MEC Consulting Group

ACOUSTIC AIR

Land at Colwell Farm, Haywards Heath
Acoustics Assessment
January 2025

Report Ref: 28406-ENV-0401 Rev B

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APPENDICES

1.0 INTRODUCTION

1.1 MEC Consulting Group Ltd (MEC) has been commissioned by Miller Homes Ltd, to undertake an Acoustics Assessment relating to the outline application with all matters reserved except for access, for up to 80 dwellings and associated infrastructure, on Land at Colwell Farm, Haywards Heath (hereafter referred to as 'the Site').

Assessment Scope

1.2 The following scope of works has been undertaken:

- An environmental sound survey has been undertaken within the Site in order to determine the prevailing acoustics conditions;
- An acoustic model has been created in order to predict sound levels across the Site for comparison against relevant criteria contained within ProPG[1], BS 8233[2] and AVOG[3]; and
- Where required, appropriate mitigation measures have been provided to demonstrate compliance with the relevant standards.

1.3 The conclusions of this report aim to demonstrate to the Local Authority that external and internal acoustic conditions will be compliant with the relevant British Standards and Acoustics Guidance.

Disclaimer

1.4 MEC has completed this report for the benefit of the individuals referred to in Paragraph 1.1 and any relevant statutory authority which may require reference in relation to approvals for the proposed development. Other third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from MEC.

1.5 MEC accepts no responsibility or liability for:

- The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
- The issue of this document to any third party with whom approval for use has not been agreed.

[1] Professional Practice Guidance on Planning and Noise, May 2017.
[2] BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'
[3] Acoustics Ventilation and Overheating, Residential Design Guide, V1.1. January 2020.

2.0 SITE DESCRIPTION

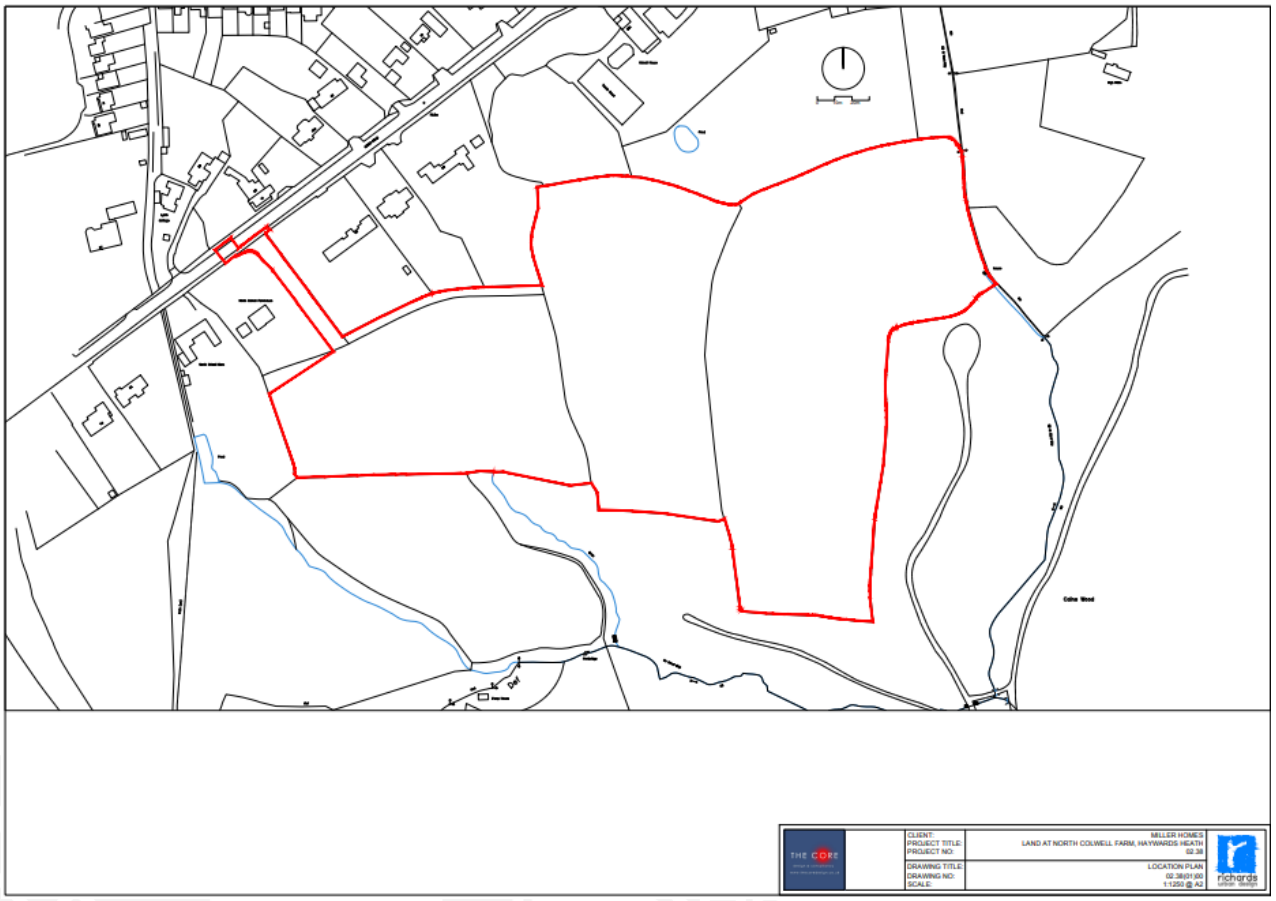
Existing Site

2.1 The Site, comprised of arable land, is bound to the north and northeast by existing residential dwellings that form part of the Haywards Heath settlement, with Lewes Road located beyond, and open green field and woodland adjacent to all other boundaries.

2.2 The principal source of noise affecting the Site will be from local road traffic using Lewes Road.

2.3 The Site location plan is presented in Figure 2.1.

Figure 2.1: Location Plan



Development Proposals

2.4 Development proposals comprise the erection of up to 80 residential dwellings, associated infrastructure and access via Lewes Road.

2.5 The parameter plan is presented in **Appendix A**.

3.0 STANDARDS AND GUIDANCE

General

3.1 An acoustic glossary is provided in **Appendix B** to assist the reader.

Summary of Guidance and Standards

3.2 The following guidance and standards relevant to the assessment are outlined below:

- National Planning Policy Framework (NPPF) 2024;
- Noise Policy Statement for England (NPSE) 2010;
- Professional Practice Guidance on Planning and Noise (ProPG) 2017;
- BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'*; and
- Acoustics Overheating and Ventilation Guide (AVOG) 2020.

3.3 For conciseness, the guidance and standards most appropriate to this assessment are summarised in this section.

National Planning Policy Framework

3.4 The latest National Planning Policy Framework (NPPF), issued by the Ministry of Housing, Communities and Local Government in 2024, sets out the Government's planning policies for England and how these are to be expected to be applied. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is to be a material consideration in planning decisions.

3.5 Paragraph 187 of the NPPF advises that, with respect to noise, planning policies and decisions should contribute to and enhance the natural and local environment by *"...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..."*.

3.6 Further, paragraph 198 advises that *"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; and

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.

