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# **ST CATHERINE'S MUSIC AND ART BUILDING NOISE SURVEY PLANNING REPORT**

# ST CATHERINE'S MUSIC AND ART BUILDING NOISE SURVEY PLANNING REPORT

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## Contents

<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>2.</b>	<b>LEGISLATION, POLICY AND GUIDANCE</b>	<b>2</b>
2.1	BS 4142:2014+A1 2019 “Methods for rating and assessing industrial and commercial sound”	2
2.2	London Borough of Richmond Adopted Local Plan (2018)	2
2.3	London Borough of Richmond Supplementary Planning Document for Noise Generating and Noise Sensitive Development (2018)	3
2.4	London Borough of Richmond Draft Local Plan (2021)	3
2.5	Additional Legislation, Policy and Guidance	3
<b>3.</b>	<b>SITE DESCRIPTION</b>	<b>4</b>
3.1	Noise climate	4
<b>4.</b>	<b>SURVEY METHODOLOGY</b>	<b>5</b>
4.1	Measurement locations	5
4.2	Equipment	5
4.3	Weather Conditions	6
<b>5.</b>	<b>SURVEY RESULTS</b>	<b>7</b>
<b>6.</b>	<b>NOISE ASSESSMENT</b>	<b>8</b>
6.1	Site suitability	8
6.2	Noise emission limits	8
6.3	Noise breakout	9
6.4	Statement of Uncertainty	9
<b>7.</b>	<b>CONCLUSION</b>	<b>10</b>

## FIGURES

Figure 1 - Site Location of St Catherine’s School Music and Art Building .....	4
Figure 2 - Measurement locations .....	5

## APPENDICES

Appendix 1 - Noise Survey Data .....	1
Appendix 2 – Additional Legislation, Policy and Guidance .....	1

## 1. INTRODUCTION

Ramboll Acoustics has been appointed by St Catherine's School, Twickenham to provide acoustic advice for the proposed Music and Art building.

The development in the existing school site proposes new music practice and teaching spaces, as well as art classrooms. This development will involve installing new external plant.

It has been necessary to carry out a noise survey to establish the existing noise levels around the site and at the nearest noise sensitive receivers (NSR's). This report describes the methodology used for carrying out the noise survey, the measurement locations and the measurement results.

The implications of the measured noise levels are reviewed particularly in terms of setting noise limits for the proposed new plant and assessing site suitability.

## 2. LEGISLATION, POLICY AND GUIDANCE

### 2.1 BS 4142:2014+A1 2019 “Methods for rating and assessing industrial and commercial sound”

Suitable criteria for determining the magnitude of the impact from any proposed building services plant are proposed based on the guidance in BS 4142: 2014<sup>1</sup>.

The basis of BS 4142: 2014 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- **Background Sound Level:**  $L_{A90,T}$  – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels (dB);
- **Specific Sound Level:**  $L_{Aeq,Tr}$  – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;
- **Residual Sound Level:**  $L_{Aeq,T}$  – the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- **Rating Level:**  $L_{Ar,Tr}$  – the specific sound level plus any adjustment made for the characteristic features of the noise. These features include tonality, impulsivity and intermittence, where a 3dB penalty will be applied.

The background level and the rating levels are compared and the standard states that:

*“Typically, the greater the difference, the greater the magnitude of impact.*

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending upon the context.*
- *The lower the rating level is to the measured background sound level, the less likely it is that the specific sound 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 upon the context.”*

The standard specifies the specific sound level as an  $L_{Aeq}$  with a one hour assessment period during the day (07:00-23:00 hours) and a fifteen-minute assessment period at night (23:00-07:00 hours).

