,8 hour	84 dB LAFmax,1 min
Wednesday 22 nd May 2024	64 dB LAeq,16 hour	57 dB LAeq,8 hour	75 dB LAFmax,1 min
Thursday 23 rd May 2024	62 dB LAeq,16 hour	58 dB LAeq,8 hour	76 dB LAFmax,1 min
Friday 24 th May 2024	62 dB LAeq,16 hour	57 dB LAeq,8 hour	74 dB LAFmax,1 min
Saturday 25 th May 2024	62 dB LAeq,16 hour	57 dB LAeq,8 hour	72 dB LAFmax,1 min
Sunday 26 th May 2024	61 dB LAeq,16 hour	57 dB LAeq,8 hour	73 dB LAFmax,1 min
Monday 27 th May 2024	60 dB LAeq,16 hour	57 dB LAeq,8 hour	77 dB LAFmax,1 min
Tuesday 28 th May 2024	64 dB LAeq,5 hour 30 minutes	N/A	N/A

Table 3: Measured sound levels at Position 2.

3.2.1 Background sound levels.

The periods of interest for the proposed development are daytime and night-time. Daytime is taken as between the hours of 07:00 and 23:00. Night-time is taken as between the hours of 23:00 and 07:00.

In place of using a 1-hour reference time interval for daytime periods recommended in BS 4142, a 15-minute sample has been used instead. As the metric used to determine background levels is a percentile of the level exceeded, using a shorter reference period is a conservative approach.

The below figures show the range of background sound levels for the daytime and night-time periods measured at Position 2 (used to represent background sound levels at the nearest noise sensitive receptor locations), as well as the number of measurements made of each integer value as a percentage (i.e. proportion) of the total number of readings at that location.

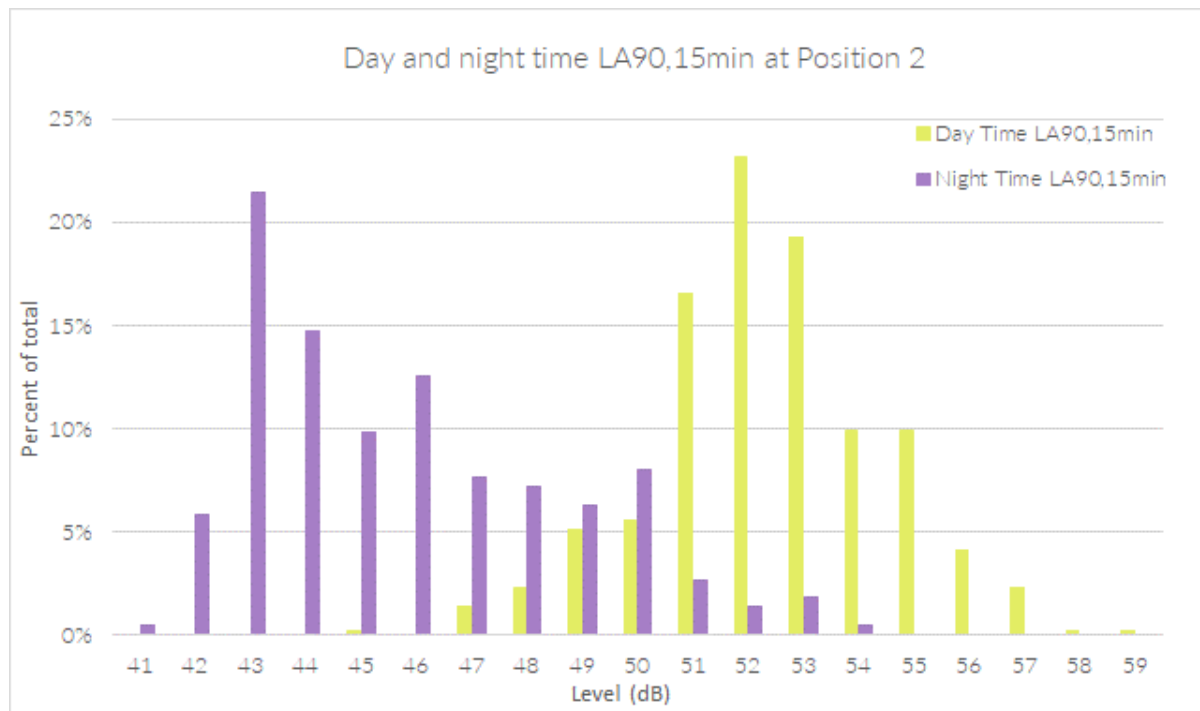


Figure 3: Measured background sound levels (Position 2).

