Planning Stage Environmental Noise Assessment

Ecclesbourne Sixth Form Extension

Wirksworth Road, Duffield, Derbyshire

DE56 4GS

HRS Services Ltd.

HRS Ref: 128474 – AC – 1v1

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I. Revision History

Revision	Description	Date	Approved
1v1	First Issue	28/02/2018	AW

II. Executive Summary

HRS Services Ltd. (HRS) has undertaken a planning stage environmental noise assessment for the proposed Ecclesbourne Sixth Form Extension based on noise surveys undertaken in February 2018 and March 2015. The proposed scheme involves the construction of a new single storey sixth form extension building, extending from the existing sixth form building.

The purpose of this assessment is to consider the existing noise climate around the proposed development site to determine suitability. The assessment considers existing background sound levels and noise impact at nearby noise sensitive receptors (NSRs).

The noise climate at the site at the time of HRS' noise survey was dominated by birdsong, with the occasional distant plane flyover and distant train passing.

Based on noise levels measured by HRS, existing site noise levels are such that Indoor Ambient Noise Levels for a new school building given in Building Bulletin 93 *'Acoustic design of schools: performance standards'* (BB93) can be met with appropriate specification of building envelope, glazing and ventilation strategy. Assessment indicates IANL requirements can be met in standard classrooms and teaching spaces with a ventilation strategy utilising partially open windows.

Should any teaching spaces be intended specifically for students with special hearing and communication needs have lower IANL requirements it is recommended that these spaces are provided with an alternative means of ventilation such that windows can remain closed.

Representative site background noise levels have been used to inform noise limits proposed to control noise emissions from new sources of building services noise introduced by the scheme in line with guidance given in BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'*. It is recommended that the Rating Level from new building services plant should not exceed the existing site representative background sound level, an indication of a 'low noise impact'.

III. Contents

1. Introduction

1.1. HRS Services Ltd (HRS) has been appointed by CPMG Architects Ltd (CPMG) to undertake acoustic consultancy services for the proposed Ecclesbourne Sixth Form Extension development, located on Wirksworth Road, Duffield.

1.2. The proposed scheme involves the construction of a new single storey sixth form extension building, extending from the existing sixth form building to the west of the existing school buildings.

1.3. The purpose of this assessment is to consider the existing noise climate around the proposed development site in order to determine suitability of the site for development as an educational building. The assessment will also consider existing background sound levels at nearby noise sensitive receptors and noise impact due to the proposed scheme.

1.4. This document has been prepared for the sole use, benefit and information of CPMG Architects Ltd (CPMG) for the purposes set out in the document or instructions commissioning the works. The liability of HRS in respect of the information contained herein will not extend to any third party.

1.5. This report is limited to addressing the specific acoustic issues contained herein and is based on information and drawings provided by the client.

1.6. Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology is included in Appendix III.

2. Site Description

2.1 The proposed development site is located off Wirksworth Road, Duffield, Derbyshire.

2.2 The proposed site currently comprises of buildings relating to Ecclesbourne School to the east, south east and north east, with a sports field to the north.

2.3 The wider site is bounded by residential dwellings on Park Road to the west, Wirksworth Road to the south and De Ferrers Court complex to the east.

2.4 The nearest Noise Sensitive Receptors (NSRs) to the proposed site have been identified as residential dwellings on Park Road, approximately 20m south west of the proposed new building.

2.5 The noise climate at the site at the time of HRS' noise survey was dominated by birdsong, with the occasional distant plane flyover and distant train passing.

2.6 A site plan is included in Appendix II with the proposed site layout.

3. Site Noise Survey

3.1 A noise survey was undertaken by HRS in order to assess the current noise climate and sound sources at the development site. Measurements were taken during typical school hours on Wednesday 21st February 2018. A night time survey was previously undertaken in the vicinity on Wednesday 11th March 2015 (detailed in '*English Block Ecclesbourne School Duffield HRS Services BS4142 Environmental Noise Assessment Report 120597 3v1')* and is taken to be representative of prevailing night time background noise levels at identified NSRs.

3.2 Attended noise levels were measured using a UKAS calibrated Brüel & Kjær 2250 precision integrating sound level meter. Calibration checks were carried out both before and after the survey with no significant variance observed. Noise was measured in terms of broadband A-weighted indices and spectral terms to assist with the design of noise control measures. Weather conditions during the survey were dry with wind speeds of less than 5 ms^{-1}. The sound level meters were mounted on a tripod at an approximate height of 1.5 metres and fitted with a proprietary outdoor microphone kit.