3.7 The NPPF's footnote to point a) above explicitly refers to the Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

Noise Policy Statement for England

3.8 The guidance of the Noise Policy Statement for England (NPSE) applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise, but does not apply to noise in the workplace

(occupational noise). It introduces the concepts of 'No Observed Effect Level' (NOEL), which is the level below which there is no detectable effect on health and quality of life due to the noise; the 'Lowest Observed Adverse Effect Level' (LOAEL), which is the level above which adverse effects on health and quality of life can be detected; and the 'Significant Observed Adverse Effect Level' (SOAEL), which is the level above which significant adverse effects on health and quality of life occur.

3.9 The Department for Communities & Local Government updated its on-line planning guidance to assist with interpretation of the original NPPF and the NPSE. The guidance covered general matters such as relevance of noise issues, noise concerns and factors, how to determine impacts, and mitigation. To assist with recognising when noise could be a concern, the guidance summarises the noise exposure hierarchy as follows, based on the likely average response.

Table 3.1: Noise Exposure Hierarchy Based on Likely Average Response

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	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. 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

ProPG

3.10 ProPG seeks to secure good acoustic design for new residential developments. The guidance includes a framework to enable situations where noise is not an issue but to help identify the extent of risk at noisier sites. The guidance does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

3.11 The guidance is restricted to sites that are exposed predominantly to noise from transportation sources. Where industrial or commercial noise is present on the site but is "not dominant", its contribution may be

included in the noise level used to establish the degree of risk. However, if the industrial/commercial source is dominant, an assessment in accordance with BS 4142[4] should be conducted.

3.12 A two-stage approach is considered whereby:

- Stage 1 – an initial noise risk assessment of the proposed development site is undertaken;
- Stage 2 – a systematic consideration of internal and external noise levels is considered ensuring good acoustic design and consideration of other relevant issues is recognised.

3.13 ProPG also references the World Health Organisation (WHO) guidance on maximum noise levels at night. Guidance from the WHO states that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night. ProPG indicates that individual noise events do not exceed 45 dB L_{AFmax} more than 10 times a night and therefore this is considered as criteria in addition to that outlined in Table 3.2.

3.14 Whilst ProPG does not define a measurement interval for the assessment of L_{AFmax} levels, research[5] has been undertaken which indicates that, for Maximum Event Level assessments, a sampling interval of between 1 and 3 minutes relates most closely to how awakening events are experienced by people in reality when compared to longer sampling periods.

3.15 For brevity, within the study, the majority of people (circa 75-85%) under test returned to a sleep state by approximately 2.5 minutes after the initial awakening event.

3.16 In summary, a longer sampling period can result in the under assessment of the 10th highest maximum level, therefore, based upon research and the recommendation of the Institute of Acoustics (IOA), a sample measurement of 2 minutes has been used to inform this assessment.

3.17 Upon completion of the ProPG's Stage 1 and 2 assessments, the findings should enable one of four possible recommendations to be presented to the decision maker, namely to grant permission without conditions, grant with conditions, 'avoid' or 'prevent'.

BS 8233

3.18 BS 8233 provides recommendations for the control of noise in and around buildings.

3.19 The guidance provided includes appropriate internal and external noise level criteria which are applicable to residential buildings exposed to steady external noise sources. It is stated in the British Standard that it is desirable for internal ambient noise levels to not exceed the criteria set out in Table 3.2.

[4] BS 4142:2014 +A1:2019 *'Methods for rating and assessing industrial and commercial sound.'*
[5] Paxton et al., Assessing L_{max} for residential development: The AVO Guide Approach, Institute of Acoustics, 2019

Table 3.2: BS 8233: 2014 Table 4 – Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 – 23:00 $L_{Aeq, 16hr}$ dB	23:00 – 07:00 $L_{Aeq, 8hr}$ dB
Resting	Living Room	35	-
Dining	Dining Room/Area	40	-
Sleeping (daytime resting)	Bedroom	35	30

3.20 Additional guidance in BS 8233 indicates that appropriate ventilation should be provided, if relying on closed windows to meet the guide values, and that such ventilation should not compromise the façade insulation and resulting noise levels.

3.21 BS 8233 additionally includes guidance on external amenity areas whereby it states that external noise levels should not exceed 50 dB $L_{Aeq, T}$ with an upper guideline of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments.

AVOG

3.22 The AVOG was published by the Association of Noise Consultants (ANC) and The Institute of Acoustics (IOA) in 2020. The guide outlines a methodology for the assessment of airborne sound during overheating conditions, and emphasises the co-dependency of acoustics, ventilation and overheating design.

3.23 Many developments require closed windows to provide good internal acoustic conditions. This is in direct contrast to the fact that residents typically open windows in order to keep a building cool. These opposing requirements are becoming a major issue in the design of buildings, in particular for housing, especially as the aim is to avoid widespread use of mechanical ventilation and cooling systems.

3.24 AVOG prescribes a two-level assessment procedure, as follows:

- Level 1 – Site Risk Assessment, based on external free-field noise levels (similar to that of ProPG); and
- Level 2 – Assessment of Adverse Effect, based on internal ambient noise level and duration.

3.25 An AVOG Level 2 assessment gives consideration to internal noise levels on a sliding scale depending on the likelihood and duration of overheating.

3.26 This report considers an AVOG Level 1 assessment.

4.0 ENVIRONMENTAL SOUND SURVEY

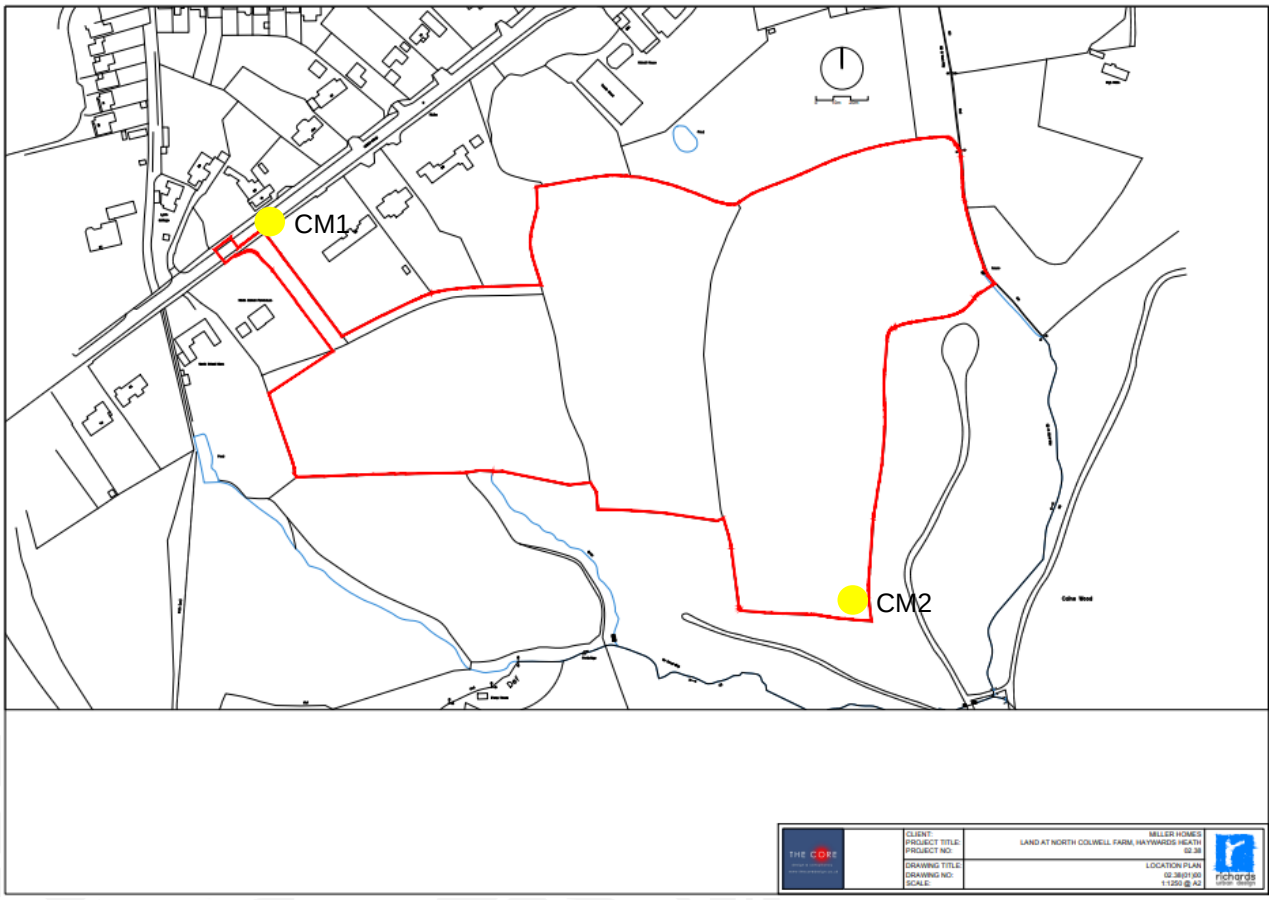
4.1 An environmental sound survey was undertaken between Thursday 29th February and Monday 4th March 2024. The survey was undertaken in full accordance with the guidance set out in BS 7445[6].

