

Harlington School Hayes

Environmental Noise Survey Report

24919/ENS1

5 March 2018

For:
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Document Control

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1.0 Introduction

Demolition of an existing building and erection of a new development is proposed at Harlington School, Hayes.

Hann Tucker Associates have therefore been commissioned to undertake a 24-hour fully automated environmental noise survey of the site to establish the currently prevailing noise climate in addition to manned measurements at appropriate locations around the proposed development site.

This report presents the survey methodology and findings together with comment on the potential ventilation strategy. The survey data may be used as the basis for various further acoustic assessment purposes.

2.0 Objectives

To undertake a baseline external noise survey over a 24h period at 3No. secure and accessible locations, to establish the prevailing background and ambient noise levels of the proposed site.

To undertake supplementary attended measurements.

To propose plant noise emission limits, based on the results of the noise survey and expectations of the Local Authority.

3.0 Site Description

3.1 Location

The proposed site is located on Pinkwell Lane, Hayes UB3 1PB as seen on the Location Map overleaf.



Location Map (Map Data ©2018 Google)

The site falls within the jurisdiction of London Borough of Hillingdon.

3.2 Description

The site is bound by Pinkwell Lane in the north and Dudley Place in the northeast. The surrounding premises in the east and north are generally residential, with a mixture of ground plus one to two storey buildings. Also to the east is the ground plus once storey Harlington Youth Centre & Nursery. To the west of the site is the Pinkwell Primary School and playing field. To the south of the site is approximately 25,000m² of grassland.

The site is shown in the Site Plan overleaf.



Site Plan (Photos ©2018 Google, Map Data ©2018 Google)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Methodology

The survey was undertaken by L. Brough BSc (Hons), TechIOA, MAES.

5.1 Unmanned Survey

5.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:15 hours on 20 February 2018 to 15:30 hours on 21 February 2018.

During the periods we were on site the wind conditions were moderate and from approximately a southwesterly direction. The sky was generally overcast. We understand that generally throughout the survey period the weather conditions were consistent with this. These conditions are considered suitable for obtaining representative measurement results.



Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15 minute periods.

5.1.2 Measurement Positions

The noise level measurements were undertaken at 3No.positions as described in the table below.

Position No	Description
1	The microphone was positioned at approximately 1.5m from the ground and attached to a branch at the north boundary of the site.
2	The microphone was positioned approximately 1.5m from the ground and attached to a fence at the northeast boundary of the site.
3	The microphone was positioned approximately 1.5m from the ground and attached to a fence at the southeast boundary of the site.

The positions are shown on the plan below.



Plan Showing Unmanned Measurement Positions (Photos ©2018 Google, Map Data ©2018 Google)



5.1.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Calibration
Position 1 Type 1 ½" Condenser Microphone	PCB	377B02	105093	Calibration on 27/02/2017
Position 1 Type 1 Preamp	Larson Davis	PRM902	4005	Calibration on 27/02/2017
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3542	Calibration on 27/02/2017
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	122885	Calibration on 16/05/2017
Position 2 Type 1 Preamp	Larson Davis	PRM902	3692	Calibration on 16/05/2017
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3444	Calibration on 16/05/2017
Position 3 Type 1 ½" Condenser Microphone	PCB	377B02	174441	Calibration on 20/06/2017
Position 3 Type 1 Preamp	PCB	PRMLXT1L	42844	Calibration on 20/06/2017
Position 3 Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4086	Calibration on 24/02/2017
Type 1 Calibrator	Brüel & Kjær	4231	2610161	Calibration on 09/05/2017

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.2 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.



5.2 Manned Survey

5.2.1 Procedure

Fully manned environmental noise monitoring was undertaken from approximately 13:30 hours on 20 February 2018 to 14:50 hours on 28 February 2018.

During the survey period the wind conditions were light and from approximately a northwesterly direction. The sky was generally patchy cloud. There was no rain during the survey.

Measurements were taken of the A-weighted (dBA) L_1 , L_{10} , L_{90} , L_{eq} and L_{max} sound pressure levels over periods of not less than 5 minutes. Atypical noises were excluded as far as reasonably possible. The noise levels measured are therefore assumed to be representative of the noise climate during the hour in which the measurements were taken.

In addition, at each position typical L_{90} , L_{eq} and L_{max} octave band spectra (from 63Hz to 8kHz) were taken in order to gain a more detailed description of the prevailing noise climate.

5.2.2 Measurement Positions

The noise level measurements were undertaken at 3 No. positions around the development site. The measurements positions are shown on the plan below.



