



ACOUSTIC CONSULTANTS LTD
noise and acoustic specialists since 1987

Environmental Noise Assessment

The Abbey School, School Expansion Phase 01
Reading

Reference: 9084/PR/DO
Date: September 2019



Client:	Architect:	Acoustic Consultant:
 The Abbey School The Independent day school in Reading for girls aged 3 - 18	 Kendall Kingscott	 ACOUSTIC CONSULTANTS LTD noise and acoustic specialists since 1987

Document Control

Version	Revision Description	Date	Author:	Reviewed by:
1.0	-	06/12/19	Pedro Rodrigues, MIOA	Daniel Oldaker, MIOA

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the external noise aspects as included in this report. We provide advice only in relation to noise and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.



Table of Contents

1.	Introduction	4
2.	The Site	5
3.	Planning and Noise	6
4.	Relevant Noise Guidance	10
5.	Noise Ingress Assessment	13
6.	Plant Noise Assessment	16
7.	Summary and Conclusions	17



1. Introduction

The Abbey School appointed Acoustic Consultants Limited to provide advice on the noise and acoustic issues of the proposed Secondary School Expansion – Phase 01 at The Abbey School in Reading.

This report addresses the environmental noise aspects of the development in support of a planning application.

This report provides an assessment of the impact of noise from various aspects of the school operation on nearby noise sensitive residential properties.

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.



2. The Site

The proposed school extension Phase 01 is to be carried out at the existing school grounds of The Abbey Senior School in Reading.

The proposal is to modify and extend the eastern area of the school building to provide new teaching spaces, offices, ancillary spaces, multi-purpose hall, dining hall and kitchen.

The nearest noise sensitive residential properties are those to the west on Kendrick Road, to the east on Redland Road and south on Morgan Road. To the South are Reading School; Morgan Road playing fields and to the East The Abbey School play grounds.

The main source of noise affecting the site is road traffic on the adjacent road traffic network and occasional aircraft and rail noise.



3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in February 2019. Section 15 entitled 'Conserving and enhancing the natural environment addresses noise as a requirement of planning. Paragraph 170 states:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

Paragraph 180 states:

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

60 See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

The NPPF does not prescribe any assessment methodology or criteria to assess the adverse effect of noise.

3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long-term vision of Government noise policy. This long-term vision is supported by three noise policy aims as follows:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

The NPSE introduces the concept of “Significant adverse” and “Adverse” impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:



"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits. The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. **National Planning Practice Guidance, Noise**

The National Planning Practice Guidance (NPPG) on noise referred to here is based on the current version (January 2015) as provided on the Planning Guidance Website. It states that *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the NPPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:



Table 1: NPPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels however the NPPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.



4. Relevant Noise Guidance

4.1. Plant Noise - British Standard 4142:2014

British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours).

Section 9 entitled 'Rating Level' states: "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."

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states: "Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9) and consider the following.

- Typically, the greater this difference, the greater the magnitude of the impact.
- 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."

The planning condition requires the plant noise level to be at least 10 decibels below the Background Sound Level.



4.2. Building Bulletin 93 – External Noise Control

Table 1 of Building Bulletin 93 gives the required upper limit for the internal ambient noise level in rooms, in terms of the 'thirty-minute equivalent A-weighted noise level', in decibels, the $L_{Aeq,30 \text{ minutes}}$ and includes contributions from both external noise and building services noise. The relevant criteria are as follows:

Table 2: Internal Ambient Noise Level Criteria

Room Type	Upper limit for the indoor ambient noise level due to external noise sources, $L_{Aeq,30mins}$ dB	
	New Built	Refurbishment
Secondary School Classrooms	35 dB	40 dB
Meeting Rooms	40 dB	45 dB
Offices	40 dB	45 dB
Staff room	40 dB	45 dB
Toilets	-	-
Kitchen	50 dB	55 dB
Multi-Purpose Hall	35 dB	40 dB
Dining Hall	45 dB	50 dB
Study Space	35 dB	40 dB
Resource/ Breakout area	35 dB	40 dB

Building Bulletin 93 also states the following with regards to the external noise levels predicted at the proposed school facades.

With regard to external noise control through natural ventilation 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. However, the ventilation strategy still requires appropriate design of façade openings, height differences between low and high level openings, corridor transfer vents/stacks, etc, to limit the required façade open areas appropriately"

Where the following noise levels are met for different room types, these spaces can be naturally ventilated with either single sided or cross ventilation with the natural ventilation criteria being achieved. Where these levels are exceeded, an attenuated hybrid or mechanical system will be required.

Building Bulletin 93 also states the following where a hybrid system is used:



"Where there is a hybrid system, any mechanical system components should meet the IANL limits from table 1. The total noise level including external noise ingress may exceed the IANL limit from table 1 by up to 5 dB."

