MEC Consulting Group

ACOUSTIC AIR

Land East of Rugby Road, Clifton-upon-Dunsmore
Acoustics Assessment
June 2025

Report Ref: 29286-ENV-0401 Rev B

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APPENDICES

1.0 INTRODUCTION

1.1 MEC Consulting Group Ltd (MEC) has been commissioned by Richborough (hereafter referred to as 'the Client'), to undertake an Acoustics Assessment for a proposed residential development at Rugby Road, Clifton-upon-Dunsmore, Rugby (hereafter referred to as 'the Site').

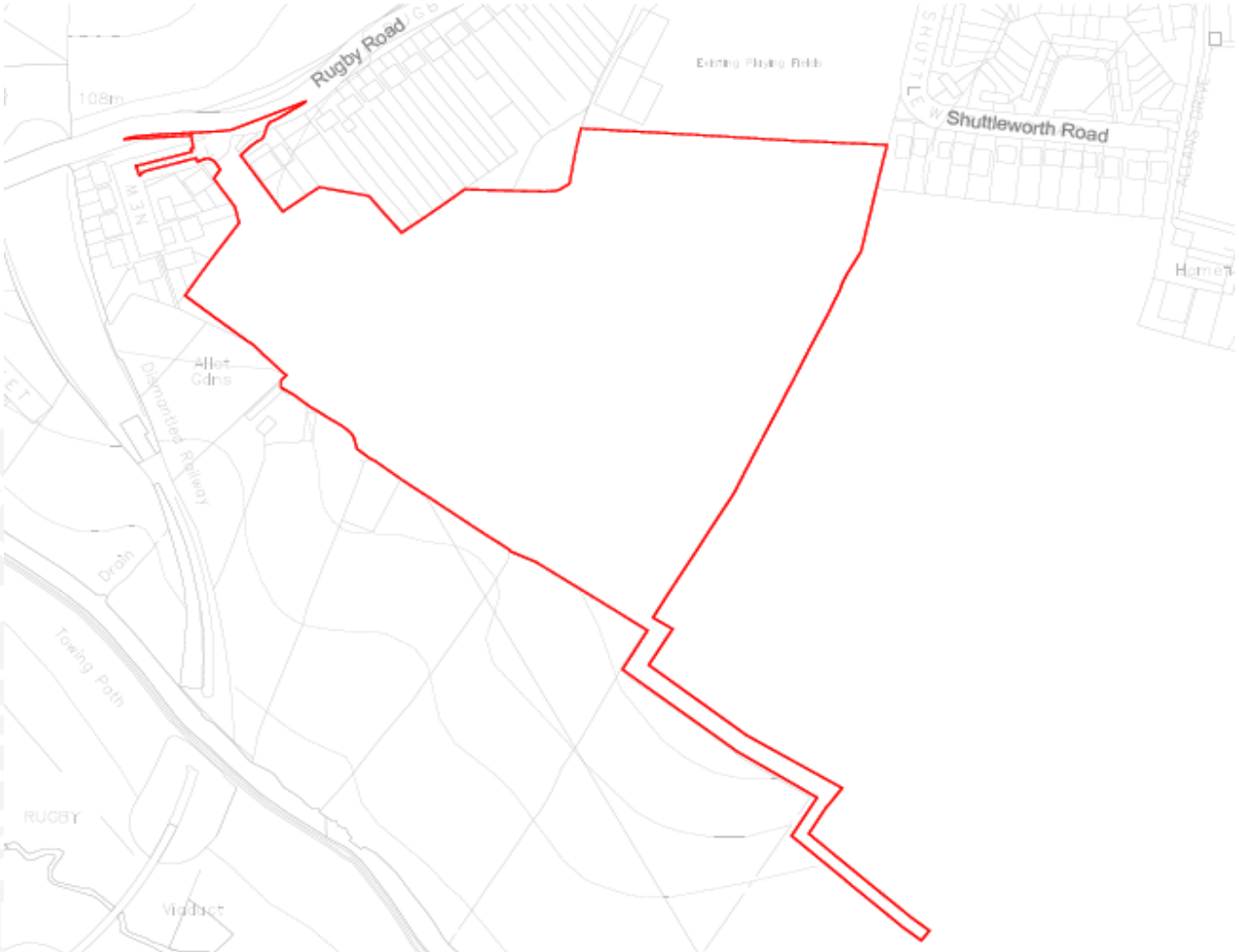
Existing Site

1.2 The Site lies approximately to the southwest of Clifton-upon-Dunsmore Village Centre. The Site is bound to the north by a mixture of existing residential dwellings and Clifton-upon-Dunsmore recreational ground, to the east by arable land which is under applicant control, to the south by open greenfield, with Houlton Way and the West Coast Main Line railway beyond and to the west by existing residential dwellings with Rugby Road beyond.

1.3 The principal source of noise affecting the Site is predicted to be from road traffic using Houlton Way and Rugby Road, along with any contributions from Clifton-upon-Dunsmore recreational ground.