Plan Showing Manned Measurement Positions (Photos ©2018 Google, Map Data ©2018 Google)



5.2.3 Instrumentation

The instrumentation used during the manned survey is presented in the table below.

Description	Manufacturer	Type	Serial Number	Calibration
Position 1 Type 1 ½" Condenser Microphone	Brüel & Kjær	4189	2643981	Calibration on 20/03/2017
Position 1 Type 1 Preamp	Brüel & Kjær	ZC0029	4195	Calibration on 20/03/2017
Position 1 Type 1 Data Logging Sound Level Meter	Brüel & Kjær	2260	2180670	Calibration on 20/03/2017
Type 1 Calibrator	Larson Davis	CAL200	3082	Calibration on 03/07/2017

The sound level meter was mounted on a tripod and was fitted with a Brüel and Kjær microphone windshield.

The sound level meter was calibrated prior to and on completion of the surveys. No significant change was found to have occurred (no more than 0.1dB).

6.0 Results

6.1 Results of Unmanned Survey

The results have been plotted on Time History Graphs 24919/TH1 to 24919/TH3 enclosed presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

The following table presents the lowest measured L_{A90} background noise levels during the survey:

Position	Lowest Measured L_{A90} Background Noise Level (dB re 2×10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	39	34	34
2	48	41	41
3	52	43	43



6.2 Results of Manned Survey

The fully manned survey measurements have been plotted as L_{10} , L_{90} , L_{eq} and L_1 octave band sound spectra in Graphs 24919/G1.1 to 24919/G1.3. The A-weighted (dBA) L_{10} , L_{90} , L_{eq} , L_1 and L_{max} sound levels are recorded overleaf.

Position	Time	Sound Levels dBA				
		L_{10}	L_{90}	L_{eq}	L_1	L_{max}
A	13:33-13:48	64	56	61	69	76
B	14:13-14:28	61	64	63	66	75
C	14:36-14:51	61	57	60	66	75

7.0 Discussion Of Noise Climate

7.1 Unmanned Survey

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise sources were noted to be traffic noise from the M4, as well as general road traffic on Pinkwell Lane.

7.2 Manned Survey

Throughout the measurements at all positions, the dominant noise source was noted to be road traffic from the M4 as well as air traffic.

8.0 Plant Noise Emission Criteria

The site falls under the jurisdiction of London Borough of Hillingdon. Their advice regarding criteria for atmospheric noise emissions from building service plant is outlined in Section 4 of their Supplementary Planning Document as follows:

“4.23 In considering new industrial development, the Council will apply policies OE1 and OE3 of the UDP and will have regard to, amongst other considerations, the British Standard 4142:1997 “Method for rating industrial noise affecting mixed residential and industrial areas”, and internal and external noise criteria. Specific consideration will also be given to the features and characteristics of the noise.



4.24 British Standard 4142:1997 gives advice on measuring and assessing the noise from machinery or plant, and is relevant if surrounding residential areas might be affected. Developments with a BS4142 assessment of marginal significance or above would not ordinarily be permitted. Consequently, the development should be controlled such that the rating level of the noise from the proposed development determined according to BS4142 is at least 5 dB below the background noise level LA90,T. Ideally, the assessment of noise should give a positive indication that complaints are unlikely.”

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window.

Plant Noise Emission Criteria (dB re 2x10 ⁻⁵ Pa)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
34dBA	29dBA

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

It should be noted that the above are subject to the final approval of the Local Authority.

9.0 BB93: Internal Ambient Noise Level (IANL)

9.1 Upper Limit for Internal Ambient Noise Levels

The table below is extracted from Table 1 of BB93.

Type of Room	Upper Limit for the Indoor Ambient Noise Level L _{Aeq,30mins} dB	
	New Build	Refurbishment
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	35	40
Open plan: (See also section 1.8) Teaching area, resource/breakout area	40	45
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	35	40
Ensemble room 1, recording studio 1	30	35
Control room – for recording 1, control room – not for recording	35	40



Lecture room	35	40
Teaching space intended specifically for students with special hearing and communication needs ²	30	35
SEN calming room	35	35
Study room (individual study, withdrawal, remedial work, teacher preparation)	40	45
Libraries: Quiet study area Resource area	40	45
Science laboratory	40	45
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	40	45
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	35	40
Atrium, circulation space not intended for teaching and learning	45	50
Sports hall, dance studio, gymnasium/activity studio	40	45
Swimming pool	50	55
Meeting room, interviewing/counselling room, video conference room	40	45
Dining room	45	50
Administration and ancillary spaces:		
Kitchen	50	55
Office, medical room, staff room	40	45
Corridor, stairwell, coats and Locker area	45	55
Changing area	50	55
Toilet	50	55

In order to protect students from regular discrete noise events, e.g. aircraft or trains, indoor ambient noise levels should not exceed 60 dB LA1, 30mins. This is achieved by default for spaces with IANLs up to 40 dB LAeq, 30min, but requires assessment in spaces with higher IANL limits, e.g., 45 and 50 dB.