The background sound levels at Position 2 are dominated by road traffic noise. Typical background sound levels, excluding atypical events, are summarised in Table 4. These are considered to be conservative representations of typical background sound levels. Background sound levels at Position 1 have not been included as the position is not representative of the nearest sensitive receptors.

It is worth noting that building services plant noise is present in the area and therefore is an accepted element of local soundscape.

Measurement position	Typical daily background sound levels typically observed	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
2	50 dB LA90,15min	43 dB LA90,15min

Table 4: Typical background sound levels at Position 2 for deriving plant noise limits.

4. Plant noise limits.

Based on the background sound levels derived at Position 2, plant noise limits have been derived and are summarised in Table 5. These are applicable at the nearest residential receptor locations and should incorporate any character corrections warranted in accordance with the guidance contained in BS 4142.

The proposed development should be designed so that the total noise from all plant does not exceed these limits at the facades or gardens of the nearby noise sensitive dwellings (whichever is closest). This is expected to provide suitable protection for all noise sensitive receptors that could be adversely impacted by noise from the proposed development. During detailed design of the proposed development consideration will need to be given to the impacts of plant noise intrusion in conjunction with façade acoustic specifications. The limits in Table 5 could be contained in a condition attached to the proposed development consent.

Receptors	Noise limits for building services plant noise	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Hotel along Blagrove Street	40 dB L _{Ar,15 min}	33 dB L _{Ar,15 min}

Table 5: Plant noise limits.

At this stage, plant selections or locations are yet to be confirmed. However, for any noisy plant positioned on the roof of the proposed development, mitigation measures may be necessary.

Selections and necessary mitigation should be reviewed prior to installation by a suitably qualified acoustician to ensure compliance with the plant noise limits. The secure this, building services plant noise limits can be conditioned.

Indicatively, the following maximum allowable sound power levels of roof plant to adhere to the plant noise limits are as follows, assuming a single unit. In practice this will depend on the number of units, their respective locations and applicable character corrections.

Daytime maximum allowable L _{WA}	Night time maximum allowable L _{WA}
102 dB	95 dB

Table 6: Maximum allowable sound power limit of roof plant.

These values do not consider the impacts on internal levels of the proposed development. Noise from fixed building services plant intruding into dwellings of the proposed development will also need to be considered during design. This will be done through a combination of controlling noise at source and designing facade acoustic performance requirements, and detailing. However, this is not considered a material consideration for planning.

5. Acoustic design statement.

5.1 Stage 1.

Based on the sound level measurements summarised above, the application site is medium risk during daytime hours and high risk during night-time hours when assessing against the initial noise risk categories within ProPG.

The following relevant text is contained in ProPG.

“High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.”

Stage 2 of this ADS therefore outlines the acoustic design process to manage noise on and from Development.

