



Whitehouse Club

Noise impact assessment of external plant units

10450.1

16th February 2023

Revision B



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Prepared for

Branley Homes Ltd

York House 1 Bridgenorth Avenue
Urmston
Manchester M41 9PA

Prepared by



EUR-ING Luis Pereira MSc MIOA

Checked by



Nick Conlan BEng MIOA

Apex Acoustics Limited Reg. in England no. 05656507
Design Works, William Street, Gateshead, NE10 0JP

T 0191 620 0750
E info@apexacoustics.co.uk
W www.apexacoustics.co.uk

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2 Summary

- 2.1 This report has been prepared in support of a Planning Application for a social club (use Class D1) with an ancillary residential apartment at 193 Middleton Rd, Crumpsall, Manchester M8 4JZ, and addresses noise emission from the proposed external fixed plant.
- 2.2 The Local Authority Environmental Health Department have been consulted, and it is required that Section 3.7.1.5 of the Manchester City Council (MCC) Planning and Noise Technical guidance document is considered.
- 2.3 The Planning and Noise Technical guidance requires that the external fixed plant achieves a rating level ($L_{Ar,Tr}$) of 5 dB below the typical background level at the nearest noise-sensitive location.
- 2.4 Background sound levels have been measured at a position considered representative of the identified noise-sensitive receptor.
- 2.5 Plant details have been identified by the mechanical engineers and provided by the client. It is understood that the mechanical plant will run only during the daytime.
- 2.6 Noise emissions from the proposed plant have been determined, and noise propagation calculated with the proprietary software OTL Suite. The potential noise impact is calculated and rated in accordance with BS 4142.
- 2.7 Potential noise mitigation measures are needed to satisfy the requirements set out by the MCC and may consist of running the proposed VRF units in low-noise mode and installing dedicated attenuators to provide a noise reduction of 7 dB. Alternatively, if preferred, an enclosure may be used.
- 2.8 Based on the proposed mitigation measures, the rated plant sound impact is calculated to be 5 dB below the background sound level, as the Local Authority requires.
- 2.9 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 a NOEL in alignment with the NPPF and NPSE aims.

3 Introduction

- 3.1 A development consisting of a social club (use Class D1) with an ancillary residential apartment has been proposed at 193 Middleton Rd, Crumpsall, Manchester M8 4JZ; the site location is shown in Figure 1.
- 3.2 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the noise from the mechanical plant associated with the development in support of a Planning Application.
- 3.3 The scope of our instruction includes the following:
- Analysis of the site survey data provided by Yacoustics Ltd;
 - 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;
 - Advise on a scheme for noise mitigation to satisfy the Local Authority requirements.
- 3.4 The noise-sensitive receptors (NSR), which sit the closest to the proposed mechanical plant, are identified as the residential properties south of the proposed site on Middleton Road (A576), identified in Figure 1 as NSR A.
- 3.5 This assessment is based on the proposed plant details identified by the mechanical engineers.
- 3.6 The potential noise impact from the sources identified is calculated and rated according to the BS 4142 methodology, Reference 1.