3.3 Although BB93 specifies indoor ambient noise levels in terms of $L_{Aeq,30min}$, where there is negligible change in noise level, shorter measurement periods are generally accepted as being representative.

3.4 Attended daytime measurements were obtained at locations 1 to 4 in order to assess noise levels incident on façades of the proposed building. Position 1 (daytime) and A (night time) are considered representative of prevailing noise levels at the nearest identified residential NSRs on Park Road.

3.5 An aerial image of the site with the proposed site indicating approximate noise measurement locations are included in Figure 1. The survey results are detailed in Appendix I and summarised in Table 1 below.

3.6 The predominant prevailing noise source observed to be affecting the site during the daytime was birdsong, with the occasional distant plane flyover and distant train passing. Activities from nearby residents and school facilities, such as lawn mowing and chainsaw tree cutting, influenced some noise measurements.

3.7 Previously taken noise levels during the night were dominated by infrequent distant trains passing.

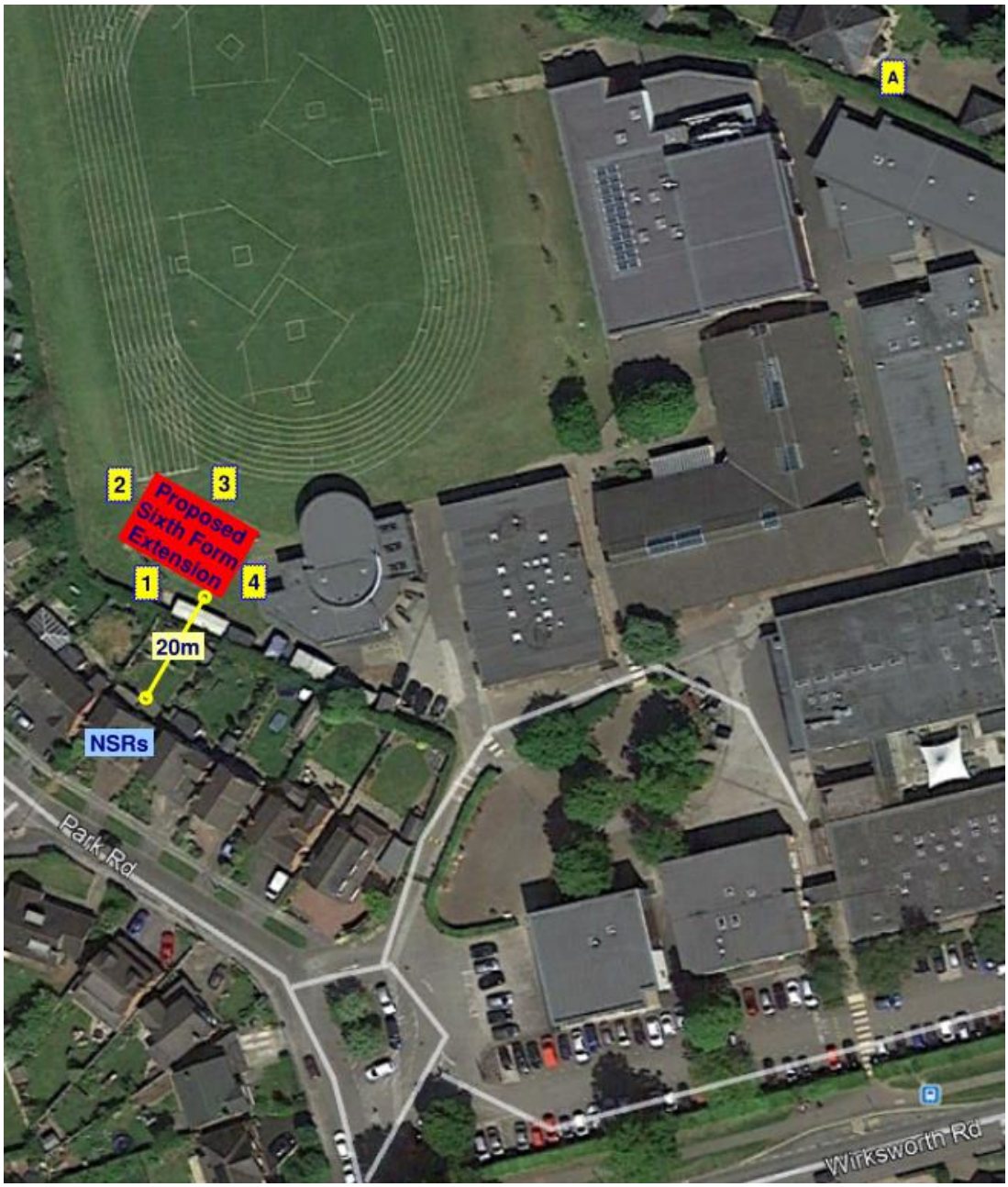
Table 1: Summary of HRS measured daytime noise levels. All noise levels values in dB, free-field

