Northumbria Coach Lane Campus, Newcastle

Noise impact assessment

10892.1

5th March 2024

Revision B

Northumbria Coach Lane Campus, Newcastle

Noise Impact Assessment

10892.1B

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A	First issue	KT	22nd October 23
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1 Contents

2 Summary

2.1 This report has been prepared in support of a Planning Application for the installation of air source heat pumps at Block F-H (main block) and Sports Hall of Northumbria University at Coach Lane, Newcastle.

2.2 Background sound levels have been measured at two positions considered representative of the identified noise-sensitive receptors.

2.3 Plant details have been provided by the client.

2.4 Noise emission from the proposed plant has been determined and noise propagation modelled with proprietary software CadnaA.

2.5 The potential noise impact is calculated and rated in accordance with BS 4142.

2.6 Based on current proposals, the rated plant sound impact is calculated to be below the background sound level.

2.7 Considering the context of the existing acoustic environment, the BS 4142 assessment results indicate the likelihood of a low impact. This impact is considered to be below a LOAEL in alignment with the NPSE aims.

4 Introduction

4.1 The installation of air source heat pumps has been proposed at Block F-H (main block) and Sports Hall of Northumbria University at Coach Lane, Newcastle; the site location is shown in Figure 1.

4.2 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the noise from mechanical plant associated with the development in support of a Planning Application.

4.3 The scope of our instruction includes:

Measurement of the existing noise environment over a 24-hour period two locations 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 in accordance with BS 4142: 2014; and

Advise on a scheme for noise mitigation to satisfy.

4.4 This report presents the evaluation of the potential noise impact from associated with the proposed development on the identified worst affected noise-sensitive receptor (NSR), in support of a Planning Application.

4.5 The NSR are identified as the residential properties:

To the south of the site on Westminster Way;

To the west of the site on Coach Lane; and

To the north of the site on Manorfield.

4.6 This assessment is based on the proposed plant details provided by the client.

4.7 The potential noise impact from the sources identified is calculated and rated according to the BS 4142 methodology, Reference 1.

Figure 1: Proposed sites and identified NSR

5 Planning policy and noise criteria

5.1 National Planning Policy Framework (NPPF)

5.2 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:

5.3 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…"

5.4 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 life[65 [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;

5.5 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. "

5.6 Noise Policy Statement for England (NPSE)

5.7 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."

5.8 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

5.9 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:

"… 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."

5.10 Planning Practice Guidance – Noise

5.11 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

5.12 BS 4142

5.13 The terminology used in BS 4142 to describe the various levels of potential adverse impact is respect to the PPG-N noise hierarchy, are summarised Appendix A.

6 Existing acoustic environment

6.1 The existing acoustic environment was measured for a 24-hour period from 10:50 hours on the 11th October 2023.

6.2 The measurement positions are shown in Figure 1.

Figure 2: Measurement positions

6.3 The microphone at P1 was located 1.5 metres above ground level within the university boundary and the microphone at P2 was located at 3 metres above ground level. Both microphones were located away from other reflecting surfaces such that the measurements are considered free-field.

6.4 The position at P2 was selected to be representative of the existing acoustic environment at the NSR to the west of the site on Coach Lane and north of the site on Manorfield.

6.5 Data was recorded in single-octave band frequencies at one-second intervals throughout the 24-hour measurement period.

6.6 The most significant noise source was road traffic.

6.7 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-05832-E0
Calibrator	Larson Davis CAL 200	9462
Sound Level Meter	NTi XL2	A2A-09585-E0
Calibrator	Larson Davis CAL 200	12573

Table 1: Equipment used

6.8 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.

6.9 The equipment was field-calibrated before and after the measurements with no significant drift in sensitivity noted.

6.10 Residual sound level, L_r

6.11 As the specific sound source under assessment is not yet operating on-site, the existing acoustic environment measured during the survey period is the L_r.