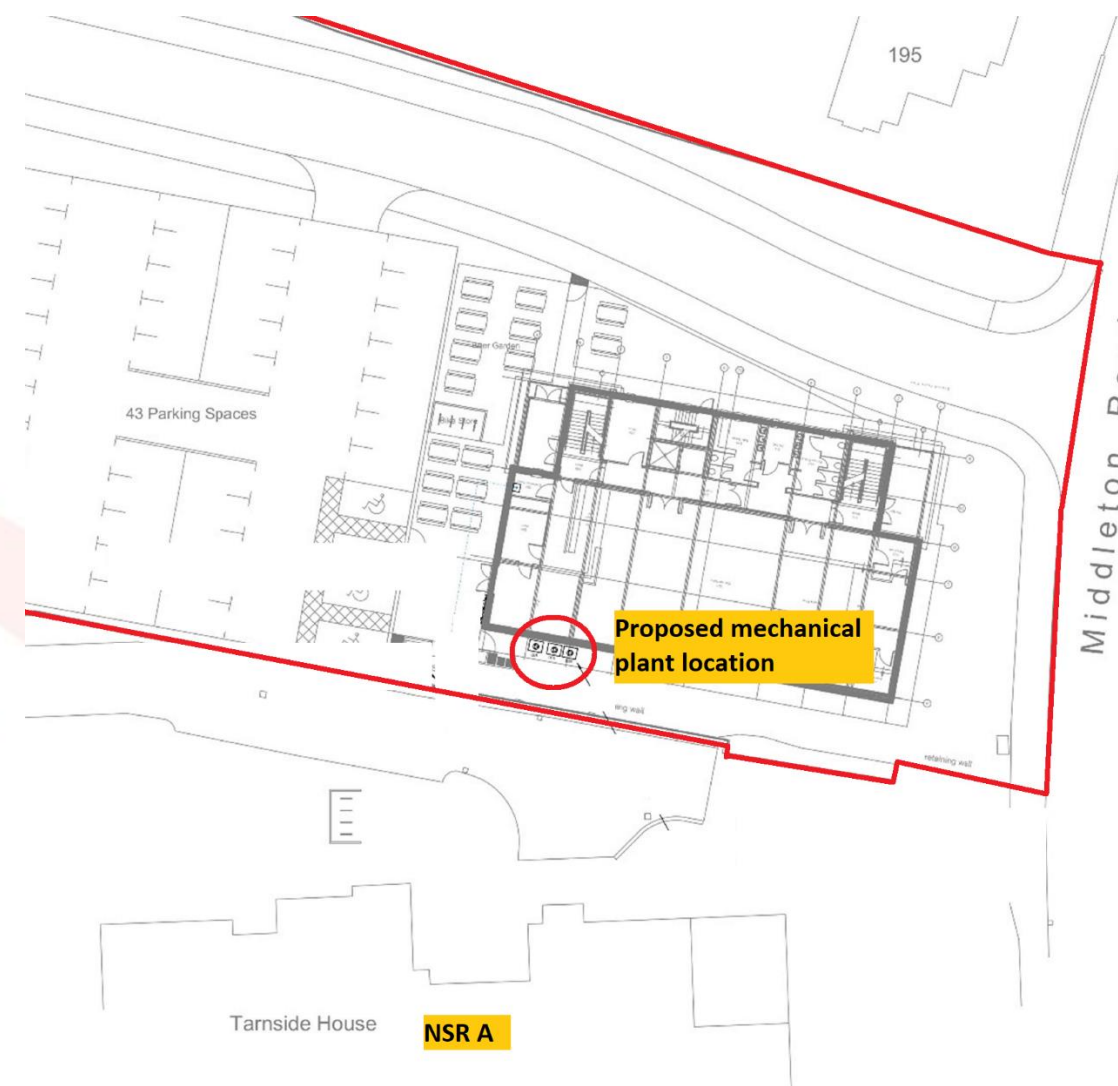


Figure 1: Proposed site, measurement position (P1) and identified nearest NSR

4 Planning policy and noise criteria

4.1 National Planning Policy Framework (NPPF)

4.2 The National Planning Policy Framework (NPPF) Reference 3, 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:

4.3 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..."

4.4 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;

4.5 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. "

4.6 Noise Policy Statement for England (NPSE)

4.7 The Noise Policy Statement for England, Reference 4, 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."

4.8 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

4.9 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."

4.10 **Planning Practice Guidance – Noise**

4.11 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

4.12 **BS 4142**

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

4.14 **Manchester City Council Planning and Noise Technical Guidance**

4.15 The Manchester City Council Environmental Department has been consulted, and it has been agreed that Section 3.7.1.5 of the Manchester City Council Planning and Noise Technical Guidance, Reference 2, needs to be considered.

