



4 High Northgate, Darlington

Noise impact assessment

10641.2

27th April 2023

Revision B



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A	First issue	JH	17 th March 23
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2 Summary

- 2.1 This report has been prepared in response to Planning Condition no. 4 of Planning Application 22/01332/FUL for the conversion from a Shisha Coffee House (Sui Generis) to a Restaurant (Class E) at 4 High Northgate, Darlington, DL1 1UN.
- 2.2 Condition 4 requires an assessment of noise impact from proposed plant associated with the development.
- 2.3 Background sound levels have been measured at a position considered representative of the identified noise-sensitive receptors.
- 2.4 Plant details have been provided by the client.
- 2.5 Noise emission from the proposed plant has been determined and noise propagation modelled with proprietary software CadnaA.
- 2.6 The potential noise impact is calculated and rated in accordance with BS 4142.
- 2.7 Based on current proposals, the rated plant sound impact is calculated to be 5 dB above the background sound level.
- 2.8 The initial assessment result indicates the likelihood of an impact between a LOAEL and SOAEL. Considering the context of the assessment it is considered a significant adverse impact is avoided and remaining noise risk is minimised in accordance with NPPF aims.

4 Introduction

- 4.1 A development consisting of a conversion from a Shisha Coffee House (Sui Generis) to a Restaurant (Class E) at 4 High Northgate, Darlington, DL1 1UN.
- 4.2 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the noise from the kitchen extract fan in support of a Planning Condition.
- 4.3 The scope of our instruction includes:
- Measurement of the existing noise environment single location representative of the nearest noise-sensitive receptor;
 - Analysis of proposed source noise levels, using manufacturers' data provided by the client;
 - Calculate noise propagation using proprietary noise modelling software to the noise-sensitive receptor and assess the impact against the requirements of the Local Authority.
- 4.4 The most exposed noise sensitive receptor is identified as the first floor flat directly above the premises.
- 4.5 This assessment is based on the proposed plant details identified by the client.
- 4.6 The potential noise impact from the sources identified is calculated and rated according to the BS 4142 methodology, Reference 1.



Figure 1: Site location

5 Planning condition

- 5.1 Planning Condition 4 associated with Application ref. 22/01332/FUL for this development is shown in Figure 2.

<p>4</p>	<p>Prior to the installation of the flue and/or any noise emitting fans, louvres, ducts or other external plant associated with this permission, a scheme to reduce noise and vibration shall be submitted or the full details of the plant and equipment has been provided and approved by the Local Planning Authority. The development shall not be carried out otherwise than in complete accordance with the approved details which shall be installed prior to the commencement of the use and remain in situ during the lifetime of the development.</p> <p>REASON - In the interests of the amenity of the local area.</p>
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Figure 2: Planning Condition 4

6 Planning policy and noise criteria

6.1 National Planning Policy Framework (NPPF)

- 6.2 The National Planning Policy Framework (NPPF) Reference 2, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. In respect of noise, Paragraph 174, 185 and 187 of the NPPF states the following:

6.3 Paragraph 174:

"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..."

6.4 Paragraph 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 life⁶⁵ [See Explanatory Note to the Noise Policy Statement for England];
- 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;

6.5 Paragraph 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. "

6.6 Noise Policy Statement for England (NPSE)

6.7 The Noise Policy Statement for England, Reference 3, states three policy aims as follows:

"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."

6.8 The NPSE defines adverse noise impact as follows:

- No Observed Effect Level (NOEL)
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.
- Lowest Observed Adverse Effect Level (LOAEL)
This is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL)
This is the level above which significant adverse effects on health and quality of life occur

6.9 The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

- 6.10 "... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

6.11 **Planning Practice Guidance – Noise**

6.12 Further Government guidance on how planning can manage potential noise impact in new development is outlined in Planning Practice Guidance (PPG-N) notes on the Government website: www.gov.uk/guidance/noise--2

6.13 **BS 4142**

6.14 BS 4142, Reference 1, defines an assessment method to quantify the potential level for adverse impact from commercial and / or industrial noise sources impacting upon sound sensitive receptors i.e. residential development.