### 2.2 London Borough of Richmond Adopted Local Plan (2018)

The currently adopted London Borough of Richmond adopted local plan (2018) states:

*Policy LP 10:*

*Developers should follow any guidance provided by the Council on local environmental impacts and pollution as well as on noise generating and noise sensitive development. Where necessary, the Council will set planning conditions to reduce local environmental impacts on adjacent land uses to acceptable levels.*

*C. The Council encourages good acoustic design to ensure occupiers of new and existing noise sensitive buildings are protected. The following will be required, where necessary:*

<sup>1</sup> British Standards Institution, 2014. BS 4142: 2014 + A1 2019 Methods for rating and assessing industrial and commercial sound, BSI.

1. *a noise assessment of any new plant and equipment and its impact upon both receptors and the general background noise levels;*
2. *mitigation measures where noise needs to be controlled and managed;*
3. *time limits and restrictions for activities where noise cannot be sufficiently mitigated;*
4. *promotion of good acoustic design and use of new technologies;*
5. *measures to protect the occupiers of new developments from existing sources.*

### **2.3 London Borough of Richmond Supplementary Planning Document for Noise Generating and Noise Sensitive Development (2018)**

The Council is in the process of developing a SPD for Noise Generating and Noise Sensitive Development. This sets out guidance intended to help protect the local occupiers of new or existing noise sensitive buildings from existing or introduced noise sources, and, where possible, improve amenity and living conditions. The SPD will assist applicants, decision makers, agents, occupiers and others to identify issues to be addressed in any planning application in which noise and/or vibration will be an important consideration.

The guide states, in accordance with BS4142:2014+A1:2019:

*Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed noise generating development is likely to be acceptable from a noise perspective. The Borough will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.*

These limits are proposed at the nearest residential window that may be affected by noise from the proposed plant.

### **2.4 London Borough of Richmond Draft Local Plan (2021)**

Richmond Council have recently released a draft local plan in 2021. The guidance on noise remains the same to the 2018 adopted local plan, and references the supplementary planning document: *Development Control for Noise Generating and Noise Sensitive Development (2018)* for specific guidance on noise and vibration.

### **2.5 Additional Legislation, Policy and Guidance**

Wider, relevant local and national policies are included in Appendix 2. These include National Planning Policy Framework, Planning Practice Guidance and the 2021 London Plan.

### 3. SITE DESCRIPTION

The site of the proposed development is located at St Catherine’s School on Cross Deep in Twickenham. Figure 1 below shows the site boundary.

The closest identified noise sensitive receptors are residential properties to the South and East of the site, as well as another school on the opposite side of Cross Deep. These are also indicated on Figure 1.



Figure 1 - Site Location of St Catherine’s School Music and Art Building

#### 3.1 Noise climate

The noise climate around site is dominated by road traffic noise from Cross Deep. Other noise sources were audible including planes flying over from Heathrow, and distant construction noise.

## 4. SURVEY METHODOLOGY

An unattended noise logger was used to measure noise levels continuously during the day and evening on Wednesday 14<sup>th</sup> September 2022. The logger measurement duration was 15 minutes, with these measurement durations considered suitable to assess noise climate at the proposed site location.

Additional attended measurements were undertaken on 14<sup>th</sup> September (day-time) and 27<sup>th</sup> September (Night time) to assess the noise levels at the nearest noise sensitive receptors.

The sound level meters calibration was checked immediately before and after the measurement periods. No significant drift in calibration was detected.

### 4.1 Measurement locations

Figure 1 shows the measurement locations.

LT1 is considered representative of rear of the proposed site

ST1 is considered representative of the noise climate at the nearest noise sensitive receptors.



Figure 2 - Measurement locations

### 4.2 Equipment

The following measurement equipment was used to conduct the survey:

- 1x Norsonic 140 Sound Level Analyser (14043396)
- 1x Norsonic 1251 Calibrator (32853)
- 1x NTI XL2 TA Sound Level Meter (A2A-09209-E0)



All measurement equipment owned or hired and operated by Ramboll Acoustics has annual calibration checks carried out by external companies traceable to national standards. Copies of all calibration records are kept and can be provided upon request.