5.2 Stage 2.

5.2.1 Element 1 - Good acoustic design process.

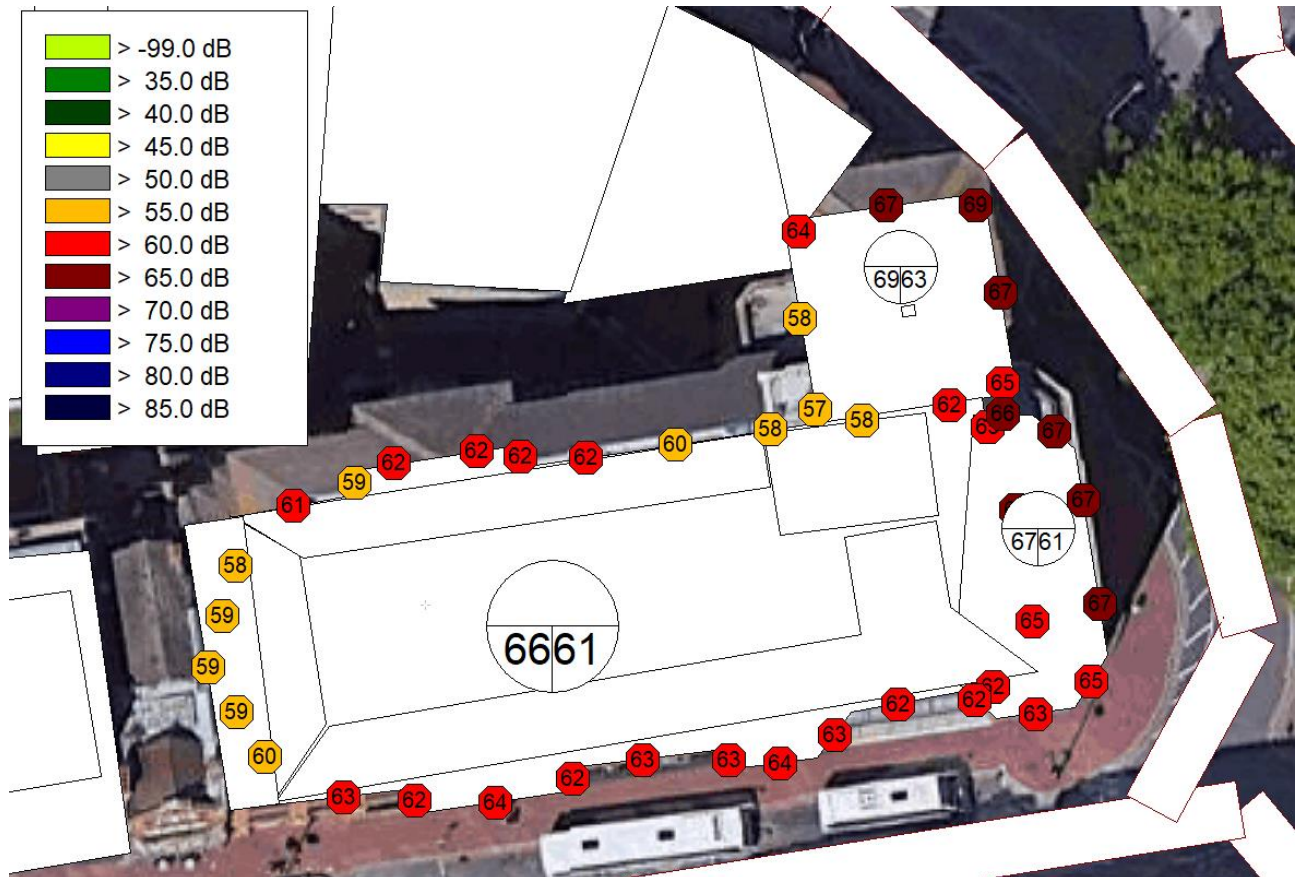
During the daytime, road traffic noise dictates the ambient and maximum noise levels, and night-time ambient levels. Passing trains to the north of the site contribute to the night-time maximum noise events. Acoustically, both of these noise sources need to be considered to manage internal levels.

Indicative acoustic performance requirements are provided for façade elements that are necessary to facilitate suitable internal noise levels.

There are no external areas contained within the proposed development.

5.2.2 Element 2 – Internal noise level guidelines.

The below figures show the highest predicted ambient and maximum noise levels incident on the proposed development facades. The façade noise levels shown in plan view are the highest predicted noise levels on any floor.