6.15 The method provides an initial estimate of the impact significance by comparing the Rated noise against the background sound levels, as summarised below:

- 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 + 5dB 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 sources having a low impact, depending on the context.

6.16 With regards to context, BS 4142 notes that where the initial estimate of the impact needs to be modified due to the context, all pertinent factors should be taken into consideration, including the absolute level of the sound:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night”.

6.17 The terminology used in BS 4142 to describe the various levels of adverse impact is consistent with the terminology used in the NPPF, NPSE and PPG-N.

6.18 NPPF states:

“...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.”

6.19 Therefore, where an adverse impact is identified an acoustic design process is required to demonstrate how the risk of adverse impact can be mitigated and minimised in the finished development.

7 Existing acoustic environment

- 7.1 The existing acoustic environment was measured between 20:55 and 21:55 hours on the 2nd March 2023.
- 7.2 The measurement position is shown in Figure 1.
- 7.3 The microphone was located 1.5 metres above ground level and away from other reflecting surfaces such that the measurements are considered free-field.
- 7.4 Data was recorded in single-octave band frequencies at one-second intervals throughout the 24-hour measurement period.
- 7.5 The most significant noise source was road traffic.
- 7.6 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	Norsonics 118	31697
Calibrator	Norsonics 1251	31286

Table 1: Equipment used

- 7.7 Both meter and calibrator have current calibration certificates traceable to national standards. The sound level meter has been calibrated within the last two years and calibrator has been calibrated within the last year in accordance with the guidance of BS 4142; calibration certificates are available on request.
- 7.8 The equipment was field-calibrated before and after the measurements with no significant drift in sensitivity noted.
- 7.9 Wind speeds were below 5 m/s, some light rain occurred in the last 10 minutes of the measurement but it is not considered to have a significant effect on the results.
- 7.10 **Residual sound level, L_r**
- 7.11 As the specific sound source under assessment was not operating during the noise survey period, the existing acoustic environment measured during the survey period is the L_r .
- 7.12 **Background sound level**
- 7.13 The background sound level, $L_{A90, 1-hr}$, is derived from the L_r , $L_{Aeq, 1-hr}$, as shown in Table 2.

Location	Start time (hh:mm)	$L_{Aeq, 1-hr}$	$L_{A90, 1-hr}$ (dB)
MP1	21:55	62	50

Table 2: Summary of the measured background sound level

- 7.14 The measured background sound level in the late evening is considered to be during the likely quietest time at which the kitchen extract fan is operating. This late evening background sound level is adopted for the assessment.

8 Noise sources

8.1 Proposed plant and associated noise levels

8.2 The client has advised the Kitchen Extract Fan will be a 350 mm diameter Flaktwood JM Aerofoil fan product. The specific product is not known so the 2 pole version of the 35JM fan is considered in the assessment, as it has higher noise levels than the 4 pole version.

8.3 The location of the all the units have been taken from the architects' drawings, Reference 6.

8.4 The proposed plant considered in the assessment is summarised in Table 3.

Plant	Manufacturer	Model	No. proposed
Kitchen Extract Fan (KEF)	Flaktwoods	35JM/16/2/5/34	1

Table 3: Proposed plant

8.5 Manufacturer supplied noise levels are shown in Table 4.

Plant	Data type	dB(A)	Single-octave band centre frequency (Hz)						
			Linear noise levels (dB)						
			63	125	250	500	1k	2k	4k
KEF	L _w	65	84	85	84	83	82	77	73

Table 4: Manufacturers noise levels

8.6 The client has advised the in-duct attenuator is a no-pod 1 x diameter type. The in-duct attenuator insertion losses provided by Flaktwoods are shown in Table 5

Attenuator ref.	Single-octave band centre frequency (Hz)						
	In-duct attenuator insertion losses (dB)						
	63	125	250	500	1k	2k	4k
355 – B	1	2	4	10	12	10	9

Table 5: Attenuator in-duct insertion loss

8.7 If plant emitting higher noise levels than those accounted for in this report is proposed, or additional plant also proposed, the impact should be reassessed to check compliance with the Planning Condition limits.