4.2 Sound Level Meters (SLMs) were installed at two locations, as follows:

- Continuous Measurement 1 (CM1): approximately 7m from the carriageway edge of Lewes Road;
- Continuous Measurement 2 (CM2): on the southern boundary of the Site.

4.3 The measurement positions are provided in Figure 4.1.

Figure 4.1: Measurement Positions



Equipment

4.4 Measurements were taken using Class 1 integrating/averaging SLMs housed in environmental protection apparatus. The SLMs were installed in a free field position at a height of 1.5m above local ground level, and field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration noted.

[6] BS 7445-1:2003 'Description and measurement of environmental noise, Part 1: Guide to quantities and procedures.'

4.5 The SLMs were set up to capture the following parameters at a minimum: L_{Aeq}, L_{A90} and L_{AFmax} values, and full details of the equipment used to undertake the survey are presented in Table 4.1.

Table 4.1: Equipment and Calibration Details

Measurement Position	Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
CM1	Sound Level Meter	Type NOR140	1407932	26/02/2025
	Pre-Amplifier	Type 1209	23695	
	Microphone	Type 1225	505583	
	Calibrator	Norsonic 1251	34315	05/03/2024
CM2	Sound Level Meter	Type NOR140	1407599	04/09/2024
	Pre-Amplifier	Type 1209	22646	
	Microphone	Type 1225	384571	
	Calibrator	Norsonic 1255	125525494	18/09/2024

Meteorological Conditions

4.6 During setup of the SLMs, weather conditions were cloudy and raining, with wet roads and no wind. On collection, weather conditions were cool and dry, with south easterly winds of up to 2.8 m/s.

4.7 The rainy conditions and wet roads will have increased the noise exposure, and will represent a worst case when determining mitigation measures.

Observations

4.8 Site notes indicate the dominant source of noise at CM1 be from road traffic using Lewes Road, with no identifiable sources at CM2.

Sound Survey Results

4.9 Table 4.2 and Table 4.3 provide a summary of measured assessment appropriate sound levels at CM1 and CM2 respectively.

4.10 Time history graphs are provided in **Appendix C.**

Table 4.2: Summary of Measured Sound Levels at CM1, dB

Date	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00	
	$L_{Aeq, T}$	$L_{Aeq, 8hr}$	Typical Maximum Event Level[(a)] $L_{AFmax, 2min}$
Thu 29th	69[(b)]	62	82
Fri 1st	69	60	80
Sat 2nd	68	58	80
Sun 3rd	67	60	80
Mon 4th	69[(c)]	-	-

[(a)] Maximum noise level not exceeded more than 10 times per night.
[(b)] T = 11hr
[(c)] T = 4.75hr

4.11 At CM1, the daytime $L_{Aeq, T}$ ranged between 67 dB and 69 dB (rounding to the nearest whole number for assessment purposes), while the measured night-time $L_{Aeq, 8hr}$ ranged between 58 dB and 62 dB.

4.12 Analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 82 dB more than 10 times during the measured night-time period. Investigation of the audio recordings shows that all values above 82 dB, were caused by vehicle 'pass-bys', with no significant low frequency spectral content. Therefore, a value of 82 dB $L_{AFmax, 2min}$, as measured at 7m from the carriageway edge of Lewes Road, is considered appropriate for assessment purposes.

Table 4.3: Summary of Measured Sound Levels at CM2, dB

Date	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00	
	$L_{Aeq, T}$	$L_{Aeq, 8hr}$	Typical Maximum Event Level[(a)] $L_{AFmax, 2min}$
Thu 29th	46[(b)]	44	62
Fri 1st	48	43	60
Sat 2nd	45	38	60
Sun 3rd	45	39	58
Mon 4th	45[(c)]	-	-

[(a)] Maximum noise level not exceeded more than 10 times per night.
[(b)] T = 10.5hr
[(c)] T = 5hr

4.13 Away from the direct effect of road traffic, sound levels at CM2 were lower, with a daytime $L_{Aeq, T}$ ranging between 45 dB and 48 dB, while the measured night-time $L_{Aeq, 8hr}$ ranged between 38 dB and 44 dB.

4.14 Analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 62 dB more than 10 times during the measured night-time period. Investigation of the audio recordings shows that all values above 62 dB, were caused by bird song.

5.0 ASSESSMENT METHODOLOGY

Acoustic Modelling

5.1 An acoustic model of the Site and environs has been generated in Datakustik CadnaA® modelling software. Noise source emissions have been informed by the environmental sound survey presented in Section 4.

5.2 Based on the measured sound levels at CM1, the following levels have been used to calibrate the 3D acoustic model.

- Daytime, $L_{Aeq, 16hr}$ – 69 dB;
- Night-time, $L_{Aeq, 8hr}$ – 62 dB; and
- Night-time $L_{AFmax, 1min}$ – 82 dB.

5.3 CadnaA® considers various inputs, including topography, buildings and road noise sources, and calculates sound levels in accordance with national and international standards; in this case, the relevant UK standards are the procedures set out within ISO 9613-2[7].

5.4 The modelling assumptions and input information for the acoustic model are as follows:

- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 12th March 2024);
- Open Street Map data (publicly available);
- Ground absorption for the Site = 0.5 (mixed ground);
- Building heights estimated following site observations or based upon masterplan;
- Buildings set to be reflective only with no absorption coefficient;
- First order reflections included in the modelling;
- Temperature set to 10˚C; and
- Relative humidity set to 70%.