6.12 Background sound level

6.13 The background sound level, $L_{A90,\ 15\text{-}min}$ is calculated from the L_r, $L_{Aeq\ 15\text{-}min}$.

6.14 Statistical analysis is undertaken of the results of all the $L_{A90,\ 15\text{-}min}$ data following the guidance of BS 4142, to determine a background sound level considered to be representative of the assessment period. Results of the analysis are shown in in Appendix B.

6.15 Based on the statistical analysis results, the background sound level considered representative of the daytime and night-time assessment periods are shown in Table 2 along with the ambient sound level.

Position	Assessment period	$L_{A90,15\text{-}min}$ (dB)	L_{Aeq} (dB)
P1 South of the site (Westminster Way)	Daytime (07:00 – 23:00 hrs)	40	47
	Night time (23:00 – 07:00 hrs)	33	39
P2 West of the site (Coach Lane)	Daytime (07:00 – 23:00 hrs)	46	69
	Night time (23:00 – 07:00 hrs)	35	61

Table 2: Background and ambient sound levels representative of the assessment periods

7 Noise sources

7.1 Proposed plant and associated noise levels

7.2 The mechanical plant is assessed based on plant details supplied by the client.

7.3 The location of the all the units have been taken from the drawings provided by the client, Reference 4.

7.4 The proposed plant is understood to comprise of that summarised in Table 3.

Plant	Manufacturer	Model	No. proposed
Air source heat pump (ASHP) for Block F-H (Main Block)	Clade	ASPEN 200KW	2
		ASPEN 100KW	1
Air source heat pump (ASHP) for Sports Hall		ASPEN 100KW	3

Table 3: Proposed plant

7.5 Manufacturer supplied noise levels are shown in Table 4.

Plant	Data type	dB(A)
ASPEN 200KW	L_w	77.9
ASPEN 100KW	L_w	77.2

Table 4: Manufacturers noise levels

7.6 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.

7.7 Operation times

7.8 All plant is assumed to operate continuously during the daytime 1-hour and night-time 15-minute assessment periods; this is a prudent assumption.

7.9 Noise transmission and propagation

7.10 Noise transmission and propagation is modelled to the NSR based on the noise source data detailed, using proprietary software, CadnaA, Reference 5.

