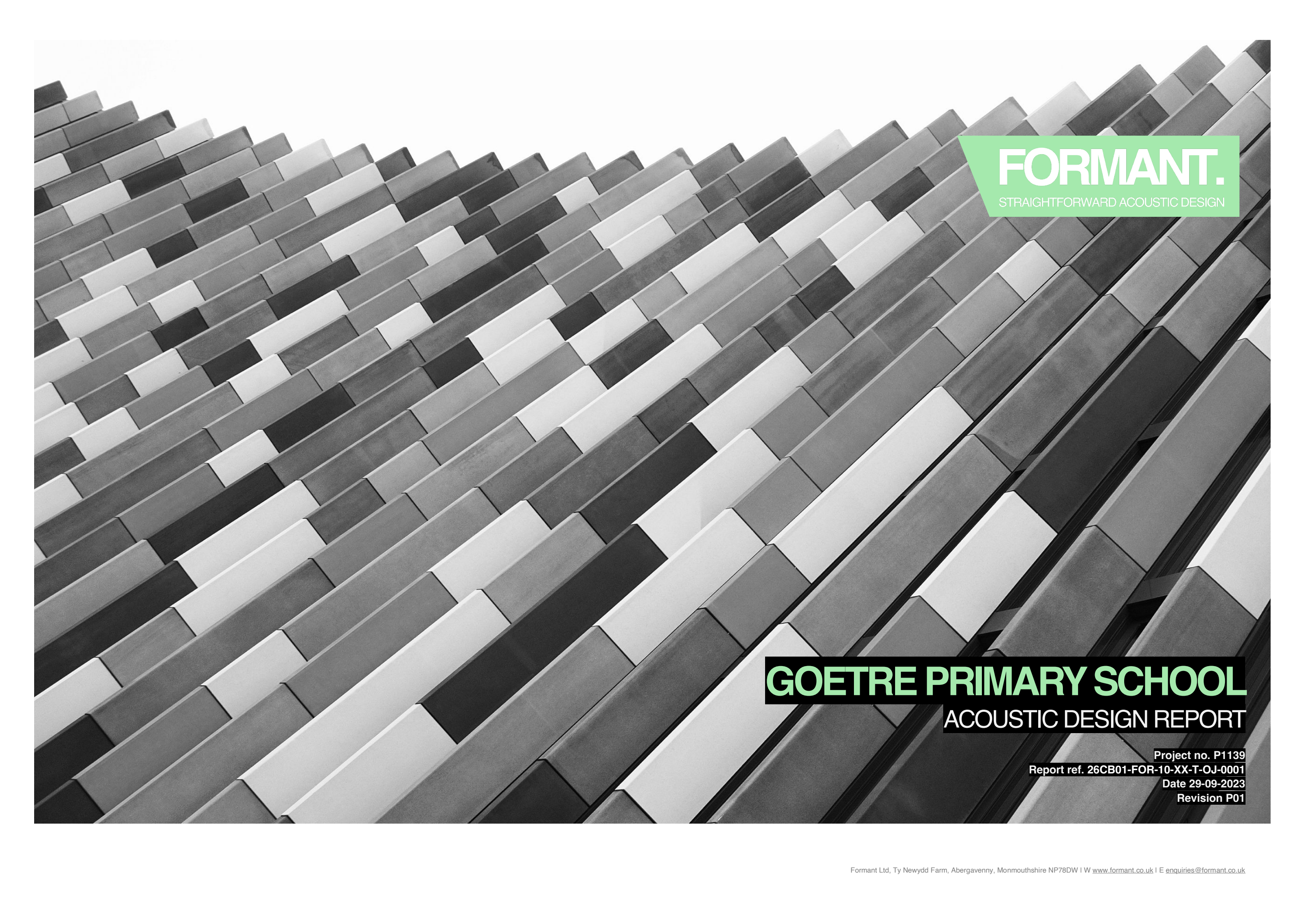




FORMANT.