1.4 The Site location for the proposed development is presented in Figure 1.1.

Figure 1.1: Site Location



Development Proposals

1.5 The development description comprises of the following:

"Outline planning application for the residential development of up to 160 dwellings, and creation of associated vehicular access off Rugby Road, pedestrian/cycle access points, parking, landscaping, drainage features, open space, children's play area and associated infrastructure (all matters reserved except for vehicular access off Rugby Road)."

1.6 A sketch layout is presented in **Appendix A**. However, it should be noted that this is illustrative and is likely subject to change throughout the development process.

Assessment Scope

1.7 The following scope of works has been undertaken:

- An environmental sound survey has been undertaken within the Site in order to determine the prevailing acoustic 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], the British Standard BS 8233[2] and AVOG[3]; and
- Where required, appropriate mitigation measures have been provided to demonstrate compliance with the relevant standards.

1.8 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

1.9 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.

1.10 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 STANDARDS AND GUIDANCE

General

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

Summary of Guidance and Standards

2.2 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.

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

Professional Practice Guidance on Planning and Noise - ProPG

2.4 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.

2.5 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 should be conducted.

2.6 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.

2.7 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 2.1.

2.8 Whilst ProPG does not define a measurement interval for the assessment of L_{AFmax} levels, research[4] has been undertaken which indicates that, for Maximum Event Level assessments, a sampling interval of

[4] Paxton et al., Assessing L_{max} for residential development: The AVO Guide Approach, Institute of Acoustics, 2019

between 1 and 3 minutes relates most closely to how awakening events are experienced by people in reality when compared to longer sampling periods.

2.9 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.

2.10 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.

2.11 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 8233:2014 '*Guidance on sound insulation and noise reduction for buildings'*

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

2.13 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 2.1.

Table 2.1: 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

2.14 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.

2.15 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.

Acoustics Overheating and Ventilation – AVOG

2.16 AVOG outlines a methodology for the assessment of airborne sound during overheating conditions, and emphasises the co-dependency of acoustics, ventilation and overheating design.

2.17 Many developments require closed windows to provide good internal acoustic conditions which is in direct contrast to residents opening windows to keep a building cool. These opposing requirements are becoming a significant issue in residential building design as only one environmental comfort is then possible: either comfortable noise levels with windows closed or thermal comfort with windows open.

2.18 AVOG prescribes a two-level assessment procedure, the first stage is based upon external sound levels and provides a risk of adverse acoustic conditions during periods of overheating. The second stage is a formal assessment which considers both internal acoustic conditions and increased ventilation during overheating concurrently. A Level 2 AVOG assessment is typically reserved for detailed design stage as the Level 1 assessment would inform any future required works for reserved matters.

2.19 It should be noted, that whilst AVOG is typically applicable at planning stage, with the introduction of AD-O[5] for Building Control purposes, which contains acoustic criteria for bedrooms during the night-time, a detailed AVOG assessment is likely to be required at some point in the project cycle.

2.20 However, as AD-O is required at Building Control stage and not necessarily for planning, an AVOG assessment for night-time is also presented in this report, to give context to the environment and the potential risk of internal acoustic conditions during periods of overheating. It should however be noted that the requirement to provide a suitable Overheating strategy that considers internal acoustic conditions is a Building Control matter or something that can be considered in more detail at reserved matters stage.

2.21 This report considers an AVOG Level 1 assessment only.

[5] The Building Regulations 2010, Overheating, Approved Document 'O'.

3.0 ENVIRONMENTAL SOUND SURVEY

3.1 An environmental sound survey was undertaken between Tuesday 21st and Thursday 23rd January 2025. The survey was undertaken in full accordance with the guidance set out in BS 7445[6].

3.2 A Sound Level Meter (SLM) was installed at two locations, as follows:

- Continuous Measurement 1 (CM1): on the western boundary of the Site, approximately 25m from the nearest carriageway edge of Rugby Road; and
- Continuous Measurement 2 (CM2): on the southern boundary of the Site, approximately 117m from the nearest carriageway edge of Houlton Way.

3.3 A monitoring location plan is provided in Figure 3.1.

Figure 3.1: Measurement Positions

Equipment

3.4 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 Class 1 calibrators, with no significant drift in calibration noted.

3.5 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 3.1.

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

Table 3.1: Equipment and Calibration Details

Measurement Position	Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
CM1	Sound Level Meter	Type NOR140	1407599	20/08/2026
	Pre-Amplifier	Type 1209	22646	
	Microphone	Type 1225	384571	
	Calibrator	Norsonic 1255	125525494	21/08/2025
CM2	Sound Level Meter	Type NOR140	1407932	26/02/2025
	Pre-Amplifier	Type 1209	23695	
	Microphone	Type 1225	505583	
	Calibrator	Norsonic 1251	34315	07/04/2025

Meteorological Conditions

3.6 During setup of the SLMs, weather conditions were dry and partly cloudy. Winds were noted to be from the south with speeds of up to 1.2 m/s.