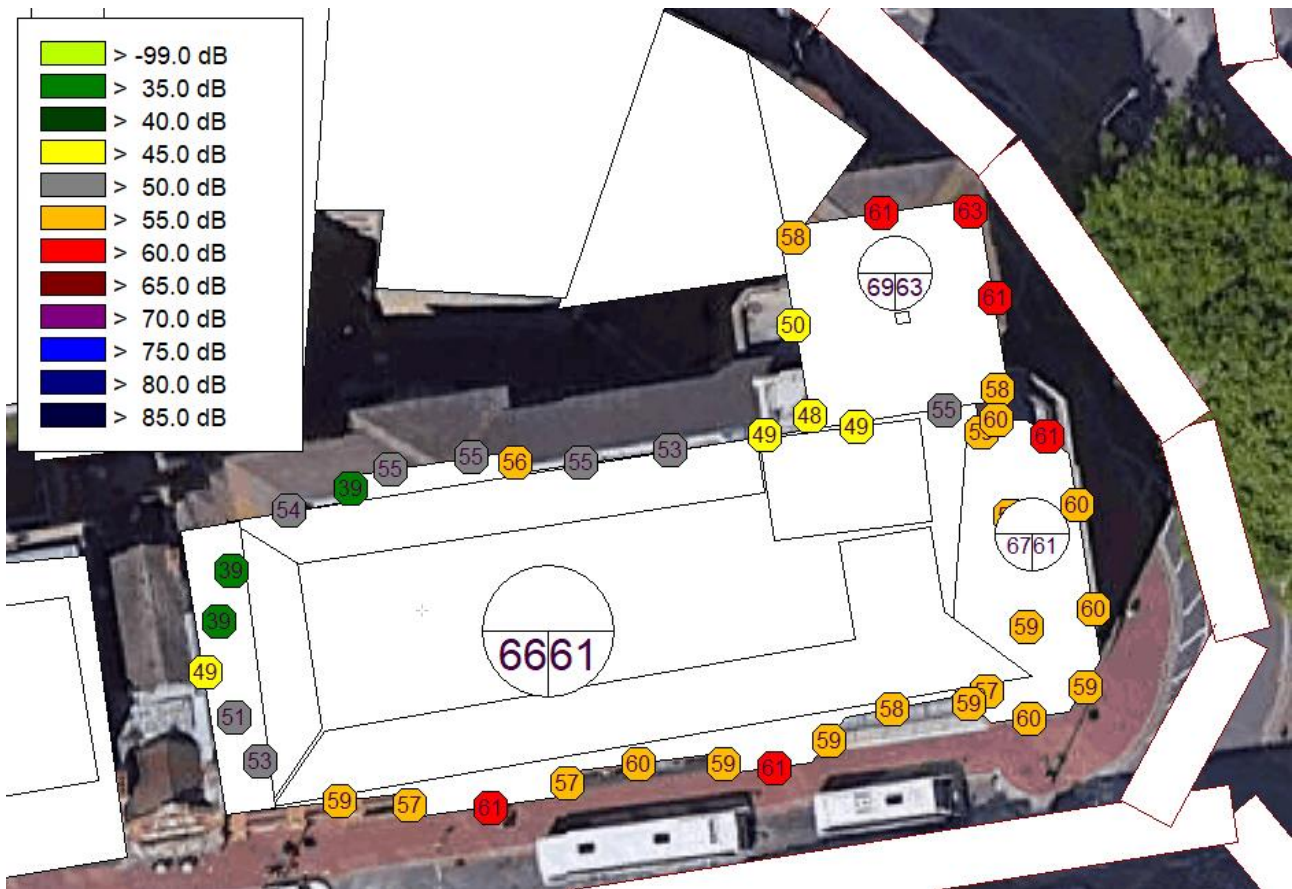


Figure 5 Night-time ambient sound levels ($L_{Aeq,8hr}$) predicted on proposed development facades, dB