4.16 Section 3.7.1.5 states the following:

4.17 *Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.*

4.18 *Many of the complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted. Any noise assessment needs to consider not only the overall level of noise emitted, but also its particular characteristics. The noise assessment should be based on BS 4142, and any application for fixed plant, equipment or machinery must demonstrate that:*

4.19 *'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.*

4.20 This criterion aligns with the guidance in NPPF, the NPSE and the PPG-N.

5 Existing acoustic environment

- 5.1 According to the information provided, Yacoustics Ltd conducted a site survey on the 14th and 15th of February 2020 for 24 hours.
- 5.2 The measurements were carried out at Position P1, as shown in Figure 2.
- 5.3 The microphone was located 1.5 metres above roof level and away from other reflecting surfaces such that the measurements are considered free-field. Position P1 is considered to be representative of the existing acoustic environment at the identified NSR.
- 5.4 The most significant noise source was the traffic noise on Middleton Road (A576).
- 5.5 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	Svantek SV307 (with built-in calibrator)	82048
Calibrator		

Table 1: Equipment used



Figure 2: Site survey measurement position

5.6 Background sound level

- 5.7 A statistical analysis of the background noise data provided was undertaken to determine the lowest background noise levels for the daytime period, following the guidance provided in the Manchester City Council Planning and Noise Technical Guidance, Reference 2. The results of the analysis are shown in Figure 3.
- 5.8 Based on the statistical analysis results, the lowest background sound level, which occurs during the daytime, is shown in Table 2.