3.7 On collection, weather conditions were noted to include light rain and easterly breeze of up to 1 m/s.

3.8 Weather data (taken from www.timeanddate.com) shows that throughout the entire survey period, conditions remained dry with partial sunshine and maximum wind speeds of 3 m/s.

3.9 Overall, it is considered there were no adverse weather conditions that could have influenced the survey outcome.

Observations

3.10 Whilst on Site it was noted that the dominant source of noise in the area is from road traffic using Rugby Road and Houlton Way. On Rugby Road. The traffic flow was noted to consist of a mixture of cars and light goods vehicles (LGVs). On Houlton Way, the traffic was noted to consist of a mixture of vehicles, including heavy goods vehicles (HGVs).

3.11 Other sources of noise observed on Site were birdsong and trains passing via the West Coast Main Line railway tracks to the south.

Results

3.12 A time history graph for the monitoring position is provided in **Appendix C.**

3.13 Table 3.2 provides a summary of measured sound levels at CM1.

Table 3.2: 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] $L_{AFmax,2min}$
Tues 21st	52[b]	45	63
Wed 22nd	53	46	61
Thurs 23rd	56[c]	-	-

[a] Maximum noise level not exceeded more than 10 times per night.
[b] T = 11.5hr
[c] T = 4.5hr

3.14 As shown in Table 3.2, ambient daytime $L_{Aeq,T}$ sound levels ranged between 52 dB and 56 dB, and for the night-time $L_{Aeq,8hr}$ sound levels ranged between 45 dB and 46 dB.

3.15 Whilst 56 dB was the highest measured daytime $L_{Aeq,T}$, it is noted that this was obtained over a 4.5-hour period. Therefore, 53 dB $L_{Aeq,16hr}$ will be used for the purpose of the assessment as this was obtained over a full 16-hour period.

3.16 Analysis of the night-time $L_{AFmax,2min}$ levels shows that the individual events did not exceed 63 dB more than 10 times during the measured night-time period. Audio recordings indicate that this level, along with the remainder of the top 10 maximum event levels were caused by vehicles passing the Site and therefore the typical level of 63 dB is considered appropriate to use for the purpose of the assessment.

3.17 Table 3.3 provides a summary of measured sound levels at CM2.

Table 3.3: 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] $L_{AFmax,2min}$
Tues 21st	47[b]	41	55
Wed 22nd	48	45	58
Thurs 23rd	51[c]	-	-

[a] Maximum noise level not exceeded more than 10 times per night.
[b] T = 11.5hr
[c] T = 4.5hr

3.18 As shown in Table 3.3, ambient daytime $L_{Aeq,T}$ sound levels ranged between 47 dB and 51 dB, and for the night-time $L_{Aeq,8hr}$ sound levels ranged between 41 dB and 45 dB.

3.19 As with CM1, the $L_{Aeq,16hr}$ sound level obtained on Wednesday 22nd January will be used for the purpose of the assessment as this level was obtained over a full 16-hour period.

3.20 Analysis of the night-time $L_{AFmax,2min}$ levels shows that the individual events did not exceed 58 dB more than 10 times during the measured night-time period. Audio recordings indicate that the maximum event levels

were caused by distant trains using the West Coast Main Line and therefore the typical level of 58 dB is considered appropriate to use for the purpose of the assessment.

4.0 ASSESSMENT METHODOLOGY

Acoustic Modelling

4.1 An acoustic model of the Site and environs has been generated in Datakustik CadnaA® modelling software.

4.2 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].

Modelling Parameters

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

- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 24th December 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%.

Source Sound Levels

Road and Rail Traffic

4.4 Based on the sound levels measured at CM1 and CM2, the following will be used to calibrate the 3D acoustic model.

Table 4.1: Sound Levels Used to Calibrate Acoustic Model, dB

Parameter	CM1	CM2
Daytime Ambient $L_{Aeq,16hr}$	53	48
Night-time Ambient $L_{Aeq,8hr}$	46	45
Night-time Maximum $L_{AFmax,2min}$	63	58

4.5 Given that the audio recordings indicate the night-time maximum event levels were caused by train pass-bys at CM2, the night-time L_{AFmax} acoustic model will be calibrated as such.

Clifton upon Dunsmore Recreational Ground

4.6 Satellite imagery shows a grass football pitch and 2 tennis courts located on Clifton upon Dunsmore Recreational Ground. Furthermore, it is noted that there are potential additional pitches included within the indicative layout which would also need to be considered as part of this assessment.

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

4.7 As there were no matches observed during setup or collection of the equipment, the approach has been to use MEC's comprehensive library of in-house measurement data, with source sound levels from football being played on Brinsley Recreation Ground and tennis being played at Carisbrooke Tennis Club. This data is presented in **Appendix C**.

4.8 It should be noted that this approach will represent a worst-case assessment, as any noise contribution from the recreational ground would typically be present for relatively short durations during the above 16-hour assessment period. Therefore, the overall 16-hour noise exposure for nearby gardens will tend to be influenced most by the ambient noises present during the remainder of the day rather than the short duration when the play areas might be used.