8.8 Operation times

8.9 As described in Paragraph 7.14, the assessment period is considered during the late evening, which is the quietest time during which the fan is expected to operate.

8.10 The fan is assumed to operate continuously throughout the 1-hour assessment period; this is a prudent assumption.

8.11 Noise transmission and propagation

8.12 Noise transmission and propagation is modelled to the NSR based on the noise source data detailed, using proprietary software, CadnaA, Reference 4.

8.13 This models noise propagation outdoors according to ISO 9613, Reference 5.

8.14 The model parameters and assumptions are summarised in Appendix C.

9 Assessment results

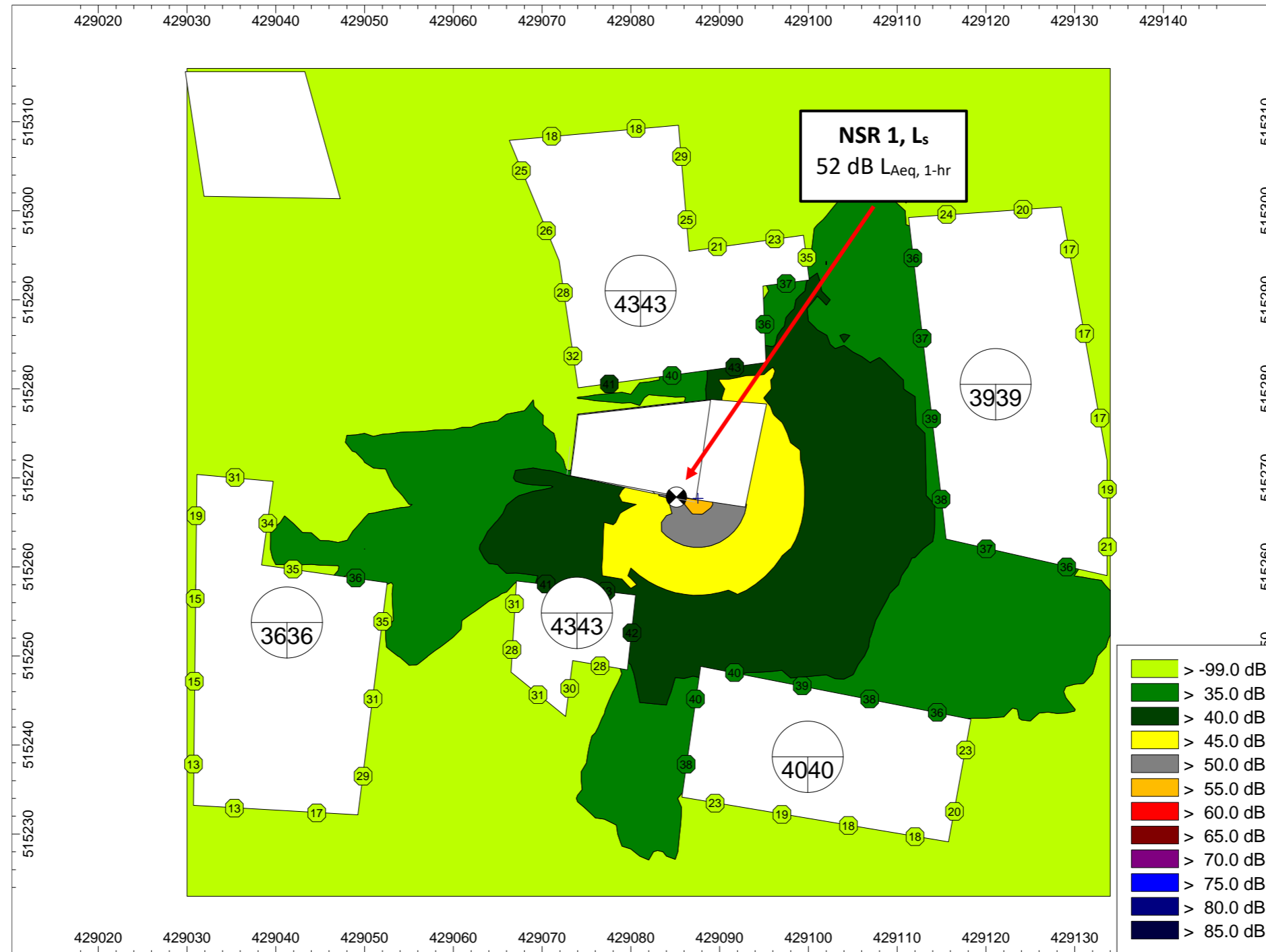


Figure 3: Sound contours at 4 m, showing the calculated specific sound level, L_{Aeq} 1 hr

Parameter	Late-evening assessment	Relevant clause of BS 4142	Commentary
Background sound level	50 dB $L_{A90, 1-hr}$	8.1.2	Measured during the quietest portion of the day
Specific sound level L_s , due to all sources for the required assessment interval	52 dB $L_{Aeq, 1-hr}$	7.27.3.6	The on-time for the sources during the assessment period are discussed in Section 8.8. The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 3; the L_s assessed is the calculated level at the most exposed window of the NSR.
Acoustic feature correction	+ 3 dB	9.2 9.3	A subjective assessment to determine acoustic features is undertaken, and the following penalties are considered applicable: <ul style="list-style-type: none"> • Tonality – 3 dB; • Impulsivity – 0 dB; • Intermittency – 0 dB; • Other – 0 dB;
Rating level, $L_{Ar,Tr}$	55 dB		