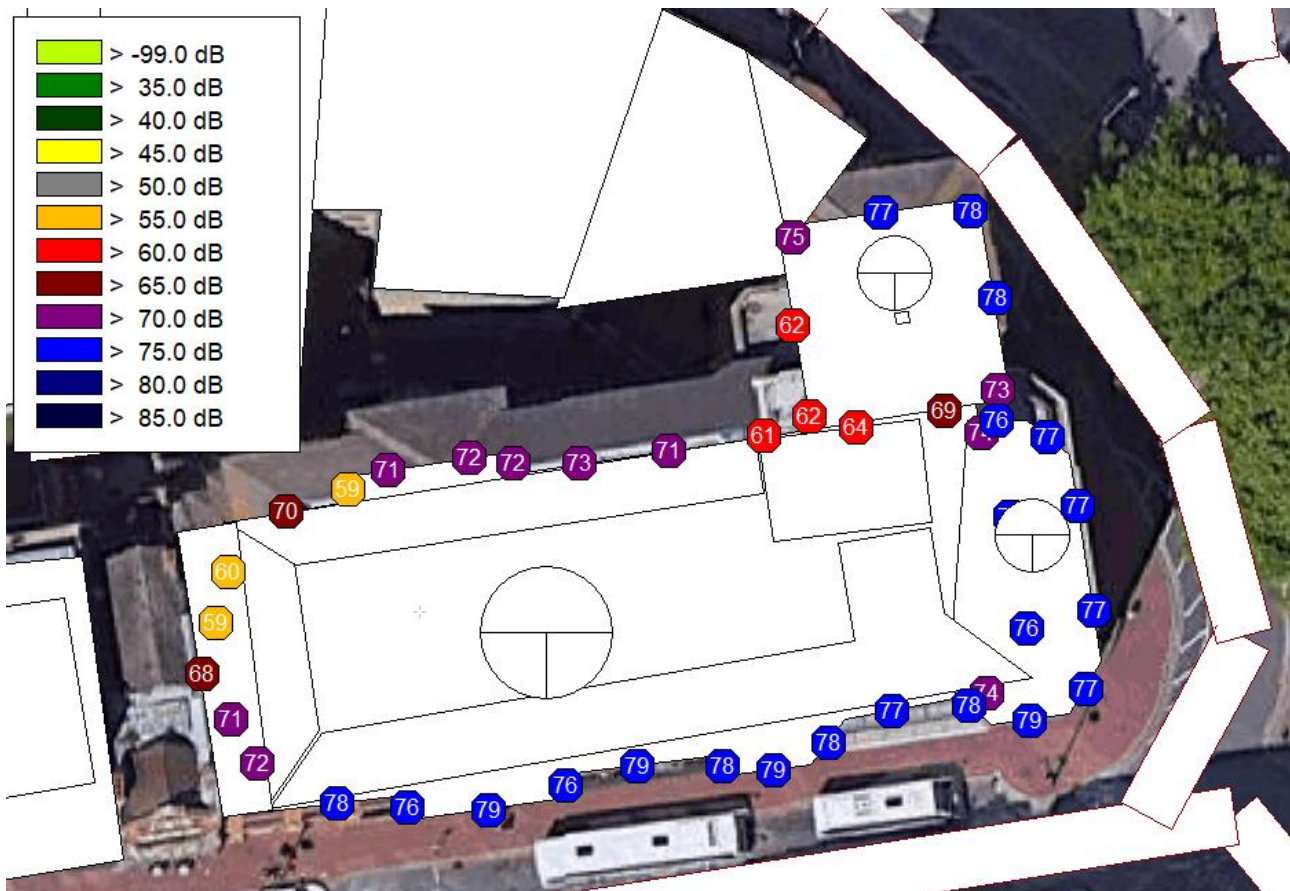


Figure 6: Night-time maximum sound levels ($L_{Amax,T}$) predicted on proposed development facades, dB

The acoustic performance requirements of facades will vary based on orientation and room type.

To contextualise the sorts of likely requirements, indicative acoustic performance requirements for the most onerous facades (i.e. the facades likely to be exposed to the highest levels of noise) are provided for bedrooms and living rooms.

The following tables indicatively summarise the highest sound insulation requirements for each façade orientation, based on room type.