7.11 This models noise propagation outdoors according to ISO 9613, Reference 6.

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

8 Assessment results – based on mechanical engineers proposals

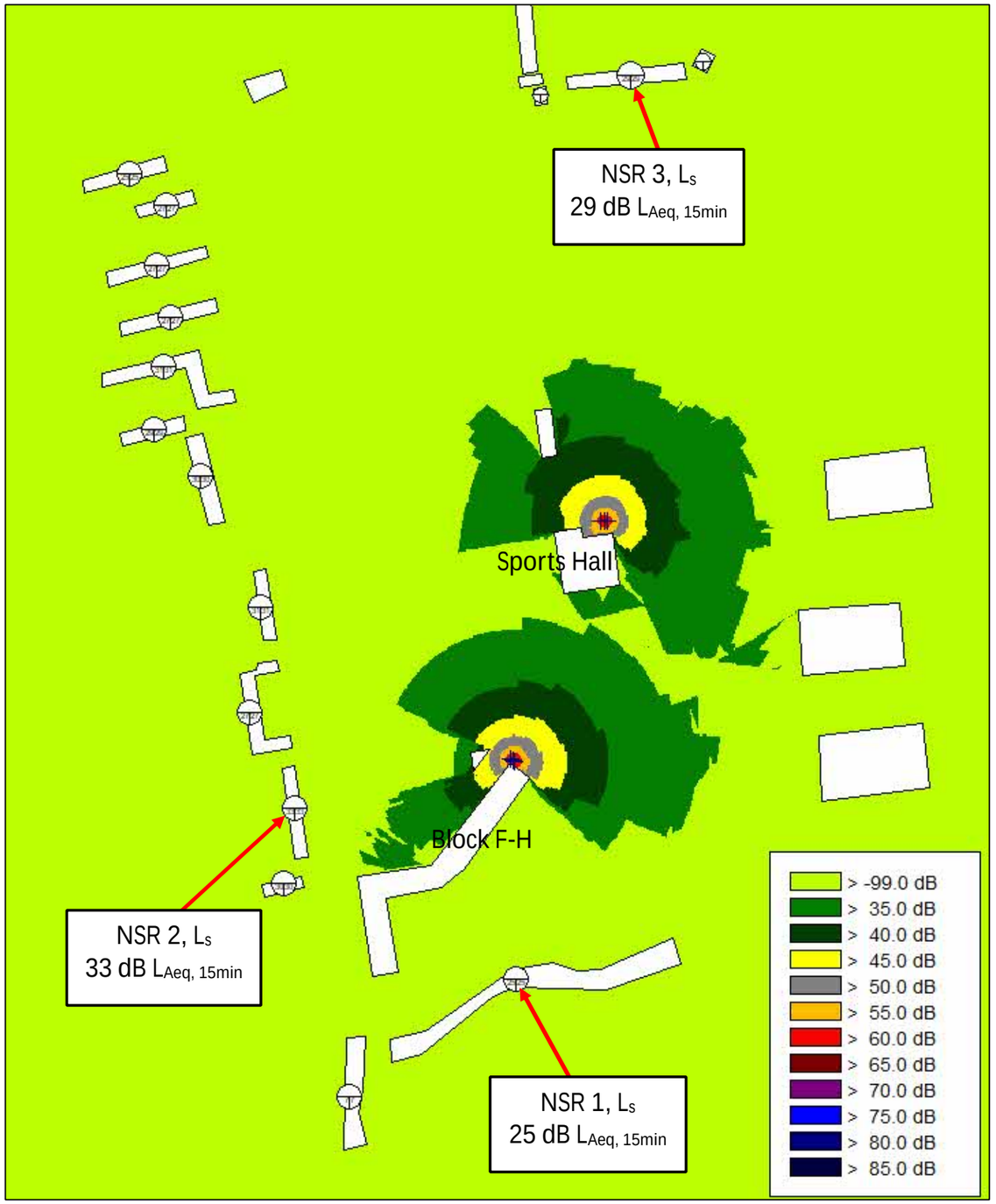

Figure 3: Sound contours at 4 m, showing the calculated specific sound level, $L_{Aeq\ 15\ min}$ based on current proposals

Parameter	NSR 1 (South)		NSR 2 (West)		NSR 3 (North)		Commentary
	Daytime assessment	Night-time assessment	Daytime assessment	Night-time assessment	Daytime assessment	Night-time assessment	
Measured residual sound level L_r,	47 dB $L_{Aeq, 15\text{-}min}$	39 dB $L_{Aeq, 15\text{-}min}$	69 dB $L_{Aeq, 15\text{-}min}$	61 dB $L_{Aeq, 15\text{-}min}$	69 dB $L_{Aeq, 15\text{-}min}$	61 dB $L_{Aeq, 15\text{-}min}$	The L_r was measured at a proxy location, where the L_r is considered representative of the assessment position.
Background sound level	40 dB $L_{A90, 15\text{-}min}$	33 dB $L_{A90, 15\text{-}min}$	46 dB $L_{A90, 15\text{-}min}$	35 dB $L_{A90, 15\text{-}min}$	46 dB $L_{A90, 15\text{-}min}$	35 dB $L_{A90, 15\text{-}min}$	Considered representative of the assessment period based on statistical analysis detailed in Appendix B.
Specific sound level $L_{s,}$ due to all sources for the required assessment interval	25 dB $L_{Aeq, 1\text{-}hr}$	25 dB $L_{Aeq, 15\text{-}min}$	33 dB $L_{Aeq, 1\text{-}hr}$	33 dB $L_{Aeq, 15\text{-}min}$	29 dB $L_{Aeq, 1\text{-}hr}$	29 dB $L_{Aeq, 15\text{-}min}$	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 highest calculated level.
Acoustic feature correction	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB	A subjective assessment to determine acoustic features is undertaken, and the following penalties are considered applicable as the specific noise levels are significantly below the ambient levels and any characteristics are unlikely to audible: Tonality – 0 dB; Impulsivity – 0 dB; Intermittency – 0 dB; Other – 0 dB;
Rating level, $L_{Ar,Tr}$	25 dB	25 dB	33 dB	33 dB	29 dB	29 dB	
Uncertainty of assessment	-	-	-	-	-	-	Background data was obtained over a 24-hr period, accounting for the changing acoustic environment. The measurement locations are proxy potions for the northern receptors, but the background levels should be very similar at night.
Excess of $L_{Ar,Tr}$ over background sound level	-15 dB	-8 dB	-13 dB	-2 dB	-17 dB	-6 dB	Considering the context the assessment result indicates the likelihood of a low impact.