#### **4.3 Weather Conditions**

The survey took place during dry and sunny conditions with little to no wind. The weather conditions during the survey period are not considered to have had any adverse effects on the measured noise levels.

## 5. SURVEY RESULTS

The summarised results are presented in Table 1 below. Full logger data is presented in Appendix 1.

**Table 1 - Summarised Logger Noise Data**

		<b>Ambient Noise Levels (<math>L_{Aeq,16hour}</math> dB)</b>	<b>Background Noise Levels (<math>LA90</math>, dB)</b>
LT1	Day – 0700-2300	63	52

Table 2 below presents the measured attended noise levels at ST1. Full Measurement Data is available in Appendix 1.

**Table 2 - Summarised Attended Measurement Noise Data**

	<b>Ambient Noise Levels (<math>L_{Aeq}</math>, dB)</b>	<b>Background Noise Levels (<math>LA90</math>, dB)</b>
ST1 (Day)	73	60
ST1 (Night)	65	38

## 6. NOISE ASSESSMENT

### 6.1 Site suitability

Based on the survey data, noise levels in the vicinity of the new art and music building are expected to be between 55-65dB  $L_{Aeq}$ .

The Building Bulletin 93 – Acoustic Design of Schools (part of the Building Regulations)<sup>2</sup> upper noise limit for the music and art teaching areas ranges between 30dB  $L_{Aeq}$  to 40dB  $L_{Aeq}$  depending on the use.

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 [of BB93] 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*'.

The rooms facing Cross Deep, i.e. the Recital Room and Art Rooms above, will not be able to rely on natural ventilation and still meet internal noise level requirements.

Teaching rooms at the rear of the building, i.e. the 1st Floor Art Room, will be able to be naturally ventilated via openable windows and still meet the internal ambient noise level requirements.

It is recommended that the music practice and performance rooms do not rely on openable windows for ventilation to avoid room to room noise transfer.

Therefore, the building will use a mixed ventilation strategy of mechanical ventilation in Music Rooms and Art Rooms facing Cross Deep, whereas the Art Room on the rear of the building will be naturally ventilated.

### 6.2 Noise emission limits

It is proposed that the rating level (in accordance with BS4142:2014) from all plant and equipment (collectively) associated with this application should be at least 5 dB below the existing background level ( $L_{A90}$ ) at the nearest noise sensitive receptors as per the expected London Borough of Richmond upon Thames planning condition.

Rating noise limits are set so that meeting these limits *indicates that the proposed noise generating development is likely to be acceptable from a noise perspective (London Borough of Richmond Upon Thames Supplementary Planning Document)*.

Plant noise rating limits to meet these criteria are given in Table 3 below.

Location	Period	Representative Background Level $L_{A90}$ dB	Noise Rating Limit $L_{Ar}$ dB
Cross Deep Residential Receptors	Daytime (0700h to 2300h)	60	55
	Night-time (2300h to 0700h)	38	33

**Table 3 - Plant Rating Noise limits**

Details of the plant selection are not fully known at this time. It is anticipated that air source heat pumps will be used in combination with mechanical heating and ventilation recovery units and air handling units.

<sup>2</sup> Building Bulletin 93 – Acoustic Design of Schools (part of the Building Regulations) 2015.

Noise emission from this plant will be controlled to meet the planning requirement using standard noise control measures, such as attenuators, enclosures and screens.

### 6.3 Noise breakout

It is important to consider noise breakout from the music practice and recital rooms when in use by the school during the day.

The nearest residential properties to the music school are 30m away on Cross Deep.

To consider noise breakout from the music rooms, Ramboll has used typical noise levels measured within similar music practice rooms by Adrian James Acoustics<sup>3</sup>. For noisy activities such as drum kits and amplified music, average noise levels could be up to 90-100dBA over brief periods.

On this basis, Ramboll has predicted noise breakout to the nearest properties based on internal reverberant noise levels of 95 dBA in the recital room. The typical acoustic performance of the music school façade has been calculated with acoustic double glazing and blockwork façade.