Assessment period	L _{A90} (dB)
Daytime (07:00 – 23:00 hrs)	44

Table 2: Background sound levels representative of the assessment periods

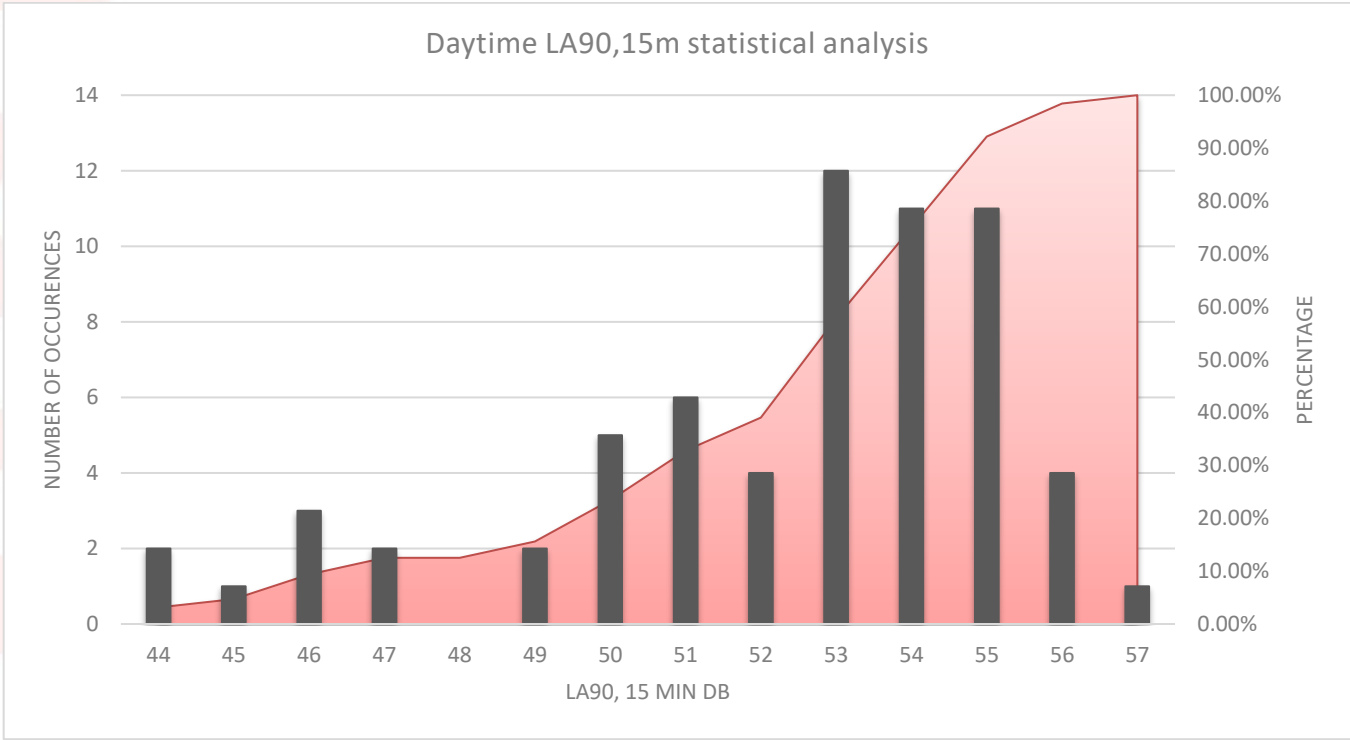


Figure 3: Day-time LA90,15m statistical analysis - P1

6 Noise sources

6.1 Proposed plant and associated noise levels

- 6.2 The mechanical plant is assessed based on plant details supplied by the mechanical engineers.
- 6.3 The location of the units has been taken from the mechanical engineers' drawings, Reference 6.
- 6.4 The proposed plant is understood to comprise that summarised in Table 3.

Plant	Manufacturer	Model	No. proposed
VRF Heat Pump Outdoor Unit	Mitsubishi	PUHY-P300YNW-A1	1
	Mitsubishi	PUHY-P350YNW-A1	1
Cooler Unit	Marstair	CKC 80	1

Table 3: Proposed plant

- 6.5 Manufacturer-supplied noise levels are shown in Table 4. The unit emits slightly higher noise levels when working in heating mode; as such, the noise levels stated refer to the unit when working in its heating mode.

Model	Data type	dB(A)	Single-octave band centre frequency (Hz)						
			Linear noise levels (dB)						
			63	125	250	500	1k	2k	4k
PUHY-P300YNW-A	L _w (Standard Heating mode)	84	94	88	85	82	77	73	69
	L _w (Heating low noise mode)	70	79	77	71	68	63	59	58
PUHY-P350YNW-A	L _w (Standard Heating mode)	83	92	89	83	82	77	73	70
	L _w (Heating low noise mode)	72	82	79	72	69	65	61	60
CKC 80	L _w (Standard cooling mode)	70	-	-	-	-	-	-	-

Table 4: Manufacturers' noise levels

6.6 Operation times

- 6.7 Following the information provided by the client, it is understood that the proposed mechanical plant will operate during the daytime only, i.e. from 07:00 to 23:00 hrs. All plant is assumed to operate continuously during the daytime 1-hour; this is a prudent assumption.
- 6.8 Plant noise impact is assessed during the daytime at the identified residential noise-sensitive receptors.

6.9 Noise transmission and propagation

- 6.10 Noise transmission and propagation are modelled to NSR A based on the detailed noise source data, using proprietary software, OTL Suite, Reference 9. The software models noise propagation outdoors according to ISO 9613, Reference 10.
- 6.11 The model parameters and assumptions are summarised in Appendix B.