Table 5: BS 4142 assessment results, based on current proposals

9 Conclusion

9.1 Based on current proposals, the rated plant sound impact is calculated to be below the background sound level.

9.2 Considering the context of the existing acoustic environment the assessment result indicates the likelihood of a low impact, on the basis of implementing the proposed noise control measures. This impact is considered to be below a LOAEL in alignment with the NPPF and NPSE aims.

10 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 Drawing provided by client, Proposed ASHP Locations – Coach Lane Campus.pdf, received on 14th November 2023.

5 CadnaA environmental noise modelling software, version 2017, Datakustik GmbH.

6 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.

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	
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)				

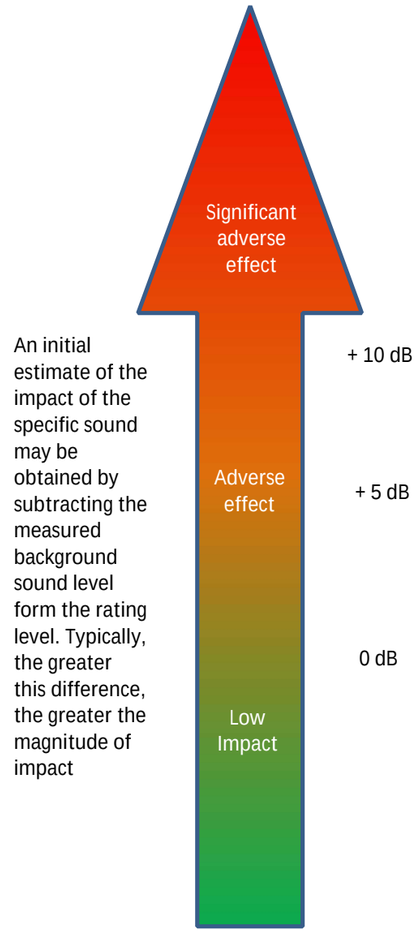

Table 6: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Background sound levels

B.1 Analysis to determine the typical background sound level representative of the daytime and night-time period is undertaken following the guidance of BS 4142, with results shown in Figure 4 - Figure 7.