Position	Description	Time	$L_{Aeq,15min}$	$L_{AF90,15min}$
1	West façade and daytime NSR	1030 - 1500	44-48*	38-42
2	North façade		46-52*	41-42
3	East façade		44-47	40-41
4	South façade		43-47	39-42
A	Representative of night time NSR	0130 - 0215	41-43	34-35

Notes to Table 1:

* – Measured noise levels influenced by lawn mower and chainsaw noise

Figure 1: Site plan with approximate noise measurement locations



4. Noise Assessment Guidance and Criteria

Planning Guidance

National Planning Policy Framework

4.1 The current planning guidance for the assessment of the potential environmental noise impact is outlined in the National Planning Policy Framework (NPPF). Whilst the NPPF does not set criteria that must be achieved, the NPPF states the following in relation to the appropriate control of potential noise impacts (paragraph 109):

4.2 *"The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…"*

4.3 Therefore, the policy requires that new developments are not affected to an unacceptable degree by environmental noise.

Noise Policy Statement for England

4.4 The Noise Policy Statement for England (NPSE) provides further guidance on Government policy with regard to the potential impacts of noise. The NPSE states the aims of Government policy relating to noise are:

4.5 *"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"*

4.6 The Explanatory Note to the NPSE provides further guidance on how significant noise effects should be determined. The concepts of No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL – the lowest noise level at which an adverse effect can be observed) and Significant Observed Adverse Effect Level (SOAEL – the noise level above which significant adverse effects on health and quality of life can be observed) are introduced, however the NPSE also states that:

4.7 *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times."*

Part E Building Regulations – Building Bulletin 93 'Acoustic design of schools: performance standards'

4.8 Section 8 of Approved Document E states that the normal way of satisfying Requirement E4 of Part E to Schedule 1 of the Building Regulations 2010 for new school buildings is to meet the performance standards set out in Building Bulletin 93 *'Acoustic design of schools: performance standards'* (BB93).

4.9 Section 1.1 of BB93 presents Indoor Ambient Noise Level upper limit criteria (IANL) for various types of teaching, study and ancillary spaces. Teaching spaces are required to achieve an IANL ≤ 35 dB $L_{Aeq,30min}$; any teaching spaces intended specifically for students with special hearing and communication needs are to achieve a maximum IANL of ≤ 30 dB $L_{Aeq,30min}$. In addition BB93 states that the indoor ambient noise level should not regularly exceed 60 dB $L_{A1,30min}$.

4.10 Note that the BB93 IANL criteria include contributions from external sources outside the school premises and building services noise but exclude contributions from teaching activity/equipment, staff and students within the school premises.

School Premises Regulations and Independent School Standards

4.11 In addition to the design and construction standards covered by the Building Regulations, the School Premises Regulations and Independent School Standards cover the performance in use of schools including speech intelligibility in the classrooms. In order to comply with the School Premises Regulations and the Independent School Standards (but not the Building Regulations), operational noise levels (e.g. of equipment) in teaching and learning spaces will need to be suitable for the activities taking place and open plan teaching and learning spaces in new and refurbished schools will need to provide adequate speech intelligibility as measured by the speech transmission index (STI).

4.12 School client bodies are responsible for ensuring compliance with the School Premises Regulations.

Department for Education - Advice on standards for school premises

4.13 Pupils with special needs may need to be taught in spaces with lower noise levels and shorter reverberation times than in mainstream classrooms and class bases. Special schools and SEN units in mainstream schools therefore require designing to a higher acoustic standard. Where pupils with these special needs are taught in mainstream schools, the acoustics of the spaces where they are taught may need to be enhanced to the same standards as those in special units.