STRAIGHTFORWARD ACOUSTIC DESIGN

GOETRE PRIMARY SCHOOL

ACOUSTIC DESIGN REPORT

Project no. P1139

Report ref. 26CB01-FOR-10-XX-T-OJ-0001

Date 29-09-2023

Revision P01

CONTENTS

EXEC SUMMARY	1
1 INTRODUCTION	2
2 CLIENT ACOUSTIC BRIEF	2
3 ACOUSTIC CRITERIA.....	2
4 ACOUSTIC DESIGN: ENVIRONMENTAL NOISE	3
5 ACOUSTIC DESIGN: INTERNAL SOUND INSULATION.....	4
6 ACOUSTIC DESIGN: ROOM ACOUSTICS	5
7 ACOUSTIC DESIGN: M&E NOISE CONTROL.....	5
8 BREEAM CREDITS	7
APPENDIX A – ACOUSTIC MARK-UPS	8

REVISION HISTORY

Date	Revision	Notes
29/09/2023	P01	For information

EXEC SUMMARY

This report sets out the key acoustic design issues, performance criteria and proposed acoustic design solutions for the proposed new Goetre Primary School. It also provides the design-stage evidence of compliance for both BREEAM and the Building Regulations (i.e. Building Bulletin 93 *Acoustic Design of Schools*).

ACOUSTIC CRITERIA

The building has been designed to comply with the acoustic performance criteria set out in Building Bulletin 93 (BB93) and the relevant BREEAM credits (Hea5 and Pol5). In general the proposed design is fully compliant with the criteria in BB93 however the client may wish to adopt an Alternative Performance Standard (APS) for some areas where large areas of glazing would require very high specifications to fully comply with BB93, but it is unlikely that such a high rating is actually required.

ACOUSTIC DESIGN STRATEGY

The site is not exposed to significant environmental noise levels and is considered suitable for natural ventilation via open windows, if required. There are no acoustic upgrades required to the building envelope.

Acoustic ratings have been set out for internal partitions, ceilings, doors and glazed screens. The specifications are in line with standard school design solutions and no abnormal costs are expected for this element of the design.

The acoustic absorption requirements are expected to be provided via mineral fibre ceiling tiles throughout all teaching and circulation areas. In most areas the ceilings provide the required absorption without any additional treatments, with the exceptions being the Hall, where we expect additional wall panels or acoustic drapes will be required.

Building services noise control requirements are set out for internal and environmental plant noise emissions.

All available BREEAM credits under Hea 05 and Pol 05 are considered to be achievable at this stage.

NEXT STEPS

During the next stage the key acoustic design tasks will be:

- 1) Client to review APS and confirm acceptance.
- 2) Formant to work with the M&E engineer to develop a coordinated ventilation strategy.
- 3) Formant to review mechanical plant selections with respect to BREEAM Pol 05 assessment.
- 4) Formant to work with architect to review acoustic panel requirements for the Hall.



1 INTRODUCTION

Formant has been appointed by Morgan Sindall to advise on the acoustic design of the proposed new Goetre Primary School, to be constructed on land to the south of the existing Pen y Dre Comprehensive School, Merthyr Tydfil. The school will comprise a 2 form entry, 420 place primary school, plus a 87 FTE place nursery, two Learning Resource Base classrooms, Flying Start (crèche) and community facilities (community use room, community kitchen).

The new school buildings are required to comply with the acoustic criteria in Building Bulletin 93 (BB93), as described in the Building Regulations Approved Document E (ADE).

This report details the acoustic criteria which apply to the development and acoustic design advice which will be implemented to provide an excellent acoustic environment for teaching and learning.

2 CLIENT ACOUSTIC BRIEF

In line with the requirements of BB93, this section clarifies any areas where we have had to interpret the acoustic criteria in BB93 to meet the project-specific goals for Goetre Primary School and any Alternative Performance Standards which are proposed.

2.1 ACOUSTIC CRITERIA FOR ALN/SEN STUDENTS

BB93 states that the type of accommodation and approach to inclusion varies and must inform the design process. No specific ALN/SEN teaching areas have been identified therefore we assume classrooms should be designed to the BB93 'primary classroom' criteria.