Uncertainty of assessment		10	The background noise level is measured during the quietest portion of the day. The calculated rating level is determined based on worst-case source noise levels for the 2-pole version of the fan. Should the 4-pole version be used, a 20 dB reduction in noise levels could be expected. The current elevation plans indicate a cowl at the top of the extract flue, no bend correction has been applied here, so up to 3 dB reduction in noise levels due to the cowl could be expected.
Excess of $L_{Ar,Tr}$ over background sound level	+ 5 dB	11	Considering the context of Appendix D, the assessment result indicates the likelihood of an adverse impact between a LOAEL and SOAEL. Given the fan is not expected to operate during the night-time, the fan noise has already been mitigated with an attenuator and the assessment has been carried out on a prudent basis as described above, it is considered a significant adverse impact has been avoided.

Table 6: BS 4142 assessment results, based on current proposals

10 Conclusion

- 10.1 This report has been prepared in response to Planning Condition no. 4 of Planning Application 22/01332/FUL for the conversion from a Shisha Coffee House (Sui Generis) to a Restaurant (Class E) at 4 High Northgate, Darlington, DL1 1UN.
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- 10.8 The initial assessment result indicates the likelihood of an impact between a LOAEL and SOAEL. Considering the context of the assessment is considered a significant adverse impact is avoided and remaining noise risk minimised in accordance with NPPF aims.

11 References

- 1 BS 4142 2014: A1+2019, Method for rating and assessing industrial and commercial sound.
- 2 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, July 2021.
- 3 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 4 CadnaA environmental noise modelling software, version 2017, Datakustik GmbH.
- 5 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.
- 6 Architects drawings, Wardman Brown, L022101-005, December 2022.
- 7 ISO 12913-1:2014 Acoustics, Soundscape, Part 1: Definition and conceptual framework