Modelled Scenarios

4.9 With reference to the noise criteria outlined in Section 2.0, the acoustic model has been used to predict sound levels at indicative dwellings across the Site based on the indicative layout (as shown in **Appendix A**) 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 $L_{AFmax,2min}$ external sound levels at first floor (4m) height.

4.10 For conciseness, this report tabulates the most exposed receptors to give context to the most stringent mitigation measures. All other receptors are assessed through the various sound level contour and mitigation reference drawings presented in the various appendices to this report.

4.11 The most exposed receptor to Rugby Road is Plot 1, the most exposed receptor to Houlton Way and the West Coast Main Line is Plot 107 and the most exposed receptor to the recreational ground is Plot 120.

5.0 ASSESSMENT

ProPG Initial Noise Risk Assessment

5.1 As required by the ProPG, an Initial Noise Risk Assessment (INRA) is presented in Table 5.1.

Table 5.1: 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 1	44			41				
Risk Assessment	Negligible			Low				
Plot 107	45			43				
Risk Assessment	Negligible			Low				
Plot 120					62	-		
Risk Assessment					Medium			

[(a)] $L_{Aeq,16hr}$ dB for daytime assessment purposes and $L_{Aeq,8hr}$ dB for night-time assessment purposes.

5.2 Based on the daytime modelled sound levels, the most exposed dwelling to Rugby Road (Plot 1) and the most exposed dwelling to Houlton Way (Plot 107) fall within the ProPG risk category of 'Negligible', for which the guidance states that the development is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

5.3 The most exposed receptor to the recreational grounds (Plot 120) falls within the ProPG risk category of 'Medium' during the daytime, for which the guidance requires that the Site should follow a good acoustic design process which confirms how the adverse impacts of noise will be mitigated and minimised.

5.4 During the night-time, the most exposed dwellings fall within the ProPG risk category of 'Low', 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.*"

BS 8233 External Amenity Criteria

5.5 The noise criterion often the most difficult to meet is the BS 8233 outdoor criterion of 55 dB $L_{Aeq,16hr}$ applicable to private amenity spaces such as gardens.

5.6 It is noted that the Site is located at a substantial standoff from the surrounding noise sources, with intervening dwellings located between the Site and Rugby Road. As such, the resulting daytime $L_{Aeq,16hr}$ sound level contour map, shown on drawing 29286_04_120_01 in **Appendix D**, indicates that BS 8233's lower-level criterion of 50 dB $L_{Aeq,16hr}$ will likely be satisfied in all garden across the Site with the provision of standard 1.8m high close boarded timber fencing.

Internal Acoustic Criteria

5.7 Table 5.2 presents the required external to internal reduction requirements for the most exposed indicative dwellings.

Table 5.2: Required Façade Performance, dB

Plot	Parameter	External Level	Internal Criteria	Required Reduction[(a)]
1	Daytime Ambient $L_{Aeq,16hr}$	44	35	9
	Night-time Ambient $L_{Aeq,8hr}$	41	30	11
	Night-time Maximum $L_{AFmax,2min}$	54	45	9
107	Daytime Ambient $L_{Aeq,16hr}$	45	35	10
	Night-time Ambient $L_{Aeq,8hr}$	43	30	13
	Night-time Maximum $L_{AFmax,2min}$	60	45	15
120	Daytime Ambient $L_{Aeq,16hr}$	62	35	27
[(a)] External to internal reduction to achieve BS 8233 and ProPG criteria.				

5.8 For the most exposed receptor to Rugby Road, the results in Table 5.2 show that a sound reduction of up to 9 dB will be required to achieve the 35 dB $L_{Aeq,16hr}$ criteria within habitable rooms, with a sound reduction of up to 11 dB required to achieve the 30 dB $L_{Aeq,8hr}$ criteria within bedrooms.

5.9 For the most exposed receptor to Houlton Way and the West Coast Main Line, a sound reduction of up to 10 dB will be required to achieve the 35 dB $L_{Aeq,16hr}$ criteria within habitable rooms, with a sound reduction of up to 13 dB required to achieve the 45 dB L_{AFmax} criteria within bedrooms.

5.10 For the most exposed receptor overlooking the recreational ground, a sound reduction of up to 27 dB will be required to achieve the internal $L_{Aeq,16hr}$ criterion during the daytime.

AVOG Level 1 Assessment

5.11 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.

5.12 The initial Level 1 assessment is presented in Table 5.3.

Table 5.3: AVOG Level 1 Assessment

Plot	Parameter	Predicted External Level dB	Level 1 Risk Grading	Level 2 Advised?
1	Daytime Ambient $L_{Aeq,16hr}$	44	Negligible	Not Required
	Night-time Ambient $L_{Aeq,8hr}$	41	Negligible	Not Required
107	Daytime Ambient $L_{Aeq,16hr}$	45	Negligible	Not Required
	Night-time Ambient $L_{Aeq,8hr}$	43	Negligible	Not Required
120	Daytime Ambient $L_{Aeq,16hr}$	62	Medium	Optional but recommended

5.13 The results demonstrate that at the most exposed receptors, an AVOG Level 2 assessment is not required for a majority of the Site.