2.2 ALTERNATIVE PERFORMANCE STANDARDS (APS)

An APS may be required for some areas where the plans show large areas of glazed partitions between teaching spaces and corridors. This adjacency would require very high ratings for strict compliance with BB93 (e.g. Rw 50 dB). If there is no particular need for such high levels of sound insulation between these spaces, the client may wish to adopt an APS e.g. the Rw 37 dB glazing as described in Section 5.3.

The only practical implication would be that noise transfer between classroom and corridor would be audible to a level comparable to a standard corridor wall containing an acoustic door.

3 ACOUSTIC CRITERIA

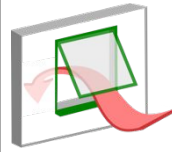
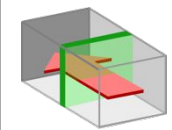
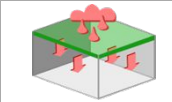
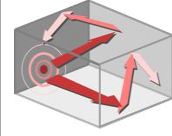
Acoustic issue	Performance standard	Room (and adjacency, if applicable)
 Internal ambient noise level (IANL) L_{Aeq,30 mins} <i>Includes contributions from building services noise AND environmental noise. For nat. vent spaces, the total noise level may exceed the limit by up to 5 dB.</i>	35 dB	All other teaching spaces
	40 dB	Staffroom, Offices, Interview room
	45 dB	Circulation
	50 dB	Changing Rooms, Kitchen, Toilets
 Airborne sound insulation D_{nT,w} <i>Criteria depend on the specific room adjacencies. Adjacencies shown are typical of those which occur in this project, but there may be others which must also comply with BB93.</i>	45 dB	Between Classrooms Between Offices/Meeting Rooms
 Rain Noise L_{Aeq}	IANL +25 dB	All teaching spaces
 Reverberation time T_{mf}	0.6 secs	All other classrooms
	0.8 secs	Meeting Rooms
	1.0 secs	Offices
	0.8-1.2 secs	Hall/Dining
	1.5 secs	Changing, Kitchen
 Plant noise emissions Noise Rating, NR (internal)	NR30	All other teaching spaces
	NR35	Staffroom, Offices, Interview room
	NR40	Circulation
	NR45	Changing Rooms, Kitchen, Toilets
	35 dB	Noise sensitive receptors outside the site
	45 dB	Outside nearest classroom window
Rating Sound Level, L_{A,r} (external)		

Table 1: Acoustic criteria



4 ACOUSTIC DESIGN: ENVIRONMENTAL NOISE

4.1 ENVIRONMENTAL NOISE AT THE SITE

A baseline noise survey was undertaken by Formant at the site in March 2021. Full details are provided in the Baseline Noise Survey Report (ref: P1139-RP-0001, dated 07-07-2021).

Ambient sound levels were fairly low with very low numbers of vehicles moving at fairly low speeds on Goitre Lane. The background sound levels at the site were dominated by distant traffic noise from the north, primarily from vehicles on the A465 and, to a lesser extent, Gurnos Ring Rd. The A465 is well screened by a cutting to the northwest of the site and by the secondary school buildings to the north.

The location of the noise measurement positions and key results are shown in Figure 1 and in Table 2.



Figure 1: Measurement positions and key results

Position and description	Parameter	Result	Photo
MP1 West side of proposed primary school site. Noise sources included traffic on Goitre Rd, distant traffic from the A465, birdsong and distant aircraft	Time	13:18 hrs	
	Duration	10 mins	
	L _{Aeq}	44 dB	
	L _{Amax}	57 dB	
	L _{A90}	40 dB	
MP2 South side of proposed primary school site. Noise climate as per MP1.	Time	13:30 hrs	
	Duration	10 mins	
	L _{Aeq}	47 dB	
	L _{Amax}	64 dB	
	L _{A90}	42 dB	
MP3 East side of proposed primary school site. Noise climate as per MP1.	Time	13:43 hrs	
	Duration	10 mins	
	L _{Aeq}	44 dB	
	L _{Amax}	57 dB	
	L _{A90}	40 dB	