5.5 With reference to the noise criteria outlined in Section 3.0, the acoustic model has been used to predicted sound levels at indicative dwellings across the Site based on the illustrative masterplan, for the following scenarios:

- Daytime $L_{Aeq, 16hr}$ external sound levels at ground floor (1.5m) height;
- Night-time $L_{Aeq, 8hr}$ external sound levels at first floor (4m) height; and
- Night-time $L_{AFmax, 1min}$ external sound levels at first floor (4m) height.

5.6 Indicative receptors have been assessed based on the current parameter plan. For conciseness, this report tabulates the impacts for the most exposed indicative receptor to Lewes Road, which is identified as Plot X within the modelled drawings presented in **Appendix D**.

[7] ISO 9613-2 *'Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.*

6.0 ACOUSTICS ASSESSMENT

ProPG Initial Noise Risk Assessment

6.1 As required by the ProPG, an Initial Noise Risk Assessment (INRA) is presented in Table 6.1.

Table 6.1: Initial Site Noise Risk Assessment, dB

Risk	Negligible		Low		Medium		High	
Period	Day	Night	Day	Night	Day	Night	Day	Night
Pro PG Threshold[(a)]	< 50	< 40	50 – 60	40 – 50	60 – 70	50 – 60	> 70	> 60
Plot X			51	46				
Risk Assessment			Low					

6.2 The modelled sound levels for the most exposed indicative dwelling based on the parameter plan would fall within the ProPG risk category of 'Low' during both the day and night-time, for which the guidance states the Site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed.

6.3 This report is considered to form the basis of the 'Acoustic Design Statement', which considers appropriate design measures to achieve suitable acoustic conditions for residential amenity.

BS 8233 External Amenity Criteria

6.4 The acoustics criterion often the most difficult to meet in residential environments situated next to busy transportation sources is BS 8233's criterion of 55 dB $L_{Aeq, 16hr}$, applicable to private external amenity spaces such as gardens.

6.5 Based on the current parameter plan, the daytime $L_{Aeq, 16hr}$ sound level contour map, shown on drawing 28406_04_120_01 in **Appendix D**, shows that BS 8233's criterion of 55 dB $L_{Aeq, 16hr}$ will be satisfied at all locations across the Site, with the majority of the Site experiencing levels below BS 8233's lower-level criterion of 50 dB $L_{Aeq, 16hr}$. Subsequently, any site layout can be adopted without the need for mitigation.

Internal Acoustic Criteria

6.6 Table 6.2 presents the required external to internal reduction requirements for the most exposed indicative dwelling.

Table 6.2: Required Façade Performance, dB

Plot	Parameter	External Level	Internal Criteria	Required Reduction
X	Daytime Ambient $L_{Aeq, 16hr}$	51	35	16
	Night-time Ambient $L_{Aeq, 8hr}$	46	30	16
	Night-time Maximum $L_{AFmax, 1min}$	66	45	21

6.7 For the most exposed indicative dwelling, the results in Table 6.2 show that a sound reduction of up to 20 dB will be required to achieve all $L_{Aeq, T}$ and L_{AFmax} criteria.

6.8 Typical window constructions to achieve the required reduction values presented in Table 6.2 can commonly be found in standard thermal double glazing coupled with direct airpath window mounted trickle ventilators, to achieve the whole-dwelling ventilation requirements of AD-F[8].

AVOG Level 1 Assessment

6.9 AVOG prescribes a two-stage assessment. Level 1 looks to determine if overheating needs to be considered further, based on the predicted external façade levels for the most exposed receptors.

6.10 The initial Level 1 assessment is presented in Table 6.3.

Table 6.3: AVOG Level 1 Assessment

Plot	Parameter	Predicted External Level dB	Level 1 Risk Grading	Level 2 Advised?
X	Daytime Ambient $L_{Aeq, 16hr}$	51	Negligible	Not required
	Night-time Ambient $L_{Aeq, 8hr}$	46	Negligible	Not required

6.11 The results demonstrate that at the most exposed receptor, an AVOG Level 2 assessment is not required, due to the negligible levels of noise.

6.12 However, it should be noted that the maximum levels will drive the acoustic design and therefore, with the introduction of the more stringent maximum night-time criteria presented within AD-O[9], the mitigation schedule may be subject to change at Building Control stage based upon the outcome of any Dynamic Thermal Modelling assessment.

6.13 Nevertheless, demonstrating a suitable overheating strategy is not necessarily a planning application consideration, and could therefore be considered at a later stage, as part of any Building Control matters.

[8] The Building Regulations 2010, Ventilation, Approved Document F, 2021 Edition.
[9] The Building Regulations 2010, Overheating, Approved Document 'O'.

7.0 MITIGATION

External Sound Levels

7.1 BS 8233's criterion of 55 dB $L_{Aeq, 16hr}$ will be satisfied at all locations across the Site, with the majority of the Site experiencing levels below BS 8233's lower-level criterion of 50 dB $L_{Aeq, 16hr}$. Subsequently, any site layout can be adopted without the need for mitigation.

Internal Sound Levels

7.2 Acoustic modelling has demonstrated potential façade sound levels and, in accordance with BS 8233, ProPG and AVOG, sound reduction performance requirements of the façade have been determined.

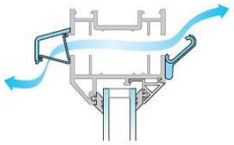
7.3 In terms of acoustics, windows and ventilation strategies are the 'weakest' acoustics point in any façade and subsequently, the composite sound reduction performance is typically dominated by these elements. Therefore, minimum performance requirements to be provided by the glazing and ventilation elements at all dwellings are presented herein.

7.4 Drawing on the above, and the acoustic modelling undertaken, Table 7.1 provides typical reduction requirements and potential glazing and ventilation solutions across the Site in order to demonstrate compliance with the internal sound level criteria outlined in BS 8233, ProPG, and the ventilation requirements of AD-F.

7.5 However, for the avoidance of doubt, all habitable rooms across the Site can comply with the relevant acoustic criteria through standard double glazing and direct airpath window mounted trickle ventilators.

7.6 For each reference in Table 7.1, the sound reduction performance requirements, in octave band and weighted reduction format, are presented in **Appendix E**.

Table 7.1: Suggested Internal Mitigation Measures

Example Glazing Solution	Example Whole Dwelling Ventilation Solution (AD-F)
4mm pane 12mm air space 4mm pane Approx. $R_w + C_{tr}$ = 27 dB	<u>Standard Non-Acoustic Trickle Vent</u> Slots typically located in the window frame.  Approx. $D_{n,e,w} + C_{tr}$ = 32 dB

8.0 CONCLUSIONS

8.1 MEC has been commissioned by Miller Homes Ltd, to undertake an Acoustics Assessment relating to the outline application with all matters reserved except for access, for up to 80 dwellings and associated infrastructure, on Land at Colwell Farm, Haywards Heath.

8.2 Assessments have been undertaken in accordance with ProPG and BS 8233, with consideration also given to internal sound levels during periods of overheating in accordance with AVOG.

8.3 Acoustic modelling has demonstrated that BS 8233's criterion of 55 dB $L_{Aeq, 16hr}$ will be satisfied at all locations across the Site, with the majority of the Site experiencing levels below BS 8233's lower-level criterion of 50 dB $L_{Aeq, 16hr}$. Subsequently, any site layout can be adopted without the need for mitigation.

8.4 With regards to internal acoustic conditions, all dwellings will satisfy the criteria in BS 8233 and ProPG through the provision of standard thermal double glazing and direct airpath window mounted trickle ventilators to achieve the whole-dwelling ventilation requirements of AD-F.