5.14 Whilst an AVOG Level 2 assessment is recommended for the plots adjacent to the recreational ground, it is important to re-iterate that sound levels over a full 16-hour daytime would be lower than what have been used as part of this assessment. Subsequently, it is considered that an AVOG Level 2 assessment would unlikely be required.

5.15 However, given that this has been based on a sketch layout, this may require further consideration once a layout has been finalised.

6.0 MITIGATION

External Sound Levels

6.1 The Site benefits from substantial standoff from the dominant noise sources and screening provided by existing dwellings along Rugby Road. Therefore, the subsequent acoustic modelling process has demonstrated that with the illustrative plan in situ, the BS 8233 lower external living criteria of 50 dB can be met across the Site with the provision on standard 1.8m high close boarded timber fencing.

Internal Sound Levels

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

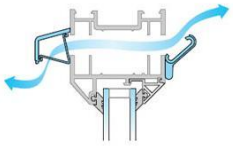
6.3 In terms of acoustics, windows and ventilation strategies are the 'weakest' acoustic point in any façade and subsequently, the composite sound reduction performance is typically dominated by these elements. Therefore, minimum performance requirements to be provided by the glazing and ventilation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

6.4 Drawing on the above, and the acoustic modelling undertaken, Table 6.1 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.

6.5 All habitable rooms across the Site would likely comply with the relevant acoustic criteria through standard double glazing and direct airpath window mounted trickle ventilators.

6.6 For each reference in Table 6.1, the sound reduction performance requirements, in octave band and weighted reduction format, are presented in **Appendix E**.

Table 6.1: 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

7.0 CONCLUSIONS

7.1 MEC has been commissioned by Richborough to undertake an Acoustics Assessment for a proposed residential development at Rugby Road, Clifton-upon-Dunsmore, Rugby.

7.2 Detailed assessments of the Site, during typical conditions, have been undertaken in accordance with BS 8233 and ProPG criteria whilst giving consideration to typical condition ventilation requirements in AD-F.

7.3 The Site benefits from substantial standoff from the dominant noise sources and screening provided by existing dwellings along Rugby Road. Therefore, the subsequent acoustic modelling process has demonstrated that with the sketch layout in situ, the BS 8233 lower external living criteria of 50 dB can be met across the Site with the provision of standard 1.8m high close boarded timber fencing.

7.4 Embedded façade mitigation measures have been suggested in order to achieve internal criteria in line with BS 8233 and ProPG. Mitigation measures include standard thermal double glazing combined with standard direct airpath window mounted trickle ventilators across the Site.

7.5 Initial considerations have been given to internal acoustic conditions during periods of overheating which, in accordance with AVOG, shows that no further consideration will likely be required.

7.6 In summary, based upon the assessment presented within this report, the Site is considered suitable for residential development.

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APPENDICES

APPENDIX A

The scaling of this drawing cannot be assured

Revision		Date	Drn	Ckd
A	Layout amended following Client's comments	02.06.2025	DR	TM
B	Red line and schedule updated	05.06.2025	SL	RM

Status	**DRAFT**
Client:	**Richborough Estates**
Project title:	**Land East of Rugby Road Clifton-upon-Dunsmore**
Drawing title:	**Sketch Layout**

Scale:	1:500 @A0
Date:	08.05.25
Drawn by	TM
Checked by:	RM
Drawing no.:	SK-01
Revision:	B