Appendix A Noise exposure hierarchy

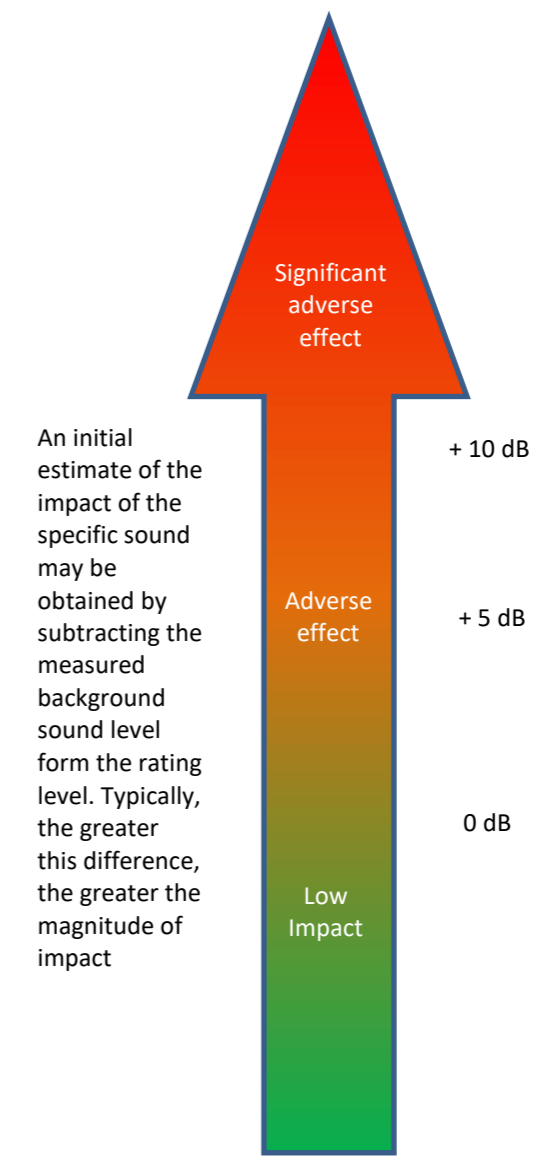
Planning Practice Guidance - Noise				BS 4142: Initial estimate of external noise risk significance
Noise	Example of outcomes	Increasing effect level	Action	
Present and very distributive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate 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	 <p>An initial estimate of the impact of the specific sound may be obtained by subtracting the measured background sound level from the rating level. Typically, the greater this difference, the greater the magnitude of impact</p>
Present and distributive	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	
Significant Observed Adverse Effect Level (SOAEL)				
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	
Lowest Observed Adverse Effect Level (LOAEL)				
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	
No Observed Adverse Effect Level (NOAEL)				
Not present	No effect	No Observed Effect	No specific measures required	
No Observed Effect Level (NOEL)				

Table 7: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Residual and background sound levels

B.1 Residual sound level time history, $L_{Aeq, 1 \text{ sec}}$

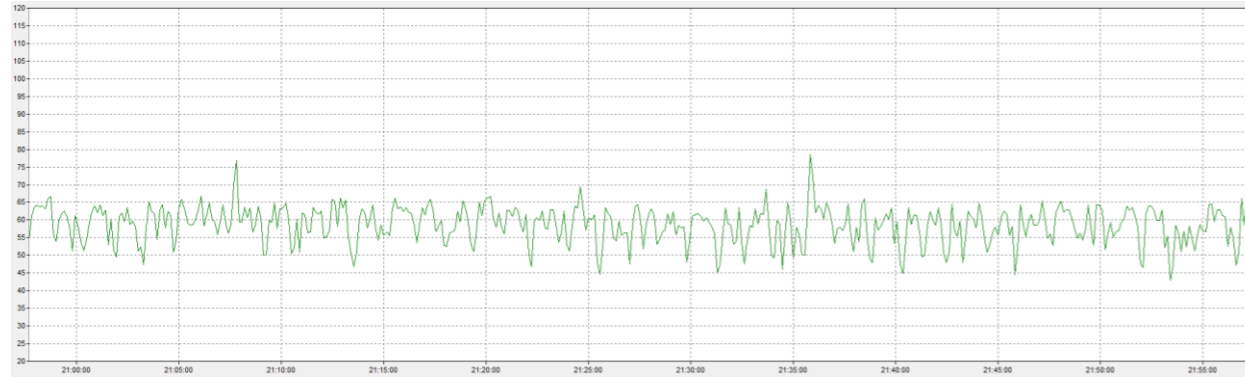


Figure 4: Residual sound level time history, $L_{Aeq, T}$ (dB)