8.5 When considering the planning guidance outlined in AVOG, an open window acoustics strategy is permissible during periods of overheating. However, maximum levels will drive the acoustic design during the night-time period and therefore, further investigations may be required under AD-O at Building Control stage. Nevertheless, as this is not a planning consideration the application should not be delayed on these grounds.

8.6 It is therefore considered that with the implementation of the recommended mitigation strategy, the Site is suitable for residential development.

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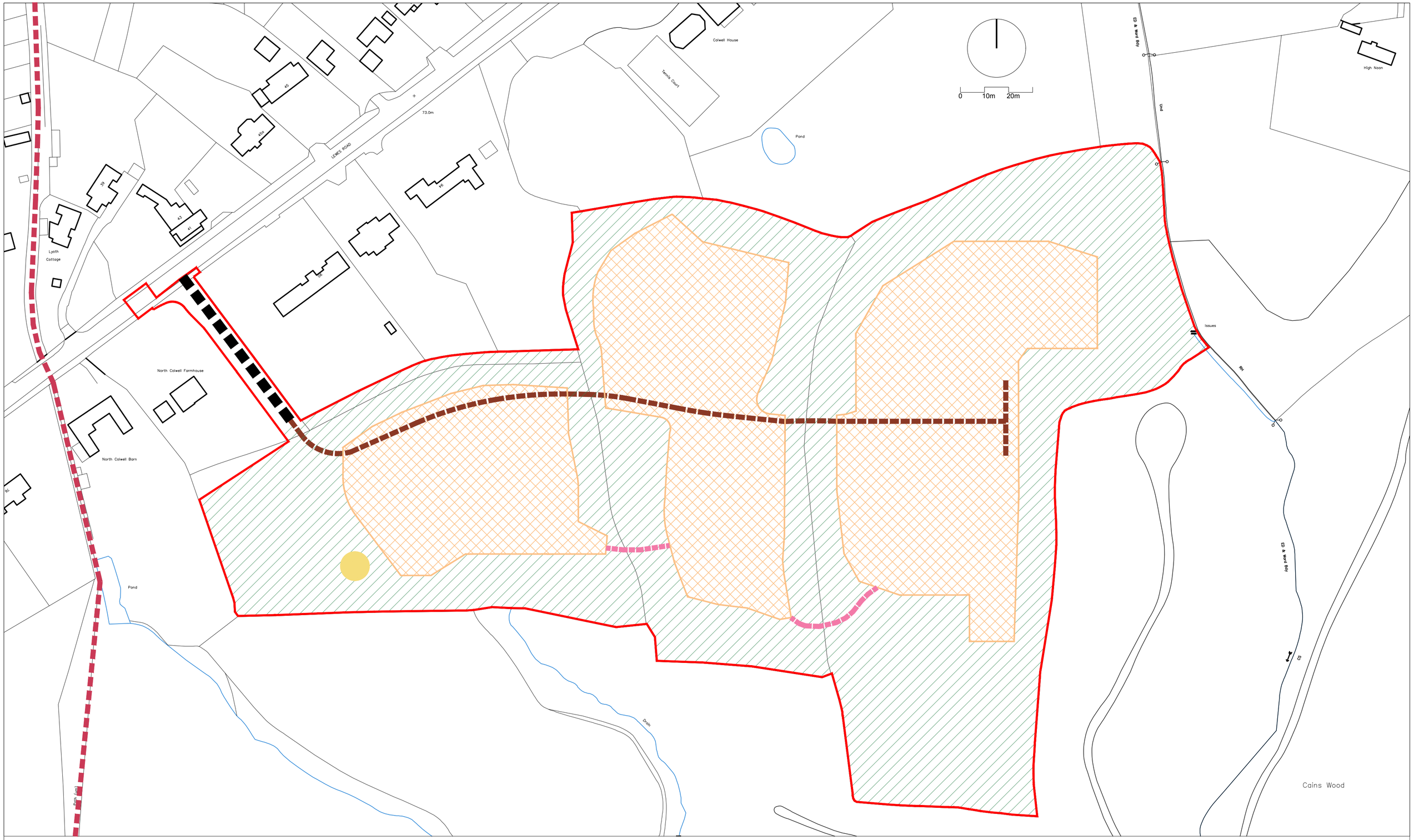
APPENDICES

APPENDIX A



KEY

- Site boundary
- Residential development area including residential use, vehicular routes, pedestrian/cycle routes, car parking, private amenity space and associated landscaping
- Existing Public Right of Way
- Supporting infrastructure including public open space, play areas, informal kickabout area, strategic landscaping and sustainable drainage
- Proposed vehicular access
- Proposed tree lined street
- Proposed pedestrian link
- Indicative play area location

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CLIENT:	MILLER HOMES
PROJECT TITLE:	LAND AT NORTH COLWELL FARM, HAYWARDS HEATH
PROJECT NO:	02.38
DRAWING TITLE:	PARAMETER PLAN
DRAWING NO:	02.38(01)01
SCALE:	1:1000 @ A2

richards urban design

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APPENDICES

APPENDIX B

GLOSSARY OF TECHNICAL TERMS

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurements, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Typical sound levels found in the environment

Sound Level	**Location**
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside a factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft taking off
140 dB(A)	Threshold of pain

Descriptor	Terminology
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting (db(A))	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq, T}$	A noise level index called the equivalent continuous noise level over the time period, *T*. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{AFmax, T}$	A noise level index defined as the maximum noise level during the measurement period. L_{Max} is sometimes used for the assessment of discrete loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. It is typically measured using the 'fast' sound level meter response.
$L_{90, T}$	A noise level index. The noise level exceeded for 90% of the time over the period, *T*. *L*90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10, T}$	A noise level index. The noise level exceeded for 10% of the time over the period, *T*. *L*10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building facade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit
One-third Octave Band	A frequency band in which the upper limit is 21/3 times the frequency of the lower limit.
Rating Level	The specific sound level, plus any adjustment for characteristic feature of sound in BS 4142.
Specific Sound Level	The A-weighted L_{eq} sound level produced by a sound source during a specified period of time. Commonly known as the sound source under investigation as defined in BS 4142.
Typical Maximum Level	The 90^{th} percentile maximum event level (L_{AFmax}) measured during a period. Used for assessing night-time maximum levels under typical and overheating conditions.