Control of External Noise Impact from Building Services

4.14 It is common for Local Authority planning requirements to require noise impact assessment. At the time of writing HRS are not aware of any specific noise impact assessment requirements for planning, however, it is good practice to control noise from mechanical services to ensure minimal impact on nearby noise sensitive properties. It is recommended that noise from new building services plant does not exceed the representative background noise level when assessed at the nearest noise sensitive receptor when assessed in line with BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* (BS 4142). This represents a BS 4142 assessment of 'low impact'.

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'

4.15 British Standard BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* describes a method for assessing the likelihood of complaints from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a 'Rating Level' for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (measured as a L_{Aeq}).

4.16 The Rating Level is then compared with the underlying background noise level (measured as a L_{A90}) in the absence of noise from the item or items of plant being assessed:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

4.17 BS 4142 states that a penalty should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive or intermittent characteristics. With respect to the acoustic feature correction, BS 4142 states:

4.18 *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

4.19 Generally a rating penalty for a sound should be based on a subjective assessment of its characteristics.

Operational Noise Impact

4.20 Consideration may need to be given to the potential for an adverse impact on the noise climate due to the operation of the new school extension. Similarly to a plant noise impact assessment in terms of noise, the impact of a development is considered relative to the existing noise climate and with particular reference to noise sensitive receptors.

World Health Organisation 'Guidelines for Community Noise'

4.21 The World Health Organisation (WHO) has published guidelines that relate to acceptable levels of noise from a health perspective detailed in the WHO *'Guidelines for Community Noise'*, 1999. The document sets out the following criteria that should be achieved on residential balconies, terraces and in outdoor living areas to protect the majority of people from being annoyed during the daytime. This is applicable for the assessment of noise impact on residential areas.

Table 2: Guideline values for community noise in specific environments (WHO)

Specific Environment	Guidance	Criteria Limit $L_{Aeq,16hr}$ (dB)
Outdoor living area	'Few seriously annoyed' in outdoor living areas	≤ 55
	'Few moderately annoyed' in outdoor living areas	≤ 50

5. Noise Assessment

Façade Noise Exposure

5.1 There are various Indoor Ambient Noise Level (IANL) criteria defined in BB93 for different spaces. Teaching spaces are required to achieve an IANL ≤ 35 dB $L_{Aeq,30min}$; any teaching spaces intended specifically for students with special hearing and communication needs are to achieve a maximum IANL of ≤ 30 dB $L_{Aeq,30min}$. Practical teaching spaces such as Science Laboratories, Art Rooms, ICT rooms, and Design & Technology rooms are required to achieve an IANL of ≤ 40 dB $L_{Aeq,30min}$.

5.2 In addition, for rooms requiring IANL of 35 dB $L_{Aeq,30min}$. or less, BB93 states that noise levels from regular discrete events (e.g. aircraft, trains) should not exceed 60 dB $L_{A1,30min}$.

5.3 The overall sound insulation performance of the external building envelope will be typically dictated by the glazing as this is expected to be the weakest acoustic element. Based on the HRS measured external noise levels, assessment assuming typical façade constructions indicates that standard thermal double glazing with a sound insulation of ≥ 28 dB $R_w + C_{tr}$ is suitable for the scheme. This can typically be achieved with a sealed unit with two panes of 6mm glazing separated by a minimum 16mm cavity.

Ventilation Strategy

5.4 Section 1.1.3 of BB93 addresses natural and hybrid (natural/mechanical) ventilation in schools and states that a 5 dB relaxation of BB93 indoor ambient noise levels is applicable in teaching spaces when the proposed ventilation systems are operating in their normal condition. The normal condition is defined below:

5.5 *"The normal condition for a ventilation system in natural or hybrid mode is defined as when the system is operating to limit the daily average carbon dioxide concentration to no more than 1,500ppm with the maximum concentration not exceeding 2,000ppm for more than 20 consecutive minutes on any day. This would normally equate to a minimum ventilation rate of approximately 5l/s per person."*

5.6 BB93 states, "*Where external ambient free field noise levels at the facade expressed as the $L_{Aeq,30mins}$, do not exceed the IANL figures given in Table 1 by more than 16 dB for single sided ventilated spaces and 20 dB for cross ventilated or roof ventilated spaces, the criteria for natural ventilation can usually be achieved."* This would equate to a maximum external free field noise level of 55 dB $L_{Aeq,T}$ for cross ventilation.