Appendix C Noise transmission and propagation

C.1 Noise transmission and propagation is modelled using proprietary software, CadnaA. This models noise propagation outdoors according to ISO 9613. The parameters used, source of data and details are described in Table 8.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architects' drawings	Architects' drawings, Reference 6
Topography	Site observations and Google Street view	Modelled with no changes in topography
Building heights	Site observations and Google Street view	3 m per storey + 3 m roof (residential properties)
Receptor positions	Site observations and Google Street view	On the NSR façade closest to the source at a height of 4 m to represent first and floor window height
Building and barrier absorption coefficient	ISO 9613-2	0.21 to represent a reflection loss of 1 dB
G, Ground factor	ISO 9613-2	Hard ground, $G = 0$
Max. order of reflections	Apex Acoustics	Three

Table 8: Modelling parameters and assumptions

C.2 A plan view and a 3D perspective of the CadnaA model are shown in Figure 5 and Figure 6 respectively.

C.3 NSR receivers are positioned as shown by the black and white circles in Figure 5.

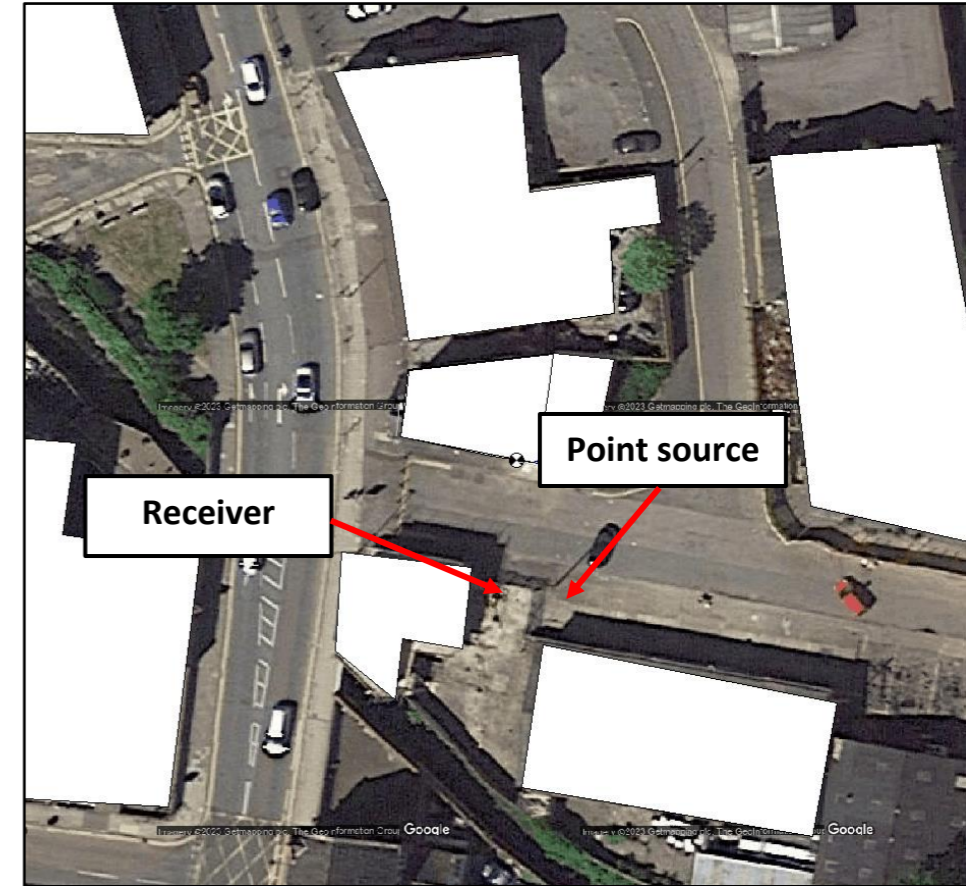


Figure 5: Plan view of the CadnaA model

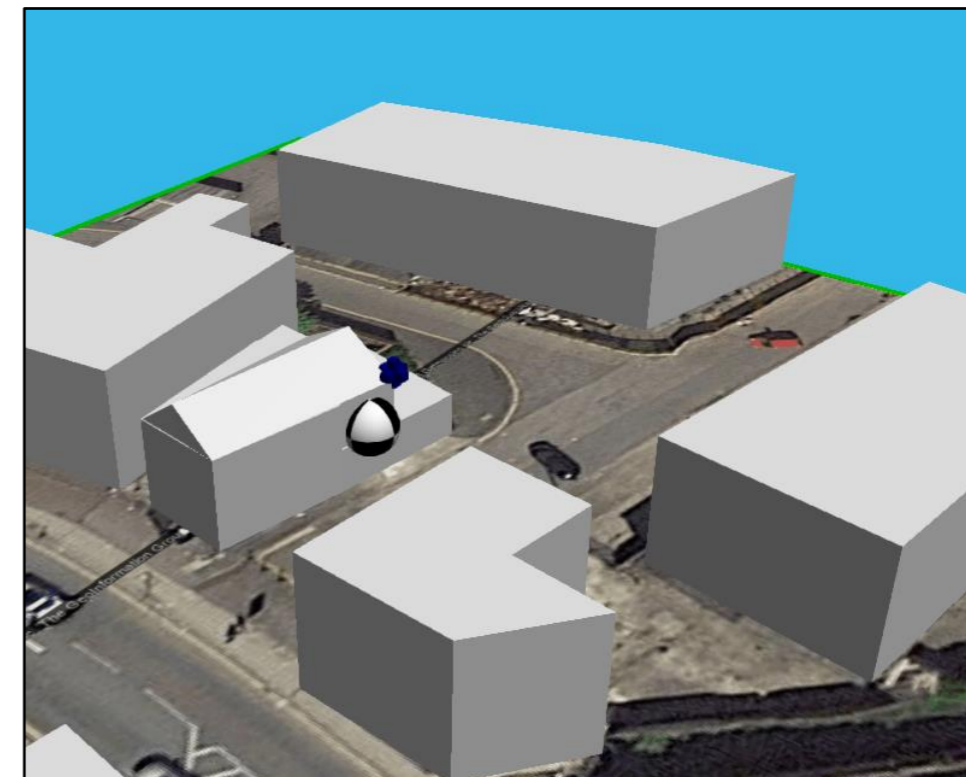


Figure 6: 3D view of the CadnaA model

Appendix D Context of acoustic environment

- D.1 The context can be expressed in relation with the soundscape, as defined in BS ISO 12913-1, Reference 7.
- D.2 ISO 12913-1 states that:
- D.3 “The context may influence soundscape through the auditory sensation, the interpretation of auditory sensation and the responses to the acoustic environment.”
- D.4 The process of experiences that describe soundscape and illustrated in Figure 7.
- D.5 The acoustic environment is defined as being:
- D.6 “... the sound from all sound sources modified by the environment. Modification by the environment includes effects on sound propagation, resulting for example from meteorological conditions, absorption, diffraction, reverberation and reflection.”
- D.7 The auditory sensation is described as:
- D.8 “... a function of neurological processes that begin when auditory stimuli reach the receptors of the ear. This is the first stage in detecting and representing the acoustic environment. Auditory sensation is influenced by masking, spectral contents, temporal patterns and spatial distribution of the sound sources.”
- D.9 The interpretation of auditory sensation refers to
- D.10 “... unconscious and conscious processing of the auditory signal to create useful information, which may lead to awareness or understanding of the acoustic environment. Awareness of the acoustic environment, in context, represents an experience of the acoustic environment.”
- D.11 Responses describe the short-term reactions and emotions while the outcomes refer to the overall, long-term consequences facilitated or enabled by the acoustic environment.