Internal noise level	Building element(s)	Acoustic performance, dB R <sub>w</sub>	Distance to receptor, m	Predicted @ receptor, dBA	Background level La90 dB
95	Façade	≥45	30	<30	52
	Glazing	≥35			

**Table 4 – Predicted noise breakout levels from the recital room at the nearest noise sensitive receptors.**

Noise breakout levels from internal music spaces are predicted to be significantly lower than typical background levels at the nearest noise sensitive receptors during the daytime periods (07:00-23:00).

### 6.4 Statement of Uncertainty

Noise levels have been taken at the site location and at the nearest noise sensitive receptors during the day and night periods. It is considered that this was a sufficiently large data set in reducing uncertainty within the measured noise levels.

The survey took place during dry and sunny conditions with little to no wind. The weather conditions during the survey period are not considered to have had any adverse effects on the measured noise levels.

The noise meters were calibrated on-site before and after the survey period and no significant drift in sensitivity was detected.

<sup>3</sup> Adrian James Acoustics, School Music Rooms- Designing beyond BB93, 2005

## 7. CONCLUSION

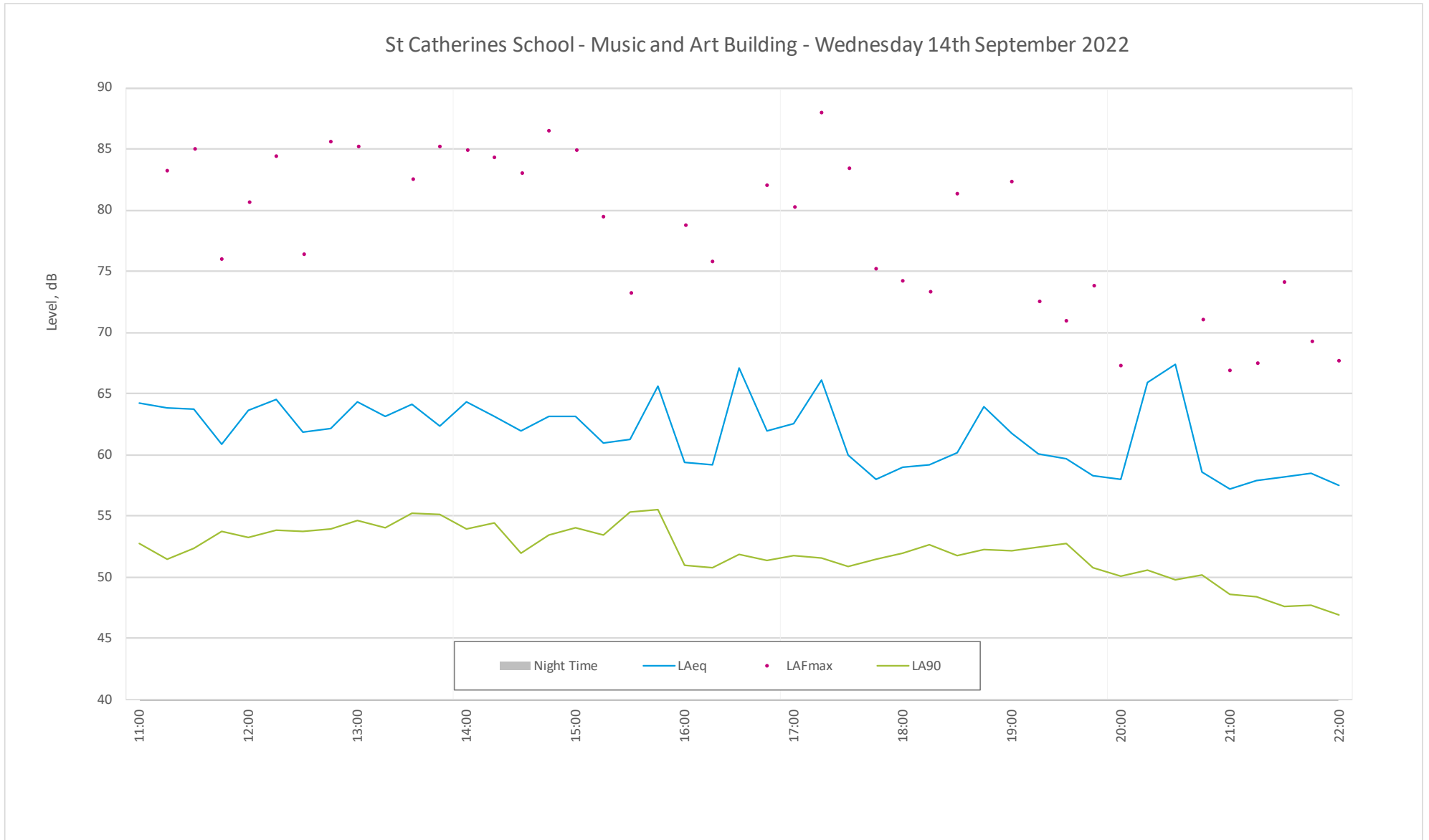
Ramboll Acoustics has been appointed by St Catherine's School, Twickenham to provide acoustic advice for the proposed Music and Art building. The development in the existing school site proposes new music practice and teaching spaces, as well as art classrooms. This development will involve installing new external plant.