5.7 Omitting the influence of erroneous noise sources, prevailing external daytime free-field noise levels (due to birdsong, resident lawn mowing, but excluding school facilities chainsaw tree cutting) around the footprint of the proposed new building were between 43 dB and 49 dB $L_{Aeq,T}$. On this basis, it is expected that indoor ambient noise levels within standard teaching spaces with ventilation via partially open windows would meet BB93 indoor ambient noise level criteria.

5.8 BB93 states that when providing intermittent boost ventilation and when operating to control summertime overheating during the hottest 200 hours in peak summertime via natural and hybrid ventilation systems, IANLs should not exceed 55 dB $L_{Aeq,30min}$.

5.9 Based on site measured noise levels, BB93 IANL requirements for standard teaching spaces are expected to be met when providing intermittent boost ventilation and control summertime overheating during the hottest 200 hours in peak summertime by open windows throughout the scheme.

5.10 Teaching spaces intended specifically for students with special hearing and communication needs have a lower BB93 IANL requirement. In order to meet this requirement it is recommended that either acoustically attenuated façade ventilators or a mechanical ventilation system is provided, such that the normal ventilation condition can be achieved with windows closed. The ventilation system should also be capable of mitigating summer time overheating without the requirement to open windows.

5.11 It should be noted that the IANL upper limits specified in BB93 also include noise from all building services, generated both internally and externally. Any external building services plant, e.g. kitchen plant, may require careful positioning or potentially additional attenuation such that it does not significantly contribute to ambient noise levels within teaching and learning spaces, i.e. it is prudent to ensure that mechanical services noise is designed to be sufficiently below the internal and external noise criteria such that the cumulative noise level from all sources does not exceed the desired target level.

External Teaching Areas

5.12 Although not included in the BB93 performance standards, additional guidance to BB93 published in *'Acoustics of Schools: A Design Guide'* states that noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq,30min}$, and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB $L_{Aeq,30min}$.

5.13 Based on site measurements undertaken by HRS, external spaces are expected to be exposed to noise levels of less than 55 dB $L_{Aeq,30min}$, and at least one external teaching area around the new school buildings screened by the new building and retained existing building is expected to have noise levels circa 49 dB $L_{Aeq,30min}$ thereby just meeting the guidance.

Control of Building Services Internal Ambient Noise Levels

5.14 BB93 IANL limits include external noise sources such as traffic noise and also building services noise. Hence, where mechanical / hybrid ventilation is proposed, the services will need to be designed such that the IANL within spaces, including the cumulative total due to both services noise and external noise intrusion, does not exceed the identified IANL $L_{Aeq,30min}$ criterion for the space.

5.15 Typically, dependant on facade specification, setting indoor noise levels due to all sources of building services to a minimum of 5 dB below the identified IANL gives suitable margin for a degree of external noise intrusion. Internal spaces without façades can be designed to meet the relevant BB93 IANL.

Control of Building Services External Noise

5.16 It is recommended that external noise from new building services plant does not exceed the existing representative background noise level when assessed at the nearest noise sensitive receptor in line with BS 4142, stating that this is an indication of the specific sound source having a ‘low impact’.

5.17 Wherever possible, the general principal of reducing the level of noise at source is recommended as the best way of reducing noise impact. Where this measure on its own may not be sufficient, additional suitably designed mitigation measures such as noise barriers, lagging materials, or acoustic attenuators/louvres may be used to control the plant noise in order to achieve the required Rating Level.

5.18 Based on measured background noise survey data, assessment in accordance with BS 4142 indicates that total emission levels for plant noise, including acoustic feature corrections where applicable, should not exceed the maximum Rating Level value provided in Table 3. It is recommended that the relevant building services engineers are made aware of the proposed plant noise limits in order to inform plant unit specification and selection, etc.

5.19 The Rating Level in Table 3 should be assessed in accordance with BS 4142, including appropriate consideration of any tonal or impulsive characteristics of the proposed building services plant. It is prudent to ensure that building services noise is designed to be sufficiently below the recommended plant noise limit criteria such that the cumulative noise level from all sources does not exceed the stated target level.