Façade orientation	Glazing sound insulation performance requirement	Other solid element sound insulation requirement
North	R_w+C_{tr} 33 dB	R_w+C_{tr} 44 dB
East	R_w+C_{tr} 38 dB	R_w+C_{tr} 44 dB
South	R_w+C_{tr} 38 dB	R_w+C_{tr} 44 dB
West	R_w+C_{tr} 38 dB	R_w+C_{tr} 44 dB

Table 7: Indicative sound insulation performance requirements for bedrooms.

Façade orientation	Glazing sound insulation performance requirement	Other solid element sound insulation requirement
North	R_w+C_{tr} 27 dB	R_w+C_{tr} 44 dB
East	R_w+C_{tr} 29 dB	R_w+C_{tr} 44 dB
South	R_w+C_{tr} 27 dB	R_w+C_{tr} 44 dB
West	R_w+C_{tr} 27 dB.	R_w+C_{tr} 44 dB

Table 8: Indicative sound insulation performance requirements for living spaces.

It should be noted that, with windows open, internal noise levels would risk exceeding guideline values. Therefore, the strategy for ventilation and management of overheating is to be developed. Opening windows for ventilation / management of overheating may be suitable acoustically for some facades, depending on the results of the overheating analysis (i.e., the context - when people open their windows, how often, and the warranted opening sizes). For any facades that are not suitable acoustically for ventilation / management of overheating via window openings, building services plant can be used to facilitate a suitable environment with windows closed. It is noted in Approved Document O of the Building Regulations (HM Government, 2021) that :

“Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)”

More detailed façade acoustic performance requirements are to be developed as the design for the scheme progresses.

5.2.3 Element 3 – External amenity area noise assessment.

There is no external amenity space for the occupants of the proposed development. Nevertheless, Forbury Gardens Park is situated opposite the proposed development which can provide external green space. Based on the guidance contained in ProPG, this is considered to be a reasonable scenario for occupants.

5.2.4 Element 4 – Assessment of other relevant issues.

Plant noise limits have been set out in Section 4 to comply with local planning policy and avoid the risk of adverse effect on nearby noise sensitive receptors.

6. Conclusion.

Hoare Lea has carried out a noise impact assessment to accompany the planning application the proposed development at North Gate House, Reading.

An acoustic survey has been carried out to quantify the prevailing sound climate in the area, which is dictated by road traffic and passing trains.

Fixed building services plant serving the proposed development are to comply with the noise limits to protect against adverse impact on surrounding sensitive receptors. Plant noise limits must include any character corrections, which should be assessed by a suitably qualified acoustician once selections have been made, prior to installation. Building services plant noise limits can be secured via a condition.

An Acoustic Design Statement has been compiled to assess the suitability of the proposed development in terms of noise. Suitable internal noise levels can be facilitated through selection of glazing with suitable sound insulation performances. Suitable internal noise levels should be provided concurrently with ventilation and management of overheating. Therefore, a strategy is to be provided that does not force occupants to choose between noise and overheating. Where noise levels are particularly high a strategy that works with windows closed may be necessary. To secure this, suitable internal noise levels in accordance with British Standard BS 8233 can be conditioned. It is recommended that any condition reference the 5 dB relaxations to internal noise levels requirements noted in the standard, if a sustainable energy strategy is desired.

References

Acoustics & Noise Consultants. (2020). *Acoustics Ventilation and Overheating Residential Design Guide*. Institute of Acoustics.

BSI. (2014). *BS4142*.

BSI. (2014). *BS8233:2014*.

Department for Environment, Food & Rural Affairs. (2010). *Noise policy statement for England*.

Department for Levelling Up, Housing and Communities. (2021). *National Planning Policy Framework (NPPF)*.

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government. (2021). *Planning practice guidance*.

HM Government. (2021). *The Building Regulations 2010, Approved Document O, Overheating*. Part O of Schedule 1 to the Building Regulations 2010.

Institute of Acoustics. (2017). *ProPG: Planning & Noise*. Association of Noise Consultants.

Appendix A: Policy and guidance documentation.

National Planning Policy.

Noise Policy Statement for England.

Noise Policy Statement for England (NPSE) (Department for Environment, Food & Rural Affairs, 2010) advises that noise impacts should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or noise limits.