Table 2: Noise survey results summary

4.1.1 FUTURE CHANGES IN SITE NOISE LEVELS

At the time of the noise survey, the A465 comprised a three-lane trunk road with a 50 mph speed limit, however construction works were taking place with a temporary 40 mph speed limit and lane restrictions. A detailed review of the proposed changes to the road is provided in the Baseline Noise Survey Report and the review concluded that there is significant uncertainty associated with using the measured noise levels to assess the future noise levels at the site. The table below summarises the effect of the uncertainty and the corrections which we have adopted to account for this:

Issue	Correction to measured levels in order to predict future levels
Measured noise levels were affected by road works temporary speed limit and Covid pandemic traffic flows	No change
Changes to A465 junction (dualling, speed increase, new cutting, new junction, changed traffic flows), change figures taken from ES.	No change overall and ± 1 dB modelling uncertainty
All issues cumulatively	± 1 dB

Table 3: Proposed corrections to measured levels in order to account for future site conditions

4.2 VENTILATION STRATEGY & BUILDING ENVELOPE

BB93 provides internal ambient noise level (IANL) criteria for each different type of space within a school. In general, most teaching spaces in a new-build school have an IANL criterion of 35 dB, with a +5 dB relaxation permitted for naturally ventilated spaces. BB93 states that the IANL criteria can normally be achieved with:

- Single-sided ventilation where external noise levels exceed the IANL criteria by up to 16 dB
- Cross-ventilation where external noise levels exceed the IANL by up to 20 dB.

The site noise levels fall below these thresholds for all proposed classrooms, even when the corrections for future noise levels are included. Therefore the site is suitable for natural ventilation by single-sided or cross-ventilation.

Standard thermal double glazing and most standard façade cladding/drylining build-ups are expected to provide sufficient sound insulation across both sites without any additional acoustic upgrades.

4.3 RAIN NOISE INSULATION

BB93 sets criteria for rain noise in classrooms and other teaching spaces. The proposed roof construction is not known at this stage, but assuming a standing seam metal roof system, with mineral wool insulation and a suspended grid ceiling underneath, we would not anticipate any additional acoustic upgrades would be required to mitigate rain noise.



5 ACOUSTIC DESIGN: INTERNAL SOUND INSULATION

The sound insulation between internal spaces is important to ensure teaching/study spaces are not unduly disturbed and to achieve speech privacy, where this is required.

The BB93 internal sound insulation requirement between two spaces depends upon:

1. the **noise levels** of activities taking place in one room and
2. the **sensitivity** of activities in the next room to noise disturbance

The minimum sound reduction criteria for typical adjacencies in the proposed building are defined in BB93 in terms of Weighted Level Difference, $D_{nT,w}$. Note that for some spaces, there are no on-site performance criteria between rooms, but the element itself (e.g. the door or corridor partition) must provide a laboratory sound insulation rating (R_w) instead.

5.1 INTERNAL PARTITIONS

The minimum sound insulation performance for each internal partition has been marked up on a set of architectural plans which are included in the Appendix to this report. As well as the laboratory rating, achieving the on-site performance is heavily dependent on good workmanship, detailing of service penetrations and flanking junctions (see Section 5.5). The following generic partition build-ups are suggested to meet the ratings shown on the acoustic mark-ups:

Typical location	Lab Sound Insulation (R_w)	Possible build-up	Overall width (mm)	
Corridor walls	40 dB	12.5 mm plasterboard (min. 9 kg/m ²), either side of 70 mm metal C stud with 25 mm mineral wool in the cavity	97	
Between classrooms with interconnecting doors	45 dB	2 x 12.5 mm plasterboard (min. 9 kg/m ²), either side of 70 mm metal C stud with no mineral wool in the cavity	122	
Between classrooms	50 dB	2 x 12.5 mm plasterboard (min. 9 kg/m ²), either side of 70 mm metal C stud with 50 mm mineral wool in the cavity	122	
Plant rooms walls	56 dB	2 x 12.5 mm dense plasterboard (min. 10.5 kg/m ²), either side of 92 mm metal Acoustic stud with 50 mm mineral wool in the cavity	144	