Table 3: BS 4142 Recommended maximum plant noise limits

Location	Period	Representative Background Noise level (dB $L_{A90,15min}$)	Rating Noise Level (dB $L_{Ar,Tr}$)
At 1m from most exposed NSR facade	Daytime (07:00-23:00)	38	38
	Night (23:00-07:00)	34	34

5.20 At the time of writing HRS are not aware of any specific noise impact assessment requirements identified for the scheme. Should there be any alternative noise impact requirements identified, these should be assessed relative to the basis detailed above and the necessary adjustments made to the recommended building services noise limits accordingly.

Operational Noise Impact

5.21 The consultation draft *'Guidelines for Noise Impact Assessment'* published by the Institute of Environmental Management and Assessment and the Institute of Acoustics (2002) provides guidance on assessing the impact due to a change in environmental noise level, as outlined in Table 4.

Table 4: Typical interpretation of impact from a change in sound level

Noise Change (dB)	Impact Category
0	No Impact
0 - 3	Slight Impact
3 – 5	Moderate Impact
5 – 10	Substantial Impact
10 and more	Severe Impact

5.22 In addition, the glossary of Planning Policy Guidance 24: Planning and Noise (1994) states:

5.23 *"A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound."*

5.24 HRS understands that no significant change to the overall number of pupils on the site is proposed, therefore, no significant increase is expected to ambient noise levels due to general operation of the school.

5.25 Generally, a doubling in the volume of road traffic results in a 3 dB increase in traffic noise when equated to a continuous equivalent noise level. It is not anticipated that any changes in local traffic due to the new school extension would lead to a perceptible change in traffic noise in the local area.

6. Summary and Conclusions

6.1 HRS Services Ltd. has completed an environmental noise assessment for the proposed Ecclesbourne Sixth Form Extension development based on site noise surveys undertaken by HRS.

6.2 During the noise surveys, the noise climate observed to be affecting the site was dominated by birdsong, with the occasional distant plane flyover and distant train passing.

6.3 Based on measured site noise levels calculations indicate that suitable internal ambient noise levels in line with BB93 guidance can be achieved within the proposed school building with suitable provision of building envelope and ventilation strategy.

6.4 Representative site background noise levels have been used to inform noise limits proposed to control noise emissions from any new sources of building services noise introduced by the scheme, in order to meet a 'low noise impact' guidance given in BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound'.*

6.5 HRS' noise survey results, site observations, and noise assessment indicate that typical operational noise due to the proposed development is not predicted to significantly impact the local area or identified noise sensitive receptors.

Appendix I. HRS Noise Survey Results

Most prominent noise source was noted as birdsong, with the occasional distant plane flyover and distant train passing.

Table A1: Daytime noise levels measured on 21st February 2018.
Night time noise levels measured on 11th March 2015 at position A (taken as representative for Park Rd NSRs).
All noise levels values in dB, free-field.

Measurement Position	Start Time	dB $L_{Aeq,15min}$	dB $L_{AF90,15min}$	dB L_{AFmax}	dB $L_{AF1,15min}$	dB $L_{AF10,15min}$
1*	10:38	47.5	41.9	60.0	55.4	51.0
2	10:54	45.7	41.5	63.2	53.5	48.2
3	11:10	46.5	40.8	61.2	56.3	49.3
4	11:25	44.9	41.8	55.3	50.4	47.2
1	11:42	43.7	40.2	60.9	51.7	45.6
2*	11:57	48.9	40.9	68.4	62.8	48.4
3	12:13	47.4	41.3	63.2	56.1	51.0
4	12:33	46.4	41.0	62.9	56.6	48.6
1*	12:49	48.3	40.7	64.5	59.8	50.8
2*	13:04	52.3	42.1	64.9	62.5	57.2
3	13:22	43.8	39.9	60.2	50.6	46.5
4	13:38	46.7	39.4	61.4	56.8	49.7
1	13:54	43.8	37.9	66.4	52.9	45.7
2*	14:10	49.8	41.0	60.8	57.0	53.4
3	14:29	43.9	40.4	58.9	53.5	45.5
4	14:45	43.2	38.6	62.3	50.9	45.2
A	01:30	41.8	34.1	64.3	54.0	40.8
A	01:45	41.0	34.5	60.3	51.1	43.4
A	02:15	43.2	33.9	64.0	56.0	44.2

* Measured noise levels influenced by residential lawn mower noise and school facilities chainsaw tree cutting noise

Appendix II. Proposed Site Plans

THE ECCLESBOURNE SCHOOL
'Learning Together For The Future'

The Ecclesbourne School, Duffield, Derbyshire
CIF 2018-2019 Funding Application | December 2017

SIXTH FORM EXTENSION | Appendices

2.00 OUTPUTS

2.01 **increasing Sixth Form capacity**
The increase in PAN, and the exceptional examination success at GCSE and A Level, make the Sixth Form very desirable to existing and other local students. The existing Sixth Form facilities are inadequate and overcrowded; this pressure will increase with the expansion to 210 16-19 pupils..