The results of the baseline noise survey are considered suitable for setting plant noise rating limits at the nearest noise sensitive receptors. Rating noise limits are set so that meeting these limits *indicates that the proposed noise generating development is likely to be acceptable from a noise perspective* (LBRUT Supplementary Planning Document).

Noise breakout from internal music spaces is predicted to be at a significantly lower level, i.e. more than 20 dB lower, than typical pre-existing background noise levels at the nearest noise sensitive receptors during the day-time periods (07:00-23:00).

No adverse effects or significant impacts are predicted from noise associated with the development.

## APPENDIX 1 - NOISE SURVEY DATA



**Table 4 - Attended Noise Measurements**

<b>Description</b>	<b>Start Time</b>	<b>L<sub>eq</sub>, (dBA)</b>	<b>L<sub>max</sub>, (dBA)</b>	<b>L<sub>10</sub>, (dBA)</b>	<b>L<sub>90</sub>, (dBA)</b>
ST1 - Day	14 Sep 2022 11:06:04	74.4	95.6	76.7	61.6
ST1 - Day	14 Sep 2022 11:16:36	72.4	82.8	76.2	59.2
ST1 - Day	14 Sep 2022 11:27:02	73.4	85.1	76.9	59.6
ST1 - Night	27 Sep 2022 01:01:00	64.9	82.1	68.3	39.3
ST1 - Night	27 Sep 2022 01:17:24	65.3	86.2	68.0	37.2

## APPENDIX 2 – ADDITIONAL LEGISLATION, POLICY AND GUIDANCE

### **Control of Pollution Act, 1974, Part III – Noise**

The Control of Pollution Act, 1974 (CPA) is a combination and refinement of earlier Acts including: The Public Health Act, 19365 (replaced by the Public Health Act 1990, Part III) and the Noise Abatement Act 19606.

Section 60 enables a Local Authority to serve a notice on a person (this includes a company) who is carrying out, or who is planning to carry out, works of construction, demolition, road-works, railway maintenance etc. in order to control the noise from those operations.

Section 61 also enables such a person to apply to the Local Authority for consent in respect of such works. The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise, where significant impacts are likely to occur. BPM refers to the selection of plant, techniques and equipment to reduce noise whilst considering local conditions, current state of technical knowledge and the financial implications. Factors such as timing, duration, location and opportunities for acoustic screening or separation are employed; to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defence to enforcement action under nuisance legislation.