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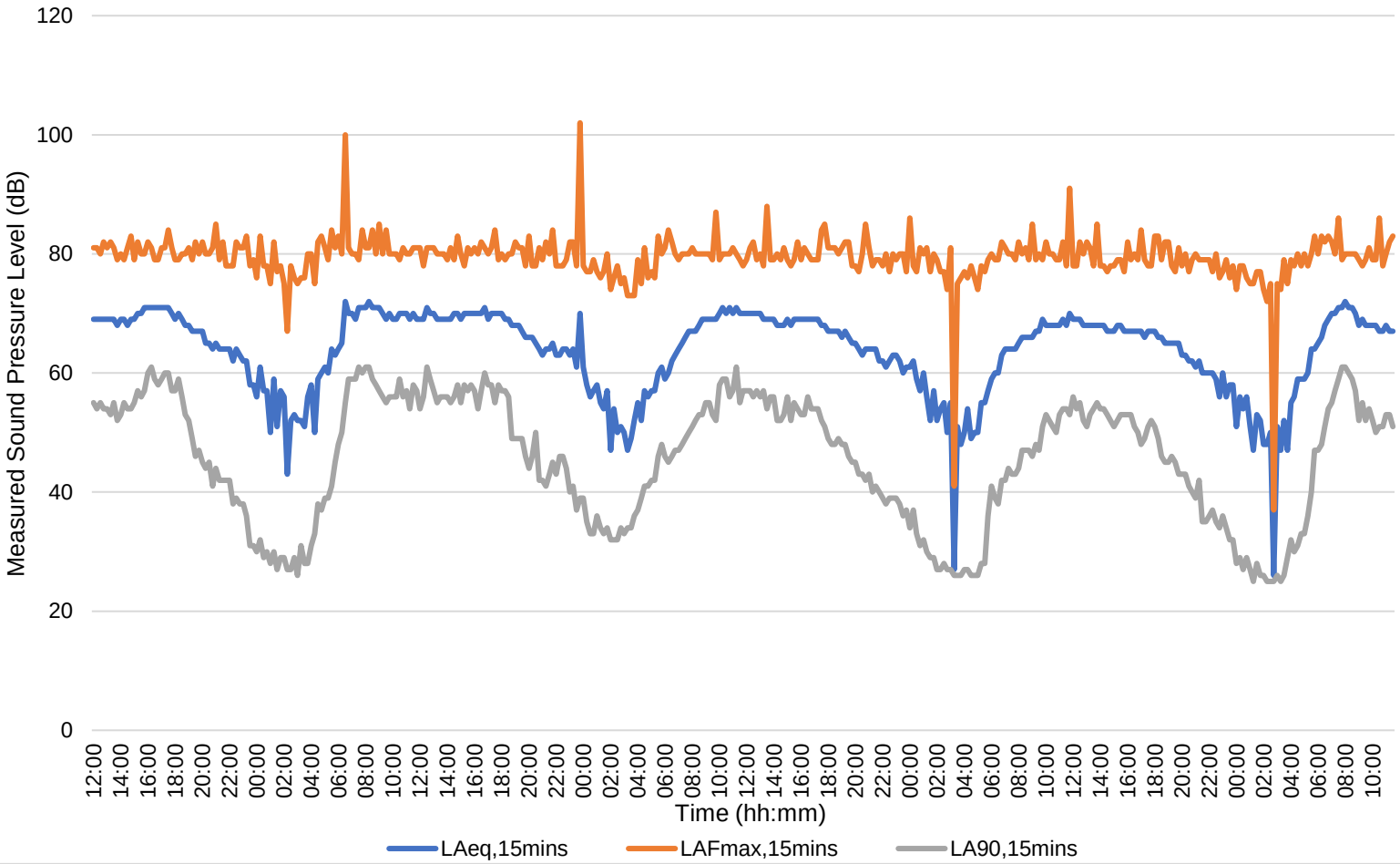
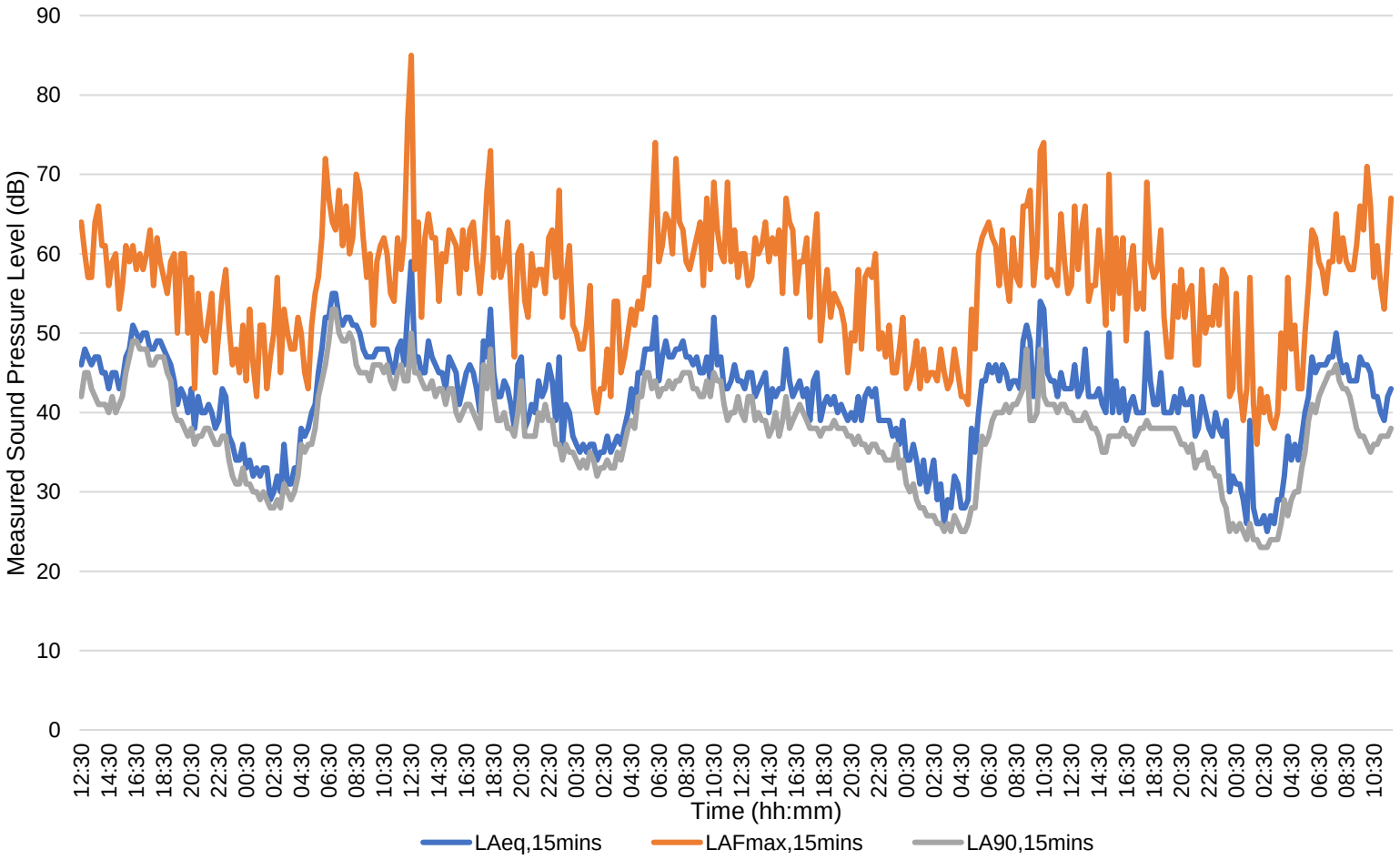
APPENDICES

APPENDIX C

Land at Colwell Farm, Haywards Heath - CM1
Environmental Sound Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 29th February - 4th March 2024



Land at Colwell Farm, Haywards Heath - CM2
Environmental Sound Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 29th February - 4th March 2024