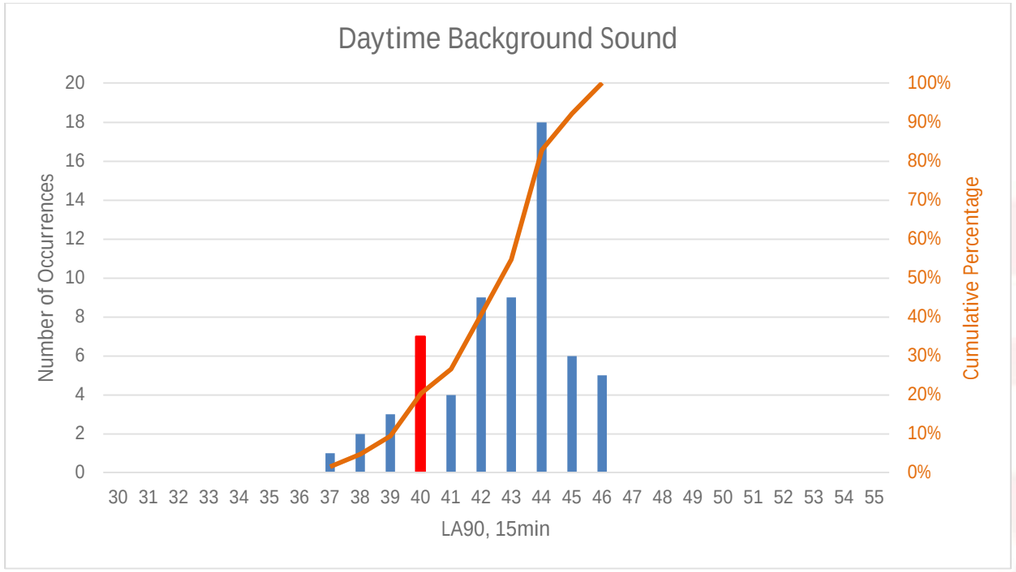

Figure 4: Analysis of daytime background levels, $L_{A90,\ 15min}$ at Position 1

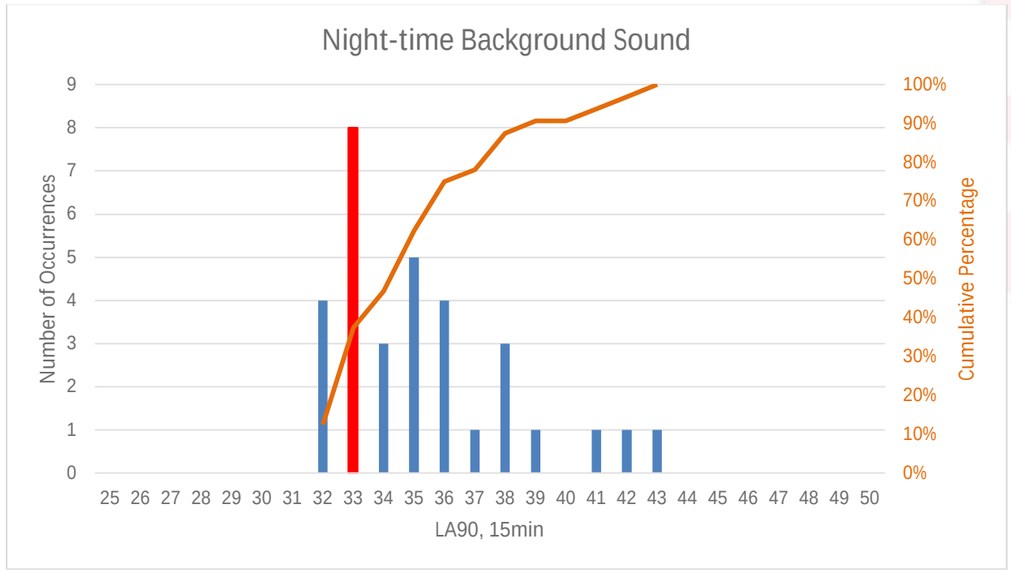

Figure 5: Analysis of night-time background levels, $L_{A90,\ 15min}$ at Position 1