7 Assessment results

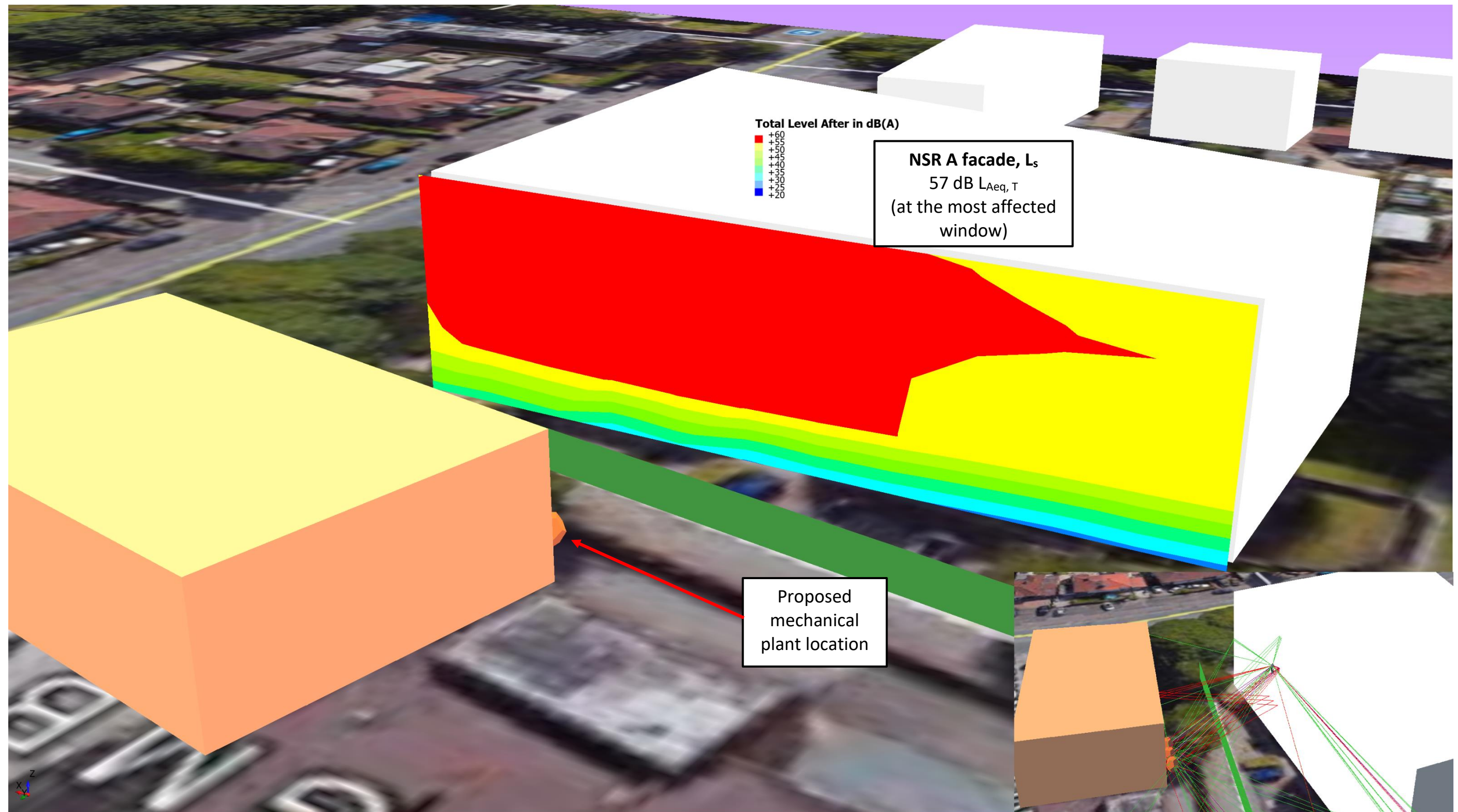


Figure 4: Sound contours at NSR A façade, showing the calculated specific sound level, $L_{Aeq, 1 \text{ hour}}$ based on current proposals

Parameter	Daytime assessment	Relevant clause of BS 4142	Commentary
Background sound level	44 dB $L_{A90, 15\text{ m}}$	8.1.2 8.1.4	Measured during the day/night-time period. Considered representative of the assessment period based on statistical analysis.
Specific sound level L_s , due to all sources for the required assessment interval	57 dB $L_{Aeq, T}$	7.2	The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 4; the L_s assessed is the highest calculated level at NSR A.
Acoustic feature correction	+3 dB	9.2	A subjective assessment to determine acoustic features is undertaken, and the following penalties are considered applicable: • Tonality – 0 dB; • Impulsivity – 0 dB; • Intermittency – 3 dB; • Other – 0 dB;
Rating level, $L_{Ar,Tr}$	60 dB		
Uncertainty of assessment	-	10	Background data was obtained over a 24-hr period, accounting for the changing acoustic environment. The use of a calculation method has reduced uncertainty in the calculated impact in accordance with ISO 9613-2. The excess of the $L_{Ar,Tr}$ over the background sound level is large; in this instance, the uncertainty of the measurement does not have any significance to the outcome of the assessment.
Excess of $L_{Ar,Tr}$ over background sound level	16 dB	11	The assessment result indicates the likelihood of a significant adverse impact and does not satisfy the Local Authority's requirements.