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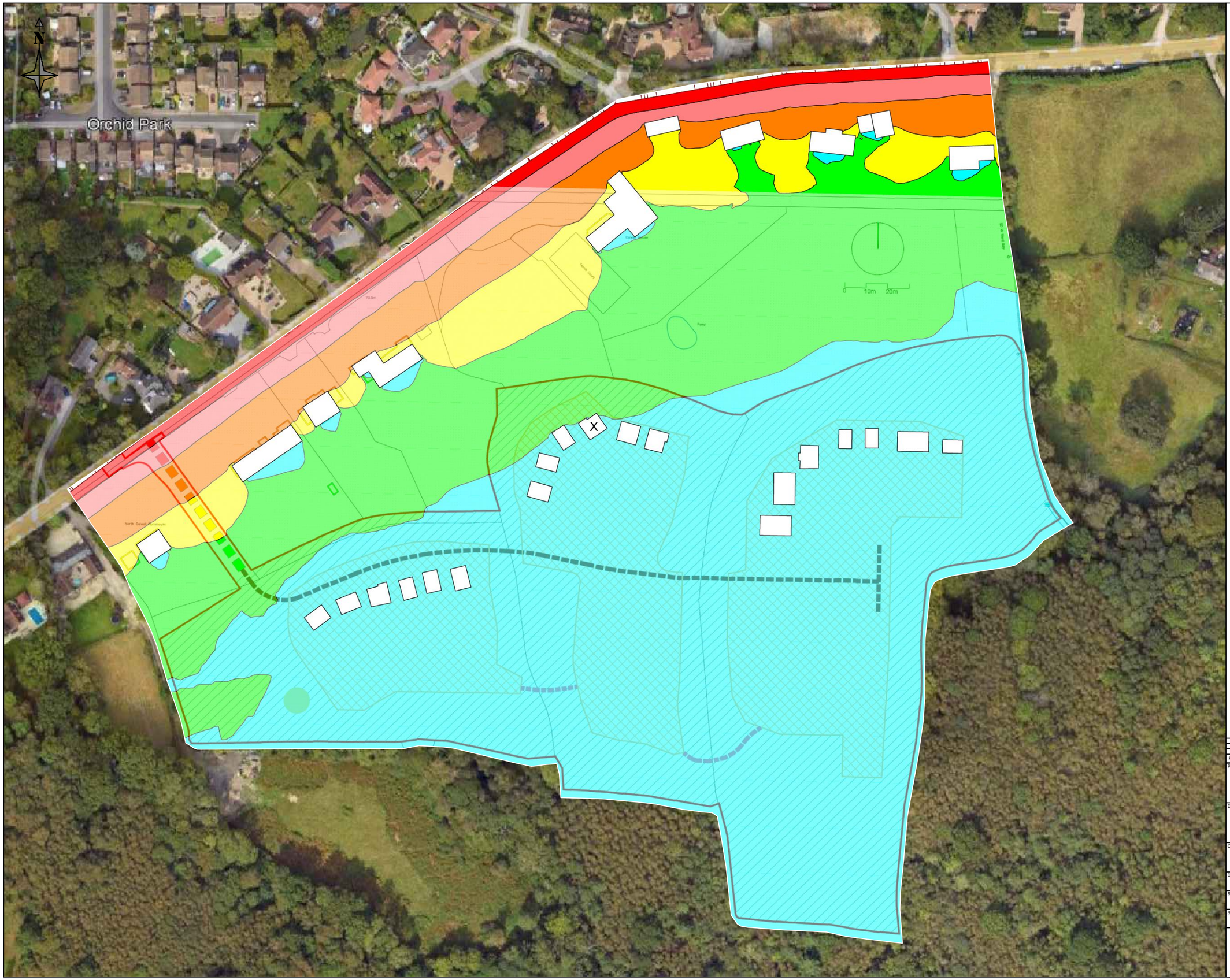
APPENDICES

APPENDIX D



NOTES:

1. DO NOT SCALE THIS DRAWING.

KEY

- 0–50dB(A)
- 50–55dB(A)
- 55–60dB(A)
- 60–65dB(A)
- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
B	UPDATED SITE PLAN	HJ	NF	TR	08.01.25
A	UPDATED SITE PLAN	HJ	DN	TR	17.12.24
-		EW	NF	AB	21.03.24

PROJECT:
COLWELL FARM,
HAYWARDS HEATH

DRAWING TITLE:
DAYTIME AMBIENT SOUND LEVELS,
LAeq,16hour

CLIENT:
MILLER HOMES LIMITED

DRAWING NUMBER:
28406_04_120_01

REVISION:	SHEET SIZE:	SCALE:
B	A3	NFS

STATUS:
FOR INFORMATION / APPROVAL

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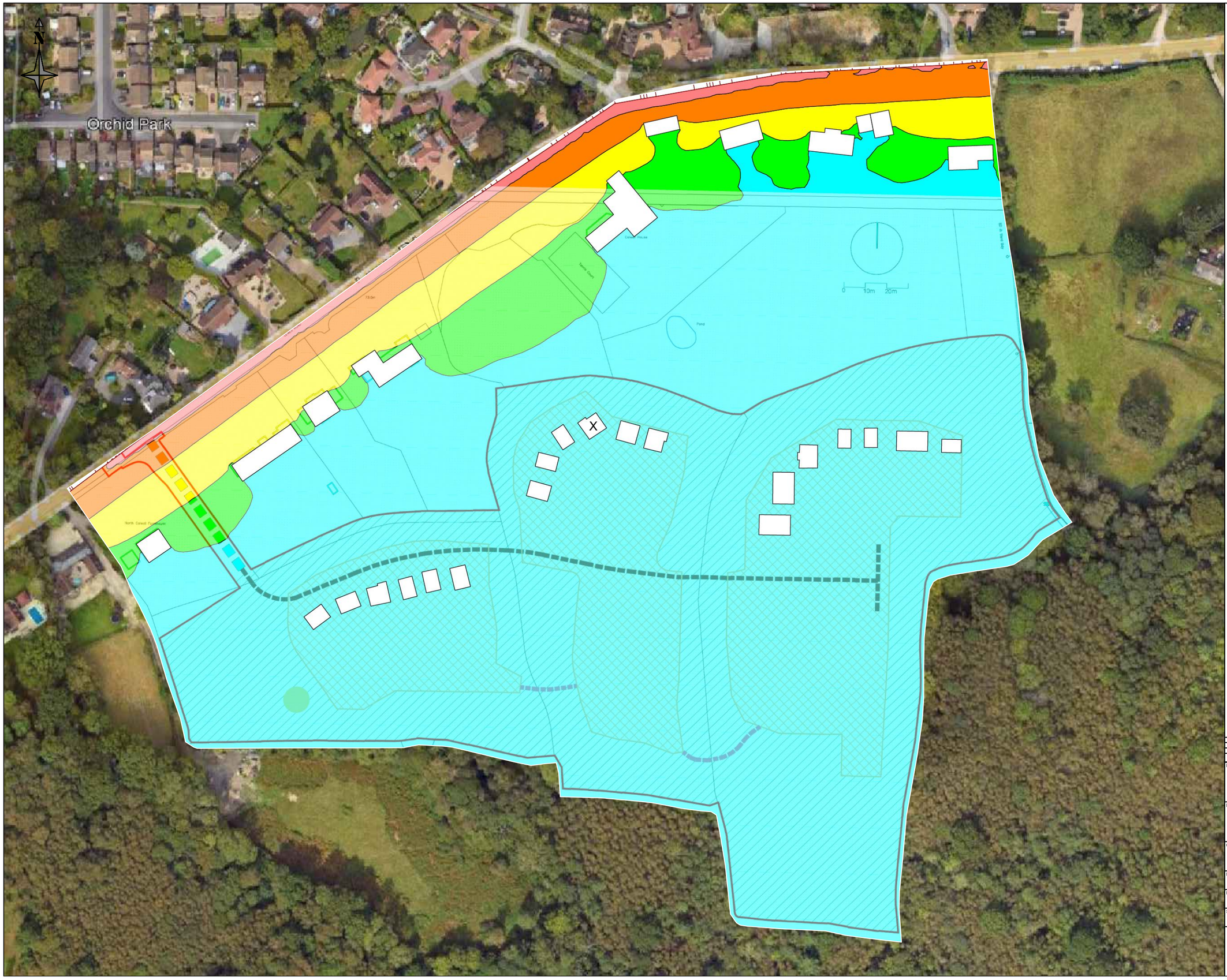