Table 4: Possible partition buildups

5.2 MOVEABLE PARTITIONS AND ROLLER SHUTTERS

No moveable partitions are proposed. Roller shutters are shown separating the Kitchens and Hall/Flying Start. BB93 recommends that kitchens do not open directly off teaching spaces with only roller shutters to separate them. If this is unavoidable then BB93 recommends minimum R_w 18 dB roller shutters.

5.3 INTERNAL GLAZING

BB93 requires the composite sound insulation performance of corridor walls (including glazing) to be at least R_w 38 dB. In order to achieve this, the following selections are proposed for glazing types:

Typical location	Lab Sound Insulation (R_w)	Typical build-up
Corridor walls (up to a max. 1 m ²)	35 dB	10 mm toughened single glazing
Corridor walls (>1m ²)	37 dB	12.8 mm acoustic laminate single glazing

Table 5: Internal glazing requirements

In some areas there are large areas of glazed partitions which would require very high ratings for strict compliance with BB93 (e.g. R_w 50 dB). If there is no particular need for high levels of sound insulation between the adjacent spaces, the client may wish to adopt an APS for these areas and provide the R_w 37 dB glazing as described above.

5.4 INTERNAL DOORS

The minimum ratings for acoustic doors are shown on the mark-ups in Appendix A. A suitable R_w 30 dB door blank would be a 44 mm solid core timber door (minimum 27 kg/m²). A suitable R_w 35 dB door blank would be a 54 mm solid core timber door (minimum 33 kg/m²).

In order to meet the acoustic criteria, the ratings apply to the doorset not just the door blanks. Effective compression seals are required around the full perimeter as well as a suitable threshold seal. Vision panels within doors should not reduce the overall sound insulation performance of the doorset.

5.4.1 VENTILATION GRILLES AND UNDERCUTS

Acoustic doors should not be undercut or have grilles for ventilation or any other purpose. This may pose a coordination issue for toilets which open via cloakrooms adjacent to classrooms. In general, no door ratings have been applied for toilets and other similar spaces on the basis that these rooms typically require undercuts or transfer grilles for ventilation, both of which would undermine the acoustic rating.

5.5 FLANKING AND SERVICE PENETRATIONS

It is important that the design of flanking elements and service penetrations does not compromise the sound insulation performance of an acoustically rated partition or floor construction. To achieve this, flanking paths should normally be designed to be 10 dB better than the partition or floor. At this stage we have not identified any specific flanking risks which need to be reviewed but we would recommend that acoustic details are developed for:

- 1) Horizontal flanking above partitions (i.e. roof deck abutments)
- 2) Horizontal flanking via the façade

6 ACOUSTIC DESIGN: ROOM ACOUSTICS

Good room acoustics are essential to ensure clear communication between teachers and students. In general, the strategy is to provide mineral fibre lay-in-grid ceilings similar to those shown in Figure 4.

As well as providing absorption in classrooms to improve speech clarity, absorptive ceilings are required in corridors and circulation spaces to control reverberant noise build-up, to minimise disturbance to other parts of the school.



Figure 2: Acoustically absorptive mineral fibre ceilings

6.1 GENERAL ACOUSTIC ABSORPTION STRATEGY

We have reviewed the proposed Reflected Ceiling Plans which show grid ceilings in all teaching and circulation spaces. **A Class A ceiling tile will provide the required acoustic absorption in most spaces with no additional wall panels required.** For some areas the proposed use of the room or the room geometry requires a slightly different design strategy, as summarised in the following sections.