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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 90th 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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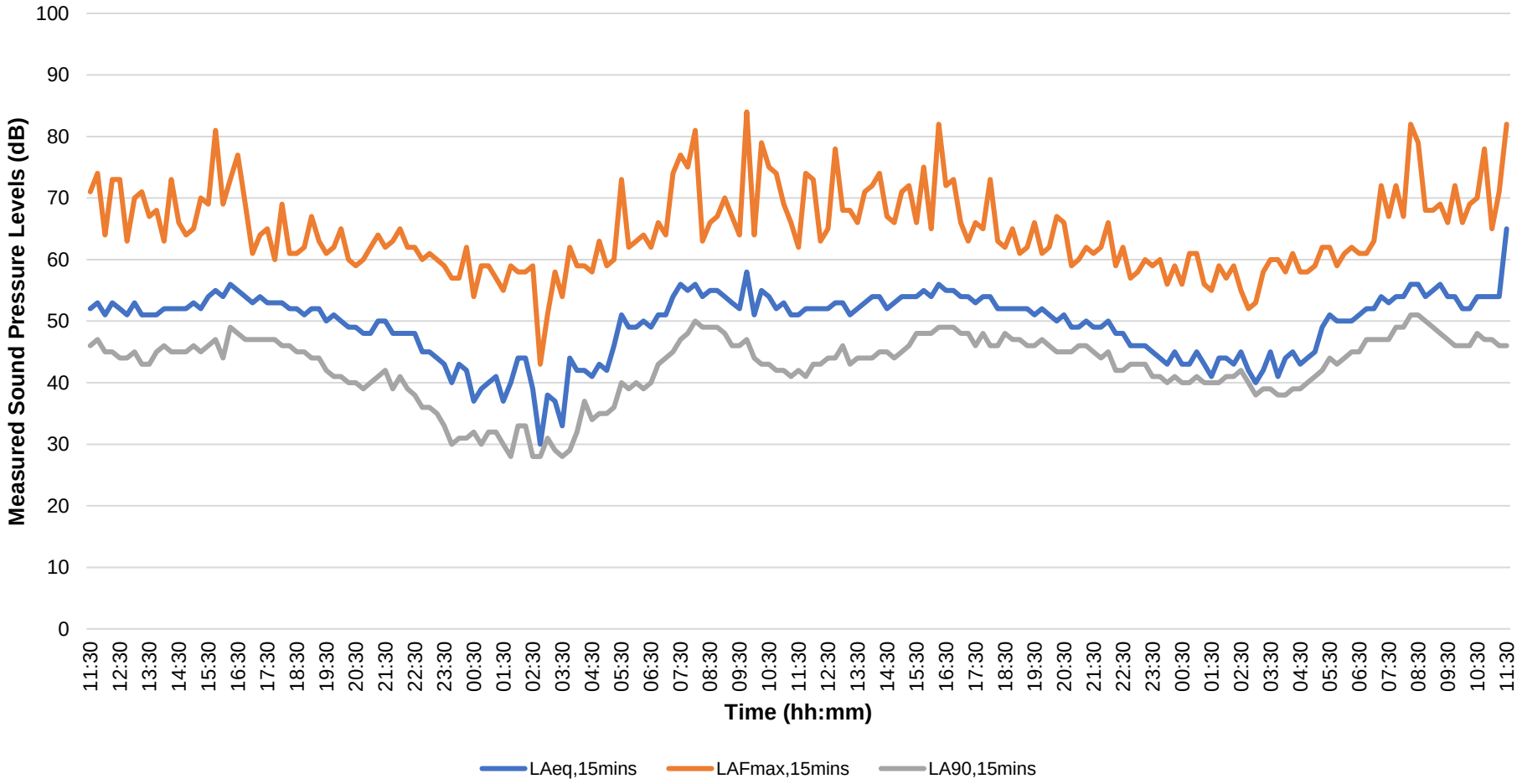
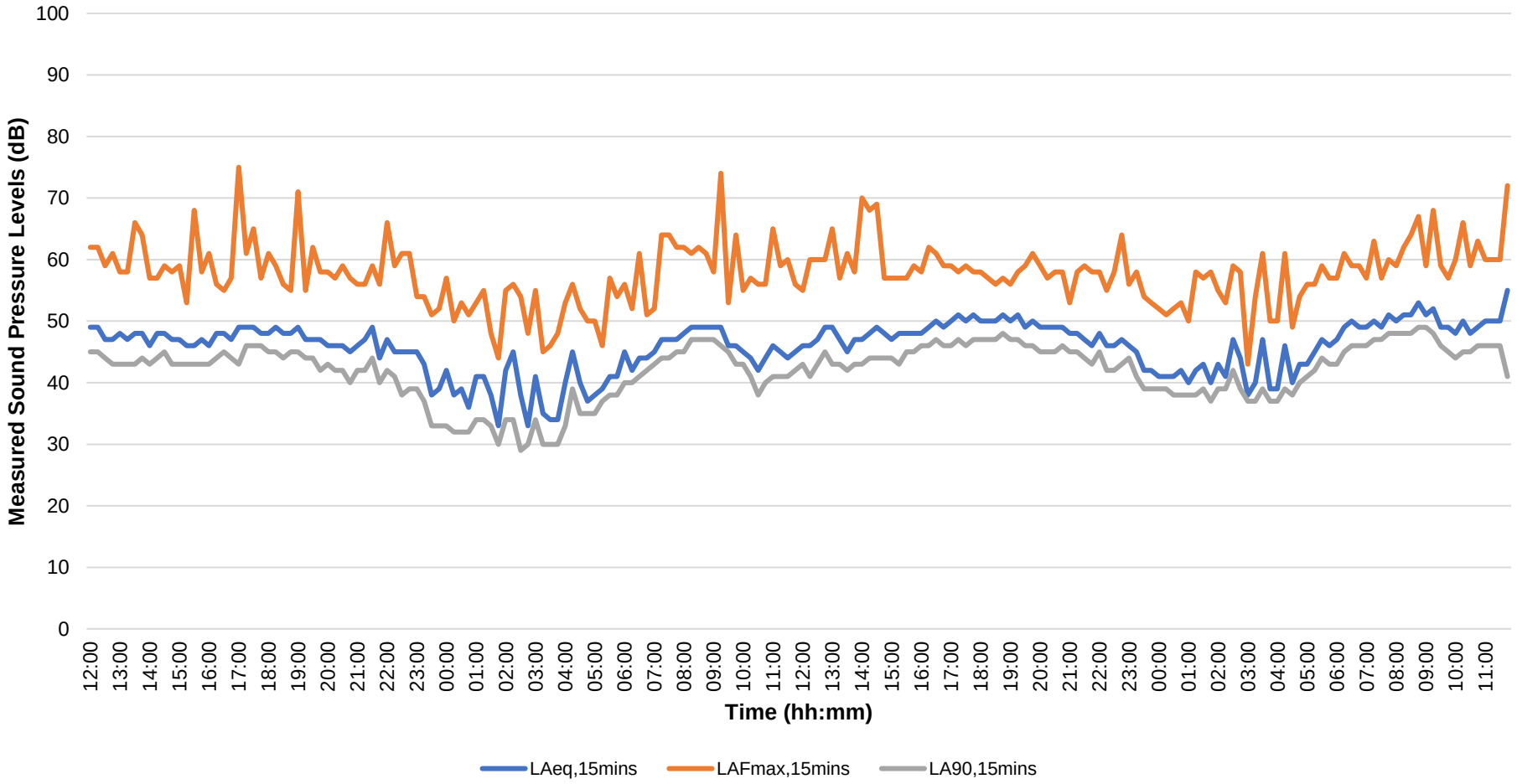
APPENDICES