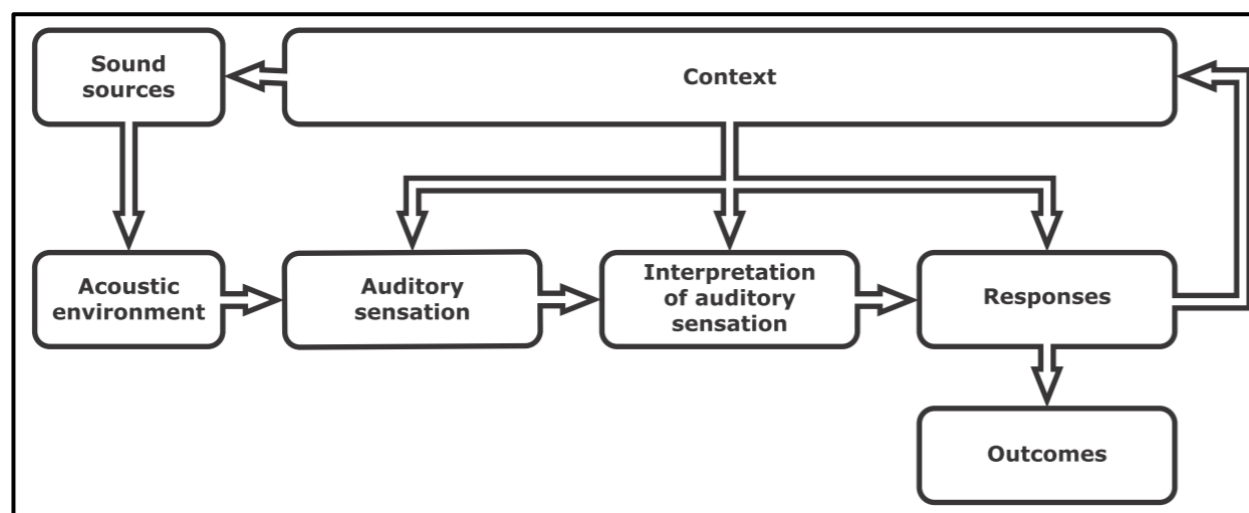


Figure 7: Elements in the perceptual construct of soundscape

- D.12 The Planning Practice Guidance notes on noise state that the impact is categorised as SOAEL when “noticeable and disruptive”. It details:
- D.13 “The noise causes a material change in behaviour and/or attitude, 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.”
- D.14 Such effect is typically defined as a difference between the BS 4142 rating level and the background level of +10 dB, depending on the context, and should be avoided on a regular basis.
- D.15 **Assessment of context**
- D.16 The rating level is calculated to be 5 dB above the background sound level.
- D.17 As described in Section 6.13, a level 10 dB above the background sound level indicates the likelihood of a significant adverse impact, dependent on the context.
- D.18 A level of 5 dB above the background sound level provides an initial indication of an adverse impact, dependent on the context.
- D.19 The site location is amongst a mixed industrial, commercial, retail and residential area, with takeaways, pubs and car mechanics nearby.
- D.20 The fan is not expected to operate during the night-time, and the assessment has been carried out against the worst-case late-evening background noise level.
- D.21 The receptor at which the background sound level is exceeded is the nearest window to the extract fan of the property directly above the development. Other receptor locations are subject to significantly lower noise levels and impacts.

Appendix E Professional qualifications and competence

- E.1 All Apex Acoustics consultants work under the close supervision of a member who holds qualification in acoustics and is a member of the IOA.
- E.2 This can be verified by searching the Institute of Acoustics’ list of Members, available here, with the surname of the consultant.
<http://www.ioa.org.uk/membership-check>
- E.3 Apex Acoustics is a member of the Association of Noise Consultants (ANC). The ANC is a trade organisation which seeks to raise the standards of acoustic consultancy and as such there are barriers to entry to ensure member’s competency.
- E.4 This report has been completed and checked by an appropriately qualified and experienced acoustic consultant.