Proximity of the new proposals to the existing Sixth Form accommodation will ease this pressure by providing multi-use Sixth Form accommodation utilising flexible spaces in the new extension. A key feature of the proposals is the incorporation of a movable partition, to provide additional flexibility in meeting post-16 group sizes for formal and informal learning. The proposal therefore provides much-needed space for Sixth Form Study, as well as offering additional formal A-Level teaching spaces for up to two class groups at a time.

2.02 **reducing pressure on central dining**
The proposed expansion of the existing Sixth Form café servery will also provide sufficient area for the catering offer to expand to include hot food rather than just snacks – this will be a significant move in reducing pressure on the main kitchen facility.

2.03 **increasing accessibility**
The accommodation increases the school's ability to provide facilities for pupils for extended school hours, and to accommodate pupils with special needs in examinations, for example by allowing space for readers and scribes. The new facilities will also provide additional opportunities for evening and weekend events to widen community use.

2.04 **resolving capacity constraint**
A survey has been undertaken of the school's current accommodation, which confirms the school's total GIFA currently as 11,930m2. The drawing opposite illustrates the current arrangement of this accommodation across the site. As has been illustrated in Section 1.00, The Ecclesbourne School is a highly successful, highly desirable school which is significantly oversubscribed year on year.

An expansion from 7FE to 8FE was agreed by the Governing Body of the school in 2014, and this has resulted in an additional form of entry at Year 7 since September 2015. Ultimately, this will see the school roll increase from 1420 to 1625 pupils, aged 11-19.

Ref	Accommodation	Area / m2		Totals / m2
		L0	L1	
01	A Block	355	355	710
02	B Block (Main)	2980	0	2,980
03	B Block (Technology Annex)	495	0	495
04	C Block	525	405	930
05	D Block	560	0	560
06	E Block	665	0	1,655
07	F Block	1175	0	1,175
08	G Block	580	0	580
09	L Block	290	290	580
10	M Block	425	0	425
11	Sixth Form Centre	320	0	320
12	Minton Sports Centre	1520	0	1,520
	TOTAL			11,930

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THE ECCLESBOURNE SCHOOL
'Learning Together For The Future'

The Ecclesbourne School, Duffield, Derbyshire
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SIXTH FORM EXTENSION | Appendices

4.00 PROJECT PLANNING

4.02 **design proposals (cont.)**

PROPOSED PLANS

Ground Floor GA Plan
(NTS)

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THE ECCLESBOURNE SCHOOL
'Learning Together For The Future'

The Ecclesbourne School, Duffield, Derbyshire
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SIXTH FORM EXTENSION | Appendices

4.00 PROJECT PLANNING

4.02 **design proposals (cont.)**

PROPOSED VISUALS

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Appendix III. Acoustic Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90}. An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$\boldsymbol{L_{Aeq,T}}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, *T*
$\boldsymbol{L_{Amax}}$	The maximum 'A' weighted noise level that was recorded during the monitoring period.
$\boldsymbol{L_{A1}}$	The 'A' weighted noise level that was recorded for at least 1% of the monitoring period.
$\boldsymbol{L_{A90}}$	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Appendix IV. HRS Acoustic Credentials

HRS Services Ltd. (HRS) have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all HRS acousticians are members of the Institute of Acoustics.

HRS has been accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) since 2006 (Testing Laboratory Number 2587).
HRS meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

This report has been prepared by Alun Williams, Senior Acoustic Consultant who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds an MEng Civil Engineering (Hons) and a PgDip in Acoustics and Noise Control.
2. Has been an Acoustic Consultant with HRS since December 2013, and previously worked within an industrial noise control company for 3 years and therefore has more than three year's relevant experience (within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. Holds Corporate Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed by Alun Williams and has been found to;

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Appendix V. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of HRS Services Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from HRS Services Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, HRS Services Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.