APPENDIX C

Rugby Road, Clifton upon Dunsmore - CM1
Environmental Noise Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 21st to 23rd January 2025



Rugby Road, Clifton upon Dunsmore - CM2
Environmental Noise Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 21st to 23rd January 2025



Sports/Football Pitches Monitoring Positions & Noise Measurements

Noise Measurements

Date	L_{Aeq}	L_{Amax}	L_{A01}	L_{A10}	L_{A90}
Location 1					
On boundary at approx 25m from pitch					
Warm up					
(2021/09/19 10:11:36.00)	52.3	72.1	62.2	53.8	46.3
(2021/09/19 10:15:02.00)	50.1	60.6	56.2	52.5	46.2
(2021/09/19 10:20:02.00)	53.5	67.3	62.5	56	48.8
Average	52.2	66.7	60.3	54.1	47.1
Maximum	53.5	72.1	62.5	56	48.8
Kick off @ 10:22					
(2021/09/19 10:25:01.00)	55.6	76.5	65.4	58.5	48.5
(2021/09/19 10:30:02.00)	59.2	79.6	70.5	60.6	46.9
(2021/09/19 10:35:02.00)	56.3	75.3	66.8	59.1	47
(2021/09/19 10:40:02.00)	54.4	69.5	63.6	58.2	46.1
(2021/09/19 10:45:02.00)	55.6	68.7	65.1	59.4	47.5
(2021/09/19 10:50:02.00)	53.5	74.6	63.7	55.3	47.2
(2021/09/19 10:55:02.00)	54.1	70.3	65.2	56.4	47.4
(2021/09/19 11:00:02.00)	52.2	69.3	65.1	53.4	44.3
(2021/09/19 11:05:02.00)	48.5	64.8	56	49.4	45.6
(2021/09/19 11:10:01.00)	49.1	69.8	55.1	50.4	45
Average	54.9	71.8	63.7	56.1	46.6
Maximum	59.2	79.6	70.5	60.6	48.5
Location 2					
On half way line at approx 10m from sideline					
(2021/09/19 11:13:10.00)	58.5	74	68.7	61.9	49.3
(2021/09/19 11:15:02.00)	59.3	78.7	70.3	62.6	49.4
(2021/09/19 11:20:02.00)	59.6	79.1	71.9	61.9	46.8
(2021/09/19 11:25:02.00)	60.5	81.4	72.3	62.6	47.7
(2021/09/19 11:30:02.00)	57.5	78.6	69.8	59.5	44.7
(2021/09/19 11:35:02.00)	57.3	80.4	68.3	58.3	47.6
(2021/09/19 11:40:02.00)	58	79.6	68.6	59.4	48
(2021/09/19 11:45:02.00)	60.4	82.3	72.1	63.1	48.2
(2021/09/19 11:50:02.00)	59.9	78.4	72.9	61.5	48
Average	59.2	79.2	70.5	61.2	47.7
Maximum	60.5	82.3	72.9	63.1	49.4

Tennis Court Monitoring Position & Noise Measurements

Time	Saturday 11th January 2025 $L_{Aeq,1hr}$	Sunday 12th January 2025 $L_{Aeq,1hr}$
09:00 – 10:00	54	47
10:00 – 11:00	53	49
11:00 – 12:00	48	52
12:00 – 13:00	45	53
13:00 – 14:00	46	56
14:00 – 15:00	43	56
15:00 – 16:00	-	52