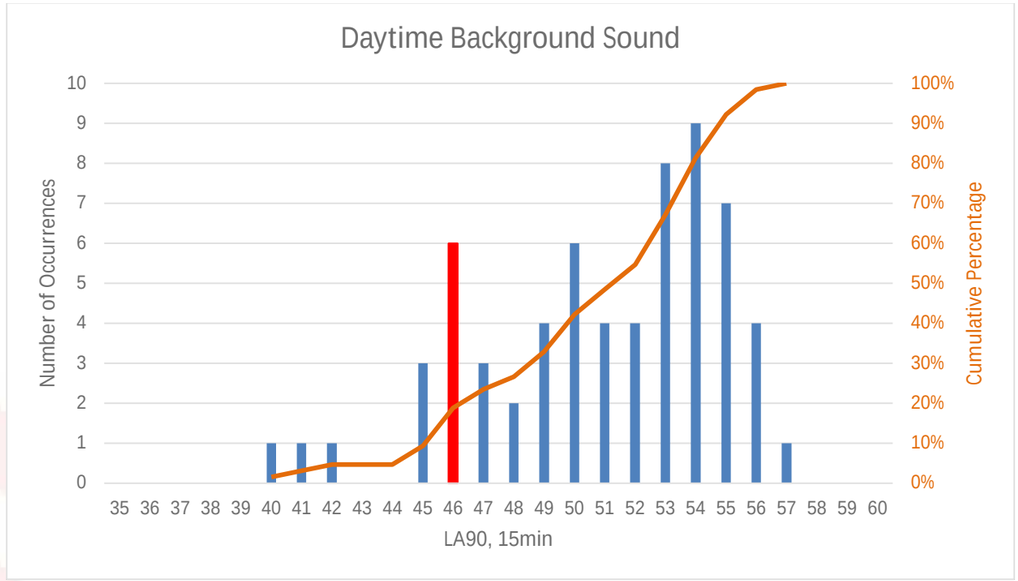

Figure 6: Analysis of daytime background levels, $L_{A90,\ 15min}$ at Position 2

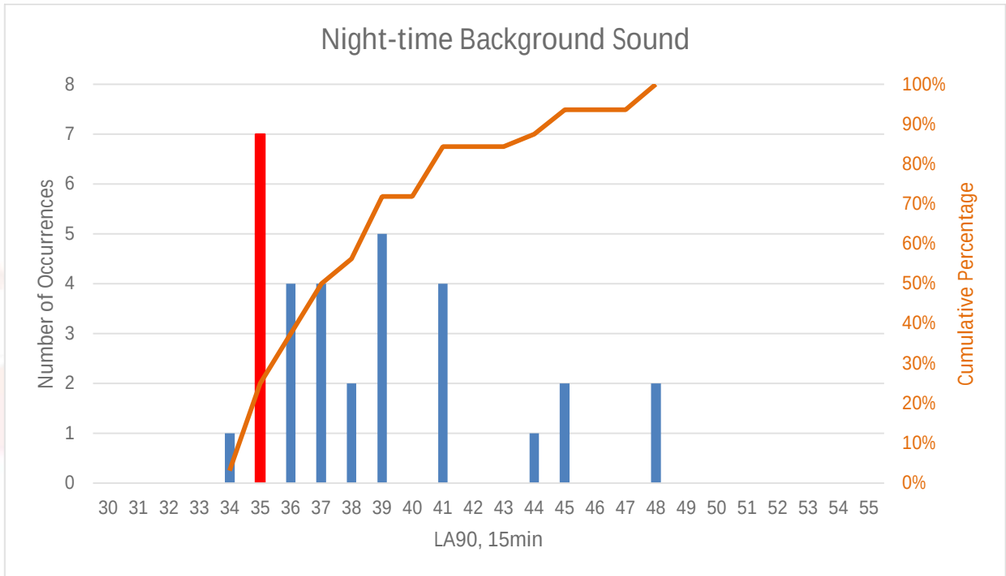

Figure 7: Analysis of night-time background levels, $L_{A90,\ 15min}$ at Position 2

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 7.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Google map and drawing provided by client	Drawing provided by client, Reference 4
Topography –within site	Site observations and Google Street view	Modelled with no changes in topography
Topography –Outside of site	Site observations and Google Street view	Modelled with no changes in topography
Building heights – proposed buildings	Drawings	Google map
Building heights – outside of site	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 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; Porous ground, G = 1 (locally on model)
Max. order of reflections	Apex Acoustics	Three

Table 7: Modelling parameters and assumptions

Appendix D Professional qualifications and competence

D.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.

D.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

D.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.

D.4 This report has been checked by an appropriately qualified and experienced acoustic consultant.