### **The Environmental Protection Act, 1990 (as amended)**

Section 79 of the Environmental Protection Act 19907 (EPA) declares that a number of matters, including noise, are to be statutory nuisances. Under the provisions of the Environmental Protection Act, the Local Authority is required to inspect its area periodically to detect any nuisance and, where a complaint of a statutory nuisance is made by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint.

### **National Planning Policy Framework, 2021**

The NPPF adopted in July 2021 in England outlines the Government's planning policies and requirements for the planning system. The NPPF forms a material consideration in planning decisions and hence must be complied with for planning permission to be granted.

Paragraph 185 of the NPPF states that the planning system should seek to:

- *"Mitigation and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".*

To achieve these aims the NPPF refers to the Noise Policy Statement for England 2010.

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<sup>4</sup> Secretary of State, 1974, Control of Pollution Act, HMSO. Available: <http://www.legislation.gov.uk/ukpga/1974/40/contents>

<sup>5</sup> Secretary of State, 1960, Noise Abatement Act, HMSO.

<sup>6</sup> Secretary of State, 1960, Noise Abatement Act, HMSO. Available: <http://www.legislation.gov.uk/ukpga/1960/68/section/1/enacted>

<sup>7</sup> Secretary of State, 1990. Environmental Protection Act 1990, The Stationary Office. Available: <http://www.legislation.gov.uk/ukpga/1990/43/contents>



## **Noise Policy Statement for England, 2010**

The Noise Policy Statement<sup>8</sup> for England sets out the long-term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

- “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 guidance defines two concepts applied to noise impacts. These are:

- NOEL is defined as: “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 which is defined as: “This is the level above which adverse effects on health and quality of life can be detected.”; and
- SOAEL which is defined as the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

The first aim is to avoid noise levels above the SOAEL;

The second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur; and

The third aim considers situations where noise levels are between the LOAEL and NOEL. In these circumstances, where possible, reductions in noise levels should be sought through the pro-active management of noise.

The NPSE recognises that it is not possible to have single objective noise-based measures that define the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

## **Planning Practice Guidance**

The Government's PPG on noise provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking the effects to the NOEL and, as exposure increases, the LOAEL and SOAEL.

As exposure increases above the LOAEL, noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and/or attitude e.g. turning up the volume of the television, speaking more loudly, or, 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."

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<sup>8</sup> Ministry of Housing, Communities and Local Government, 2017. Planning practice guidance. HMSO. London.

PPG identifies the SOAEL as the level above which "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."

For the purposes of this assessment, the magnitude of effect is assigned by reference to the guidance in PPG-Noise, as summarised in Table 5.

**Table 5: PPG Guidance**

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
<b>Lowest Observed Adverse Effect Level (LOAEL)</b>			
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
<b>Significant Observed Adverse Effect Level (SOAEL)</b>			
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

Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

## **The London Plan (2021)**

The London Plan<sup>9</sup> provides strategic planning guidance for Greater London. Boroughs' local development documents have to be 'in general conformity' with the London Plan, which is also legally part of the development plan that has to be taken into account when planning decisions are taken in any part of London unless there are planning reasons why it should not.

The following policies applicable to the proposed development refer to noise:

- D13 – Agent of Change: "Development should be designed to ensure that established noise-generating venues... remain viable and can continue or grow without unreasonable restrictions being placed on them";
- D14 – Noise: "Residential and other non-aviation proposals should manage noise by:
  - Avoiding significant adverse noise impacts on health and quality of life;
  - Reflecting the Agent of Change principle as set out in Policy D13 Agent of Change;
- Mitigation and minimising the existing and potential adverse impact of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses;
  - improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity);
  - separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation;
  - where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles;
  - promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver"; and
- 'Policy T7' - "Development plans should consider noise from deliveries, servicing and construction".

Other key themes are the consideration of traffic/ transport noise, suitable façade design to limit internal noise levels and the use of emerging technologies e.g., electric vehicles to reduce noise.

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<sup>9</sup> Greater London Authority, 2021. The London Plan. The Spatial Development Strategy for Greater London. London. GLA.