NPSE introduces the concepts summarised in **Table 9** that can be applied when considering the significance of noise impacts, which are applied by the World Health Organization.

The document advises that it is not possible to have *'a single objective noise based measure... that is applicable to all sources of noise in all situations'*. NPSE further advises that the sound level at which an adverse effect occurs is likely to be different for different noise sources, for different receptors at different times.

Effect Level	Description
No Observed Effect Level (NOEL)	This is the noise level below which no effect can be detected. In simple terms, below this level of noise, there is no detectable effect on health and quality of life due to the noise being assessed.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level of noise above which adverse effects on health and quality of life can be detected.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.

Table 9: NPSE observed effect levels.

National Planning Policy Framework.

National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2021) sets out the Government's planning policies and how these are expected to be applied. In relation to noise and vibration, NPPF section 15 paragraphs 174, 185 and 187 are presented below:

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

...

- a. 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...'

'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;*
- and*
- c. *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

'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.'

Planning Practice Guidance - Noise.

Online Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, 2021) has been published online to provide greater details in relation to the relevance of noise to the planning process following the introduction of the NPPF and NPSE.

Under *Noise*, this guidance states, under the heading *"How can noise impacts be determined?"*, that the following should be considered by local authorities:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

In line with NPSE, this includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation during the operation of the Proposed Development.

Further guidance on each of the various observed effect levels set out in the NPSE is provided in the '*Noise exposure hierarchy table*' which is reproduced below in Table 2. It is important to note that no specific noise parameters or target noise levels are defined in the text. Under the heading '*What factors influence whether noise could be a Concern?*', the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. This depends on how various factors combine in particular situations.

Perception	Example 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

Table 10: PPG noise exposure hierarchy table of observed effects

Local policy.

the Reading Borough Local Plan (Reading Borough Council, 2019) makes reference to noise in terms of planning within the following policies.

Policy EN17 of the Reading Borough Local Plan (Reading Borough Council, 2019) states the following:

"EN17: 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."

Appendix B: Measurement equipment.

Position 1 measurement equipment.

Rion - Microphone: UC-59 SN 21946

Rion - Pre-amplifier: NH-25 SN 22110

Rion - Sound Level Meter: NL-52 SN 00721004

Position 2 measurement equipment.

Rion - Microphone: UC-59 SN 07371

Rion - Pre-amplifier: NH-25 SN 43577

Rion - Sound Level Meter: NL-52 SN 01143560

Attended measurement equipment.

Brüel and Kjær - Microphone: 4189 SN 3196389

Brüel and Kjær - Pre-amplifier: ZC 0032 SN 29117

Brüel and Kjær - Sound Calibrator: 4231 SN 3014189

Brüel and Kjær - Sound Level Meter: 2250 SN 3003702

Appendix C: Acoustic survey time history.