NOTES:

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KEY

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- 50–55dB(A)
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- 60–65dB(A)
- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
B	UPDATED SITE PLAN	HJ	NF	TR	08.01.25
A	UPDATED SITE PLAN	HJ	DN	TR	17.12.24
-		EW	NF	AB	21.03.24

PROJECT:
COLWELL FARM,
HAYWARDS HEATH

DRAWING TITLE:
NIGHT-TIME AMBIENT SOUND LEVELS, LAeq,8hour

CLIENT:
MILLER HOMES LIMITED

DRAWING NUMBER:
28406_04_120_02

REVISION:	SHEET SIZE:	SCALE:
B	A3	NFS

STATUS:
FOR INFORMATION / APPROVAL

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Email: group@m-ec.co.uk
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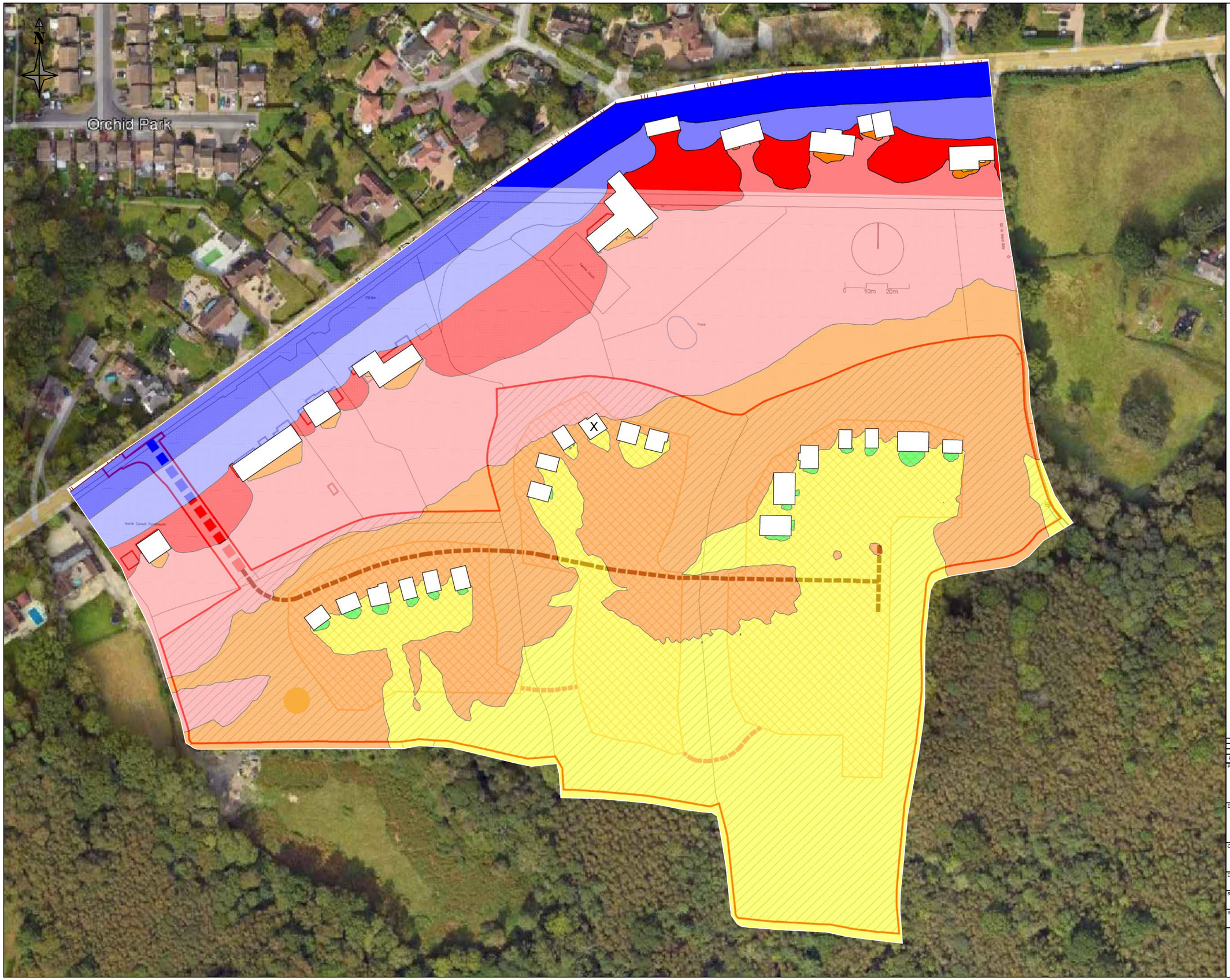

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- 50–55dB(A)
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REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
B	UPDATED SITE PLAN	HJ	NF	TR	08.01.25
A	UPDATED SITE PLAN	HJ	DN	TR	17.12.24
-		EW	NF	AB	21.03.24

PROJECT:
COLWELL FARM,
HAYWARDS HEATH

DRAWING TITLE:
NIGHT-TIME MAXIMUM SOUND LEVELS, LAFmax,T

CLIENT:
MILLER HOMES LIMITED

DRAWING NUMBER:
28406_04_120_03

REVISION:	SHEET SIZE:	SCALE:
B	A3	NFS

STATUS:
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APPENDICES

APPENDIX E

Performance Requirements

Façade Element	Sound Insulation Performance Requirements (dB) in Octave Band Centre Frequencies (Hz)						R_w / $D_{ne,w}$ (dB)	C_{tr} (dB)
	125	250	500	1k	2k	4k		
Glazing	22	20	26	36	39	31	31	-4
Ventilation (Trickle)	32	32	31	33	31	31	32	0
The glazing reduction requirements can typically be found in a configuration of 4/12/4, where the information is presented in terms of the thickness of one pane of glass in mm, followed by the size of the air gap in mm, followed by the thickness of the second pane of glass in mm.								

Minimum performance requirements for overheating ventilation only applicable if passive ventilation is used. If mechanical ventilation is chosen, please refer to the main body of the acoustics report for suitable noise limits.

It is appreciated that it is impractical to achieve every octave band minimum performance requirement, therefore, during procurement of solutions, the $R_w + C_{tr}$ or $D_{ne,w} + C_{tr}$ should be adhered to at a minimum.

- CIVIL ENGINEERING
- TRANSPORT
- FLOOD RISK & DRAINAGE
- STRUCTURES
- GEO-ENVIRONMENTAL
- ACOUSTIC AIR
- UTILITIES
- GEOMATICS
- LIGHTING
- EXPERT WITNESS

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