6.2 MAIN HALL ABSORPTION

We have not calculated the required quantity of acoustic absorption at this stage as the height of the hall has not been finalised. However, we would expect that **the Main Hall will require acoustic absorption on the ceiling and on the walls.** The absorption quantities will be determined in line with the method in *Acoustics of Schools – A Design Guide*, which allows the BB93 T_{mf} criterion to be demonstrated by calculation using Sabine formula to calculate the T_{mf} (1.2 secs) and the reverberation time in the 1 kHz octave band, T_{1kHz} . For a hall of this size, we recommend the budget allows for a total of **55 m² of Class Acoustic Wall panels** and the distribution of the wall panels in the room must follow two conditions:

- (a) Wall panels must be distributed reasonably evenly over at least two non-opposite walls and
- (b) The absorption must be located no higher than 75% of the room height above the finished floor level.

By this method the spaces are not tested at Practical Completion, instead calculation will be provided during Stage 3 as the evidence for BB93/BREEAM

6.3 CORRIDORS, STAIRWELLS AND CIRCULATION

Strictly speaking these spaces require 100% ceiling coverage with Class C or better acoustic absorption in order to comply with the Building Regulations Approved Document E (ADE) requirement. We recommend that the ceilings in these spaces comprise a minimum Class C lay-in-grid ceiling tile. If a plasterboard margin is required, a Class A ceiling tile should be specified. This is likely to offer very similar performance to 100% coverage with Class C absorption, therefore this should be considered acceptable by Building Control, although it is not strictly compliant with the requirements of ADE.

7 ACOUSTIC DESIGN: M&E NOISE CONTROL

7.1 VENTILATION STRATEGY

Full details of the acoustic issues relating to the ventilation strategy are covered in Section 4.

7.1.1 INTERNAL AIR TRANSFER GRILLES

If classrooms incorporate passive cross-ventilation through to the central circulation area, this will require an acoustic ventilator (e.g. Soundscoop) located in the corridor wall. The minimum performance of the ventilators in each room is $D_{ne,w} + 10\log N$ 32 dB (where N is the number of ventilators).

If any doors require undercuts or air transfer grilles, the M&E engineer must check that there are no clashes with acoustic-rated doorsets. If this occurs it will be necessary to either find an alternative means of air transfer which does not undermine the sound insulation of the door, or in some cases it may be possible to downgrade the door. Should any clashes occur, please let us know so that we can review the situation.

7.2 INTERNAL PLANT NOISE CONTROL

7.2.1 PLANT NOISE CRITERIA

We have not reviewed any individual plant selections at this stage, but it is critical that all selections comply with both the internal and external noise criteria in Table 1.

7.2.2 PLANT ROOM NOISE LEVELS

The noise levels within the plant room will need to be controlled to minimise the noise transmission within the building, and also noise break-out to the external environment. Noise levels in plant rooms should not exceed NR65. We have not reviewed the plant specifications for the plantroom but consider it unlikely that this limit would be exceeded.

7.2.3 PLANT FIXINGS AND VIBRATION

Fixings connecting significant building services items (e.g. fans/boilers/pumps) to the building structure should be resiliently mounted if there is any risk of the IANL criteria being exceeded.

7.3 ENVIRONMENTAL PLANT NOISE EMISSIONS

7.3.1 ENVIRONMENTAL PLANT NOISE LIMITS

Based on the results of the baseline noise survey, a rating sound limits of **35 dBL_{A,r}** applies at the location of nearby NSRs. This target is 5 dB below the measured background sound level, which is compliant with the requirements of BREEAM Pol 5.

In addition to the requirement to limit noise levels at NSRs outside the site, **plant noise levels at classroom windows should be limited to no greater than 45 dBA.** This requirement is likely to affect the location of external condensers or air source heat pumps and the location must allow sufficient distance and screening for nearby classroom windows.

7.3.2 PLANT NOISE FEATURE CORRECTIONS

Should the external plant noise exhibit any acoustic features (tonality, intermittency, etc.), additional penalties should be applied, in line with the guidance set out in BS 4142. Based on similar plant used on other schemes, we have assumed no feature corrections are required, but this should be confirmed with the manufacturers.