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

8 Noise mitigation measures

- 8.1 Based on the current mechanical plant proposals, the results indicate the likelihood of an adverse impact and do not satisfy the requirements of the Local Authority.
- 8.2 This section details the proposed noise control measures required to mitigate noise emissions to satisfy the Local Authority requirements.
- 8.3 **Mitsubishi VRF Heat Pump Outdoor Units**
- 8.4 The proposed Mitsubishi VRF units require a total noise reduction of 21 dB. A suitable mitigation solution may consist of the following:
- Set these units to run in low-noise mode at all times - which provides a noise reduction of 14 dB;
 - Install dedicated attenuators to provide a further noise reduction of 7 dB, such as [Ambient Acoustics Mitsubishi VRF Acoustic Kits](#) or equivalent.
- 8.5 Other mitigation solutions suitable to provide a minimum attenuation of 7dB can be used if preferred. Examples of manufacturers that can provide solutions such as full enclosures are [Allaway Acoustics](#); [Ambient Acoustics](#), and [Environ](#).
- 8.6 **Marstair Cooler unit**
- 8.7 The proposed cooler unit does not require any specific mitigation.

9 Assessment results – with proposed noise control measures

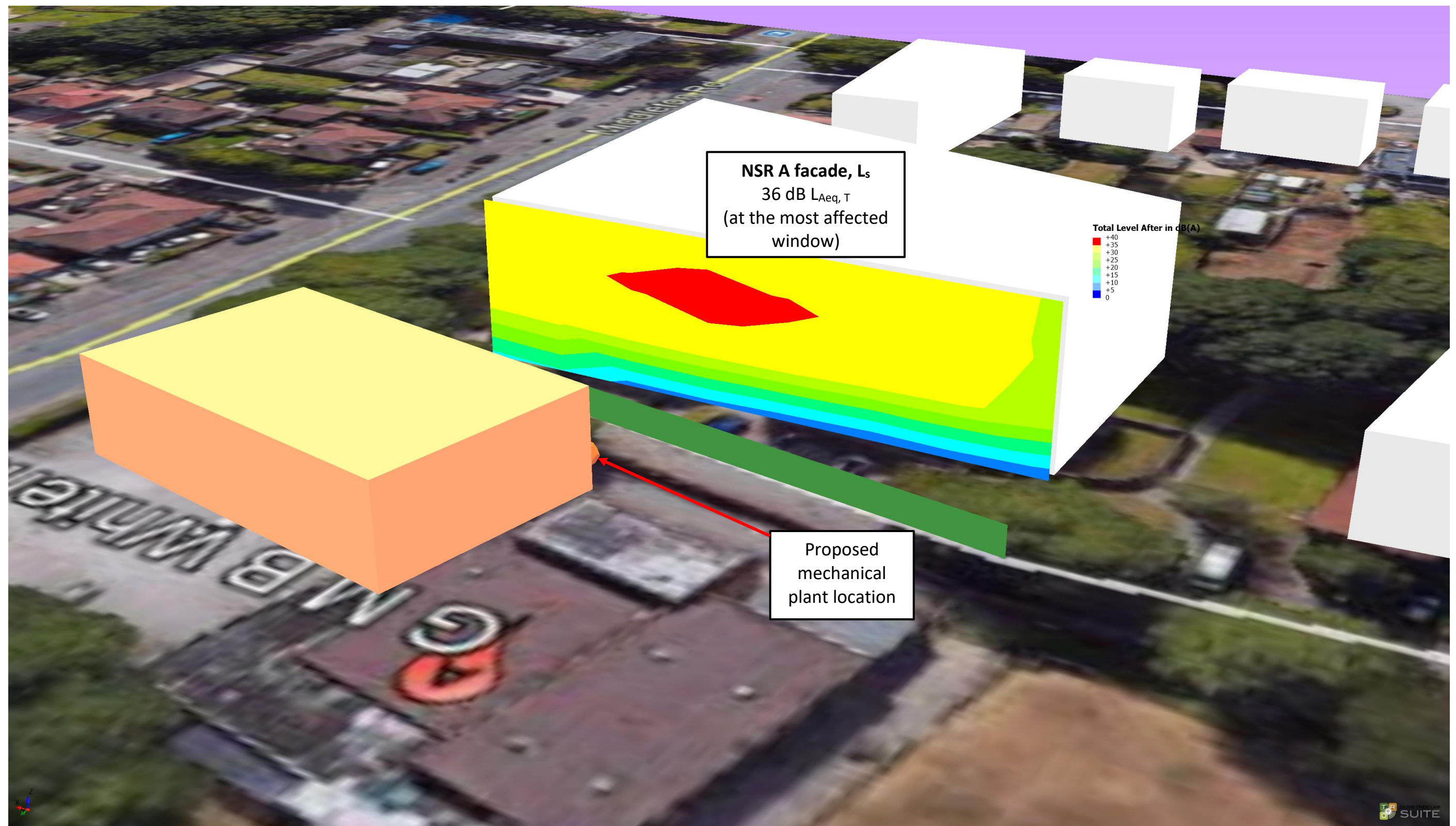


Figure 5: Sound contours at NSR A façade, showing the calculated specific sound level, $L_{Aeq, 1 \text{ hr}}$ with proposed mitigation measures

Parameter	Daytime assessment	Relevant clause of BS 4142	Commentary
Background sound level	44 dB $L_{A90, 15\text{ m}}$	8.1.2 8.1.4	Measured during the day/night-time period. Considered representative of the assessment period based on statistical analysis.
Specific sound level L_s , due to all sources for the required assessment interval	36 dB $L_{Aeq, T}$	7.2	The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 4; the L_s assessed is the highest calculated level at NSR A.
Acoustic feature correction	+3 dB	9.2	A subjective assessment to determine acoustic features is undertaken, and the following penalties are considered applicable: • Tonality – 0 dB; • Impulsivity – 0 dB; • Intermittency – 3 dB; • Other – 0 dB;
Rating level, $L_{Ar,Tr}$	39 dB		
Uncertainty of assessment	-	10	Background data was obtained over a 24-hr period, accounting for the changing acoustic environment. The use of a calculation method has reduced uncertainty in the calculated impact in accordance with ISO 9613-2.
Excess of $L_{Ar,Tr}$ over background sound level	-5 dB	11	The assessment result indicates the likelihood of a low impact and does satisfy the requirements of the Local Authority.