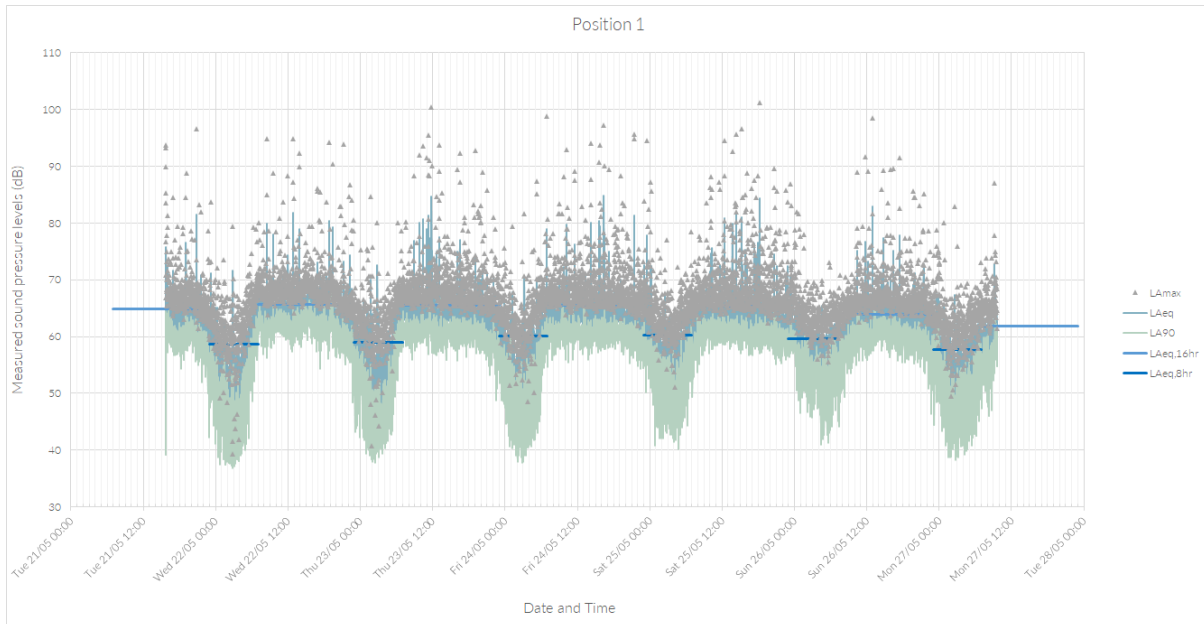


Figure 7: Time history of acoustic survey results (Position 1).

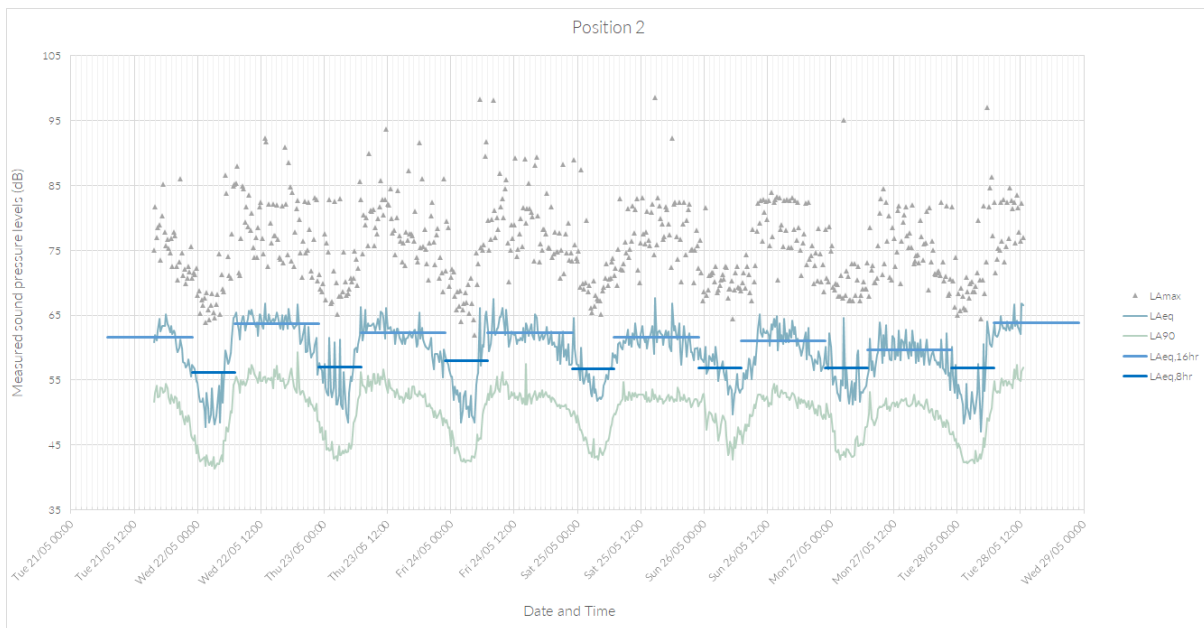


Figure 8: Time history of acoustic survey results (Position 2).



JOSH HALE

ACOUSTICS ENGINEER

+44 1454 806 898
joshhale@hoarelealea.com

HOARELEA.COM

155 Aztec West
Almondsbury
Bristol
BS32 4UB
England