7.3.3 BREEAM POL5

It is anticipated that the type of plant proposed for a building of this type can comply with the above criteria, therefore the BREEAM Pol 5 can be targeted. Once final plant selections have been made we will provide a full BS 4142 assessment to cover the design stage requirements for BREEAM.

7.4 DUCTWORK AND CROSSTALK

7.4.1 DUCTWORK DESIGN AND INSTALLATION

Ductwork should be installed to ensure a minimum of regenerated noise and laminar airflow within the system by incorporating:

1. Gradual bends,
2. Gradual changes in cross-sectional area/long transition pieces, and
3. Rectangular ductwork with a near unity aspect ratio.

Spigot arrangements should not contribute to regenerated noise within ducts or cause turbulent airflow to terminal components. Ductwork should be installed in a manner to ensure that no self-noise such as rattling or ringing is audible.

Grilles and diffusers should be selected such that they do not result in any significant levels of airflow regenerated noise at normal operational air velocities.

7.4.2 BUILDING SERVICES ROUTING

One of the most common causes of acoustic test failures is unnecessary and/or poorly sealed building services penetrations. Wherever possible, all building services distribution should be via corridors, not through acoustic partitions. This concept is illustrated in Figure 3 and applies to ventilation, pipework and electrical services.

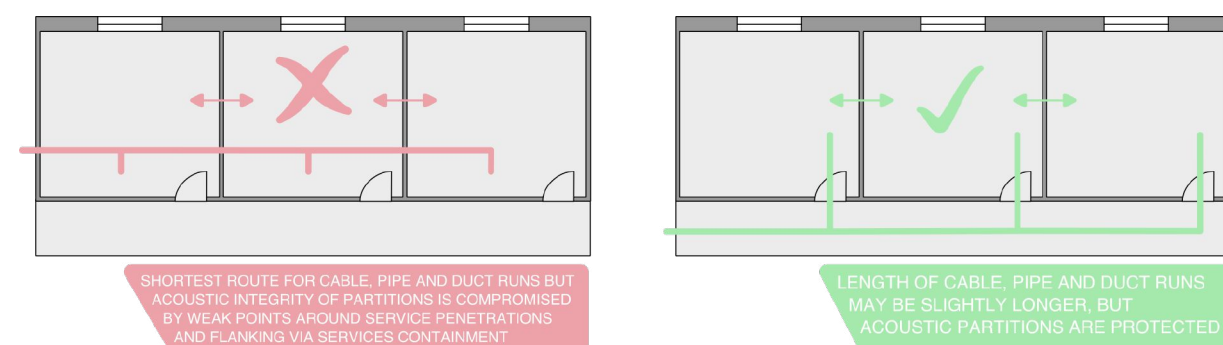


Figure 3: Services distribution should be via corridors, not passing through/over acoustic partitions.

If it is not possible to route services away from acoustic partitions, then acoustic service penetrations will be required and the following general guidance applies:

1. All penetrations should be formed with the minimum practicable clearance.
2. The remaining gap should be packed tightly with mineral wool and sealed using a collar of material with surface weight 9 kg/m² extending at least 50 mm past the edge of the penetration.

3. All interfaces should be sealed using a non-hardening flexible acoustic sealant.
4. If present, any lagging (acoustic or thermal) shall be removed from the section of duct penetrating the partition.
5. Soil and rainwater pipework routed through ceiling voids shall be avoided wherever possible. Where this is not possible, the pipework shall be routed via an acoustic enclosure with acoustic access panels for any rodding eyes.
6. If present, duct/pipe lagging (acoustic or thermal) should only be removed from the section of duct penetrating the element.
7. Pugging bags (e.g. clay/mortar/sand) should be used to fill larger gaps after the installation of electrical services such as cable trays, conduits etc. These should be rammed tightly to completely fill any gap.

7.4.3 CROSSTALK ATTENUATORS

Crosstalk attenuators may be required if common ductwork serves two acoustically sensitive spaces. We will review the proposed ductwork layout plans and advise on any requirements.