Table 6: BS 4142 assessment results, with proposed mitigation measures

10 Conclusion

- 10.1 Based on the current development proposals, it is calculated that the requirements of the Local Authority are not met.
- 10.2 Noise control measures are required to minimise potential adverse impacts to satisfy the Local Authority criteria.
- 10.3 Based on the mitigation measures detailed in Section 8, the calculated BS 4142 Rating level at the NSR is 5 dB below the measured daytime background level. It, therefore, complies with the limits indicated by the Local Authority.
- 10.4 Considering the context of the existing acoustic environment, the assessment result indicates the likelihood of a low impact based on implementing the proposed noise control measures. This impact is considered to be a NOEL in alignment with the NPPF and NPSE aims.

11 References

- 1 BS 4142 2014: A1+2019, Method for rating and assessing industrial and commercial sound.
- 2 Manchester City Council Planning and Noise Technical Guidance, 2022
- 3 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, July 2021.
- 4 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 5 Association of Noise Consultants (ANC) BS 4142:2014+A1:2019 Technical Note.
- 6 Mechanical engineer's drawings J115-GLD-00-DR-M-5700-001
- 7 BS EN ISO 3740:2019 Determination of sound power levels of noise sources.
- 8 Fläkt Woods, Practical guide to noise control, Fifth Edition, published by Fläkt Woods Limited
- 9 OTL Suite noise modelling software, version 4.0, PEMARD.
- 10 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.
- 11 ISO 12913-1:2014 Acoustics, Soundscape, Part 1: Definition and conceptual framework

Appendix A Noise exposure hierarchy

Planning Practice Guidance - Noise				Significant adverse effect Adverse effect Low Impact 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 + 10 dB + 5 dB 0 dB
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 7: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Noise transmission and propagation

B.1 Noise transmission and propagation is modelled using proprietary software, OTL Suite. 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 4050-000-150
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	Architects' drawings
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	A receivers grid (1x1 meters) has been defined at 1 meter from the NSR façade
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 8: Modelling parameters and assumptions

B.2 A plan view and a 3D perspective of the model are shown in Figure 6 and Figure 7, respectively.