5. Noise Ingress Assessment

5.1. Site Noise Levels

An attended site noise survey was undertaken on the 20th November 2019 approximately between 10:20 and 11:30 hours at selected monitoring location; see figure below. The aim of this survey was to determine noise levels from the most significant noise generating sources around the proposed site. The measurement location was also considered representative of the existing ambient noise levels at the nearest noise sensitive receivers around the school site and that might be impacted by new proposed plant or external sports activities.

It was determined that the main source of noise affecting the site at monitoring location was distant road traffic and occasional aircraft traffic. The current site also has plant units running on site (see below) and for that reason we selected where noise from plant is not distinguishable. Sensitive receivers located to the south west are currently subject to levels of noise that are considered higher than the ones determined at the monitoring location. Nevertheless, the assessment will be based on the determined noise levels and are considered worst case.

Figure 1: Noise Monitoring Location





Monitoring was undertaken using two Class 1 sound level meters. The equipment is checked and calibrated annually to all relevant national standards and the certificates are available for inspection if required.

The noise monitoring equipment and calibration status is as follows.

Table 3: Noise monitoring equipment

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-13617-E0	13/09/2018	FL-18-082
Pre-Amp, NTI, MA220	7727	13/09/2018	FL-18-082
Microphone, NTI, MC230A	A16151	13/09/2018	FL-18-082
Calibrator, Larson Davis, CAL200	12605	27/08/2019	32690

The sound level meter was checked before and after use with the calibrator and no drift was detected.

During the noise survey, the weather conditions were dry and warm with an average temperature of approximately 8 degrees Celsius and wind speed was generally below 5 ms⁻¹. The conditions are not expected to have adversely affected the measurement procedure.

From the measurement data the following typical equivalent noise levels have been determined at the survey locations for the proposed hours of school use.

Table 4: Design Measured Noise Levels

Time	L _{Aeq}	L _{A90}
10:20 to 11:35	50	48

5.2. Impact of External Noise on School

Building Bulletin 93 provides internal ambient noise level criteria which is duplicated in Table 2. Where a room is naturally ventilated or uses hybrid ventilation, it states that this level can be increased by 5 decibels for environmental noise.

With regard to external noise control BB93 states also 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. However, the ventilation strategy still requires appropriate design of façade openings, height differences between low and high level openings, corridor transfer vents/stacks, etc, to limit the required façade open areas appropriately"



Based on an internal ambient noise level criteria of 35dB(A) for a general teaching space (new build), natural ventilation is suitable where the noise level external to the building does not exceed 51dB(A) when using single sided ventilation or 55dB(A) when using cross ventilation.

Based on the measured noise levels which was determined to be 50dBA $L_{Aeq, 1 \text{ hr}}$, no specific sound attenuating measures would be required to the building fabric and either natural or hybrid ventilation can be used and BB93 internal noise limits from external noise sources will be achieved.



6. Plant Noise Assessment

6.1. Plant Noise Limits

Any plant associated with the proposed school extension is understood to operate during school hours only. At this stage, no plant has been provided and proposed. As such we have provided plant noise limits at the nearest noise sensitive dwellings based on the monitoring data obtained above and British Standards 4142:2014.

Based on the above criteria and operational hours, the maximum cumulative Rating Noise limit of noise from plant associated with the development are as follows.

Table 5: Plant Noise Rating Level Limits

Time Period	Limits at Existing and Proposed Receivers $L_{Ar(T)}$
Daytime (07:00 to 19:00 hrs)	48dB $L_{Ar(1 \text{ hour})}$

The above plant noise limits are the cumulative plant noise limits at the most sensitive receivers around the site.

With plant meeting the above limits the plant rating noise level will result in a "difference" of 0 decibels at the façade of the noise sensitive dwellings will be met.

The plant should be selected to ensure any tonality, intermittency or other sound characteristics are not readily distinguishable at the dwellings.

In terms of environmental noise, we would consider that acceptable conditions can be achieved within the dwellings on the site when plant associated with the school extension is design to achieve the plant noise limits set above.

We would also consider the noise impact of the proposed site to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPPG and NPSE where the plant noise limits above are met.

7. Summary and Conclusions

Kendall Kingscott appointed Acoustic Consultants Limited to provide advice on the noise and acoustic issues of the proposed Secondary School Expansion – Phase 01 at The Abbey Senior School in Reading.

This report addresses the environmental noise aspects of the development in support of a planning application.

It was determined that no specific sound attenuating measures would be required to the building fabric and either natural or hybrid ventilation can be used and BB93 internal noise limits from external noise sources will be achieved.

Plant noise limits for any plant use within the development site was also given in this report and are based on the measured background noise levels and British Standard 4142:2014.

We would also consider the noise impact of the proposed site to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPPG and NPSE.



ACOUSTIC CONSULTANTS LTD
noise and acoustic specialists since 1987

T: 0117 986 2956 | E: mail@acoustic-ltd.co.uk



ACOUSTIC CONSULTANTS LTD
noise and acoustic specialists since 1987

Head Office: 194 West Street, Bedminster, Bristol, BS3 3NB

T: 0117 986 2956

www.acoustic-ltd.co.uk