7.5 PIPEWORK, DRAINAGE AND SIPHONIC DRAINAGE

Waste water and rainwater pipes which pass through classrooms should be boxed in with mineral wool and one layer of 12.5 mm plasterboard. Any siphonic drain pipes should be fixed via acoustically resilient pipe fixings and boxed in with 2 layers of dense plasterboard (min 12.5 kg/m²) and min. 50 mm mineral wool.

7.6 HAND DRYERS

If the final layouts feature pupil toilets which open directly off the open-plan areas with no doors, we would recommend noisy hand dryers be avoided and ideally paper towels be provided instead. If this is not desirable, quiet-specification hand dryers should be selected.



8 BREEAM CREDITS

Up to four credits are available for acoustic design issues under BREEAM Education 2018 and **all four credits are considered to be achievable** based on the current design proposals. Specific details for each credit are set out below.

8.1 HEA5

Three credits are available under Hea5 provided that the building meets the acoustic performance standards and testing requirements relating to sound insulation, indoor ambient noise level and room acoustics.

The criteria are based on BB93 where appropriate with Alternative Performance Standards as set out in Section 2.2 and design stage compliance is demonstrated as follows:

Credit	BREEAM Requirement	Compliance demonstrated where?
First	Achieve the performance standards set out in Section 1 of Building Bulletin 93: Acoustic design of schools: performance standards, February 2015 (BB93) relating to airborne sound insulation between spaces and impact sound insulation of floors.	Section 5 of this report
Second	Achieve the indoor ambient noise level standards set out within Section 1 of BB93 for all room types.	Section 4 of this report
Third	Room acoustics (Control of reverberation, sound absorption and speech transmission index (STI)): Teaching and study spaces achieve the requirements relating to reverberation time for teaching and study spaces set out within Section 1 of BB93. Open plan teaching spaces achieve the performance requirements relating to reverberation time and STI set out within Section 1 of BB93. <i>[Not applicable]</i> Corridor and stairwells , for those that give direct access to teaching and study spaces, achieve the performance requirements relating to sound absorption.	Section 6 of this report

Table 6: BREEAM Hea 5 design stage compliance

8.2 POL5

One credit is available where a noise impact assessment compliant with BS 4142:2014 is commissioned and the noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, is at least 5 dB lower than the background noise throughout the day and night.

A BS4142 Noise Impact Assessment has not been undertaken at this stage but it is anticipated that the design will be compliant with the BREEAM criterion and the credit under Pol5 can be targeted.

8.3 SUITABLY QUALIFIED ACOUSTICIAN

The assessment and design work detailed in this report have been undertaken by Paul Driscoll, MIOA. Paul can be considered to be 'suitably qualified' for the purposes of a BREEAM assessment because:

- 1) He has over 18 years relevant experience working as an acoustic consultant in the UK, working on projects in all sectors of the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures; and
- 2) Paul is a Member of the Institute of Acoustics.

8.4 DEMONSTRATING COMPLIANCE

A programme of acoustic measurements will be carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined below.

SOUND INSULATION TESTS

Measurements of sound insulation (airborne and impact) will be made between a sample of teaching spaces and other noise sensitive spaces, in accordance with the relevant part of BS EN ISO 16283 series. Where possible, measurements will be conducted between one in four pairs of adjacent noise sensitive rooms.

REVERBERATION TIME MEASUREMENTS

Measurements of reverberation time will be made in accordance with the engineering grade (or better) requirements of BS EN ISO 3382-2:2008 and in each receiver room.

INDOOR AMBIENT NOISE MEASUREMENTS

Noise level measurements will be made in at least one in ten noise sensitive rooms and in at least four rooms in which noise levels can be expected to be greatest either because they are on the noisiest façade or because they are on a naturally ventilated façade.

ENVIRONMENTAL NOISE EMISSIONS MEASUREMENTS

There is no requirement to measure environmental noise emissions to demonstrate compliance with Pol5.



APPENDIX A – ACOUSTIC MARK-UPS