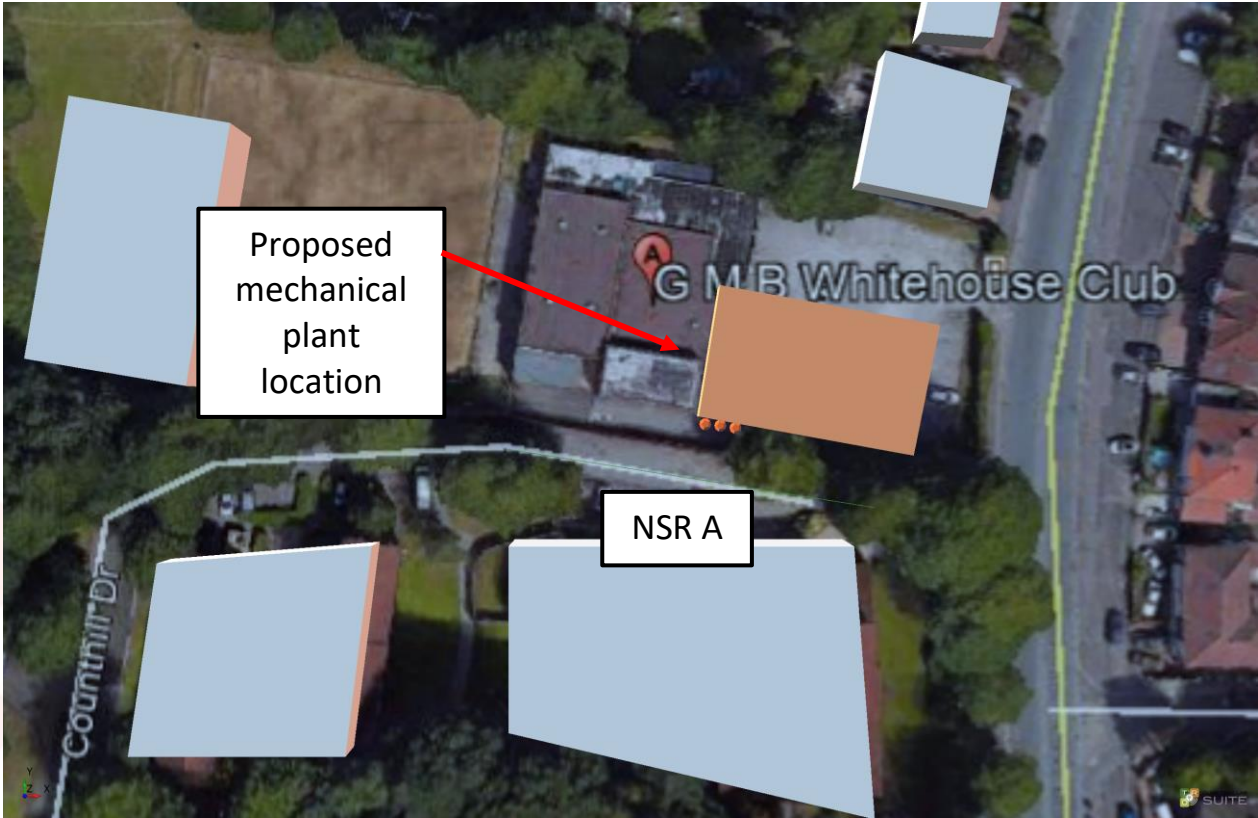


Figure 6: Plan view of the CadnaA model



Figure 7: 3D view of the CadnaA model

Appendix C Professional qualifications and competence

- C.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.
- C.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>
- C.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.
- C.4 This report has been completed by an appropriately qualified and experienced acoustic consultant.