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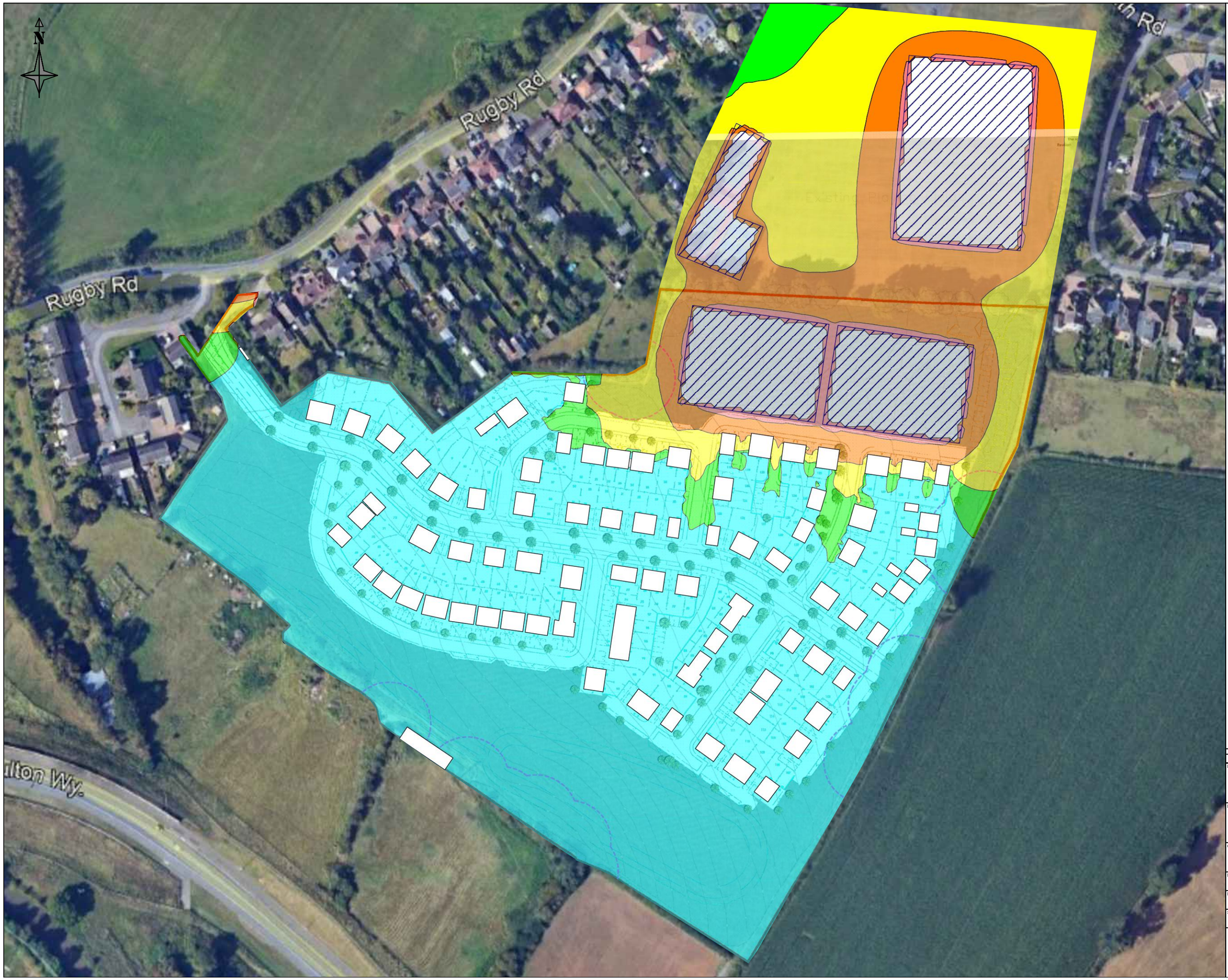
APPENDICES

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:
-		HJ	MH	AB	28.05.25

PROJECT:
LAND EAST OF RUGBY ROAD,
CLIFTON-UPON-DUSNMORE,
RUGBY

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

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
29286_04_120_01

REVISION:	SHEET SIZE:	SCALE:
-	A3	NFS

STATUS:
FOR INFORMATION / APPROVAL

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Website: www.m-ec.co.uk

NOTES:

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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:
-		HJ	MH	AB	28.05.25

PROJECT:
LAND EAST OF RUGBY ROAD,
CLIFTON-UPON-DUSNMORE,
RUGBY

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

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
29286_04_120_02

REVISION:	SHEET SIZE:	SCALE:
-	A3	NFS

STATUS:
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- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
-		HJ	MH	AB	28.05.25

PROJECT:
LAND EAST OF RUGBY ROAD,
CLIFTON-UPON-DUSNMORE,
RUGBY

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

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
29286_04_120_03

REVISION:	SHEET SIZE:	SCALE:
-	A3	NFS

STATUS:
FOR INFORMATION / APPROVAL

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APPENDICES

APPENDIX E

Mitigation Reference - Performance Requirements

Façade Element	Sound Insulation Performance Requirements (dB) in Octave Band Centre Frequencies (Hz)						R_w / $D_{n,e,w}$ (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. This is combined with standard non-acoustic trickle vents for ventilation purposes.								

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 $D_{n,e,w} + C_{tr}$ 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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