9.2 Building Services and Indoor Ambient Noise Levels

The table below is extracted from Table 2 of BB93.

Condition	Condition	Noise Level Limit
Normal – ventilation for normal teaching and learning activities	Mechanical ¹	Table 1 value
	Natural ²	Table 1 value + 5 dB ⁴
Normal – ventilation for normal teaching and learning activities	Hybrid ²	Mechanical system noise:
		Table 1 value
		Total noise level:
		Table 1 value + 5 dB



Summertime ⁵ – ventilation under local control of teacher to prevent overheating – allowable during the hottest 200hrs of the year	Mechanical	Table 1 value + 5 dB ⁴
	Natural or Hybrid	≤ 55 dB
Intermittent boost ⁶ – ventilation under local control of teacher for dilution of fumes during practical activities as in practical spaces for science, art, food technology and design and technology	Mechanical	Table 1 value + 5 dB ⁴
	Natural	≤ 55 dB
Process extract ³ - can be automatic ventilation for safety and/or under local control of teacher	Mechanical and/or natural	See IoA/ANC guide for operational noise levels

Notes

¹ The normal condition for a ventilation system with purely mechanical air supply is defined as when the system is operating to limit the daily average carbon dioxide concentration to no more than 1,000ppm with the maximum concentration not exceeding 1,500ppm for more than 20 consecutive minutes on any day during normal school operating hours. This would normally equate to a minimum ventilation rate of approximately 8l/s per person. Mechanical ventilation in this context refers to systems (or parts of systems) that use mechanical fans to mix or drive the air including those in mechanical, hybrid, mixed mode and natural ventilation systems and in fan convector heaters.

² 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. For hybrid systems, the mechanical noise excluding external noise break in, should meet the IANL figure in table 1. The mid-season design condition can be used in simple ventilation calculations and is defined as an outside temperature of 11 °C and an internal air temperature of 20 °C with no external wind effect. 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 20dB 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 facade openings, height differences between low and high level openings, corridor transfer vents/stacks, etc, to limit the required facade open areas appropriately. 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 5dB.

³ Process extract includes the operational noise from local exhaust ventilation systems and boost ventilation under the local control of the teacher as required for fume and dust extract in design and technology, odour and steam from cookers in food technology, fume cupboard extract and similar process extract systems. See guidance on specification and measurement of operational noise levels in 'Acoustics of Schools: a design guide' Ref.1. For example, for new fume cupboards the maximum noise level should not exceed 50 dB(A), measured at a height of 1,500 mm above the floor and 1,500 mm from the face of the fume cupboard, with the sash set at a height of 200 mm.

⁴ The +5dB does not apply to teaching and learning spaces where the Table 1 IANL is greater than or equal to 45dB.

⁵ Natural, mechanical or hybrid ventilation systems may be used to improve thermal comfort in summer at the expense of higher indoor ambient noise levels. The normal ventilation IANL can be exceeded during the hottest 200 hours in peak summertime conditions and the design should show that IANLs, defined in table 3 can be met under these conditions as well as under normal operation. The ventilation must be



under the local control of the teacher so that the noise level can be reduced to normal levels when needed. This does not apply to classrooms intended specifically for students with special hearing and communication needs, or to speech therapy rooms.

9.3 Proposed Ventilation Strategy & Achievable IANL

The new development needs to account for differing noise levels encompassing the site. When combined, the measurement positions describe the noise climate at the site boundaries. The ventilation strategy for each façade corresponds to the measured L_{Aeq} at the most appropriate measurement boundary, which is detailed in the table and shown in the site plan overleaf.

Boundary	Reference	Measurement Position	$L_{Aeq,15mins}$
North		1	60
West		B	63
South		C	60
East		3	64
Northeast		2	70



Site Plan Showing Measurement Positions and Measurement Boundary (Photos ©2018 Google, Map Data ©2018 Google)



9.4 Proposed Ventilation Strategy For New Builds

The tables below show the likelihood of BB93 IANL criteria being met under natural ventilation conditions, for different room types and different façades. This should allow the appropriate façade design approach to be selected. This is based on subtracting 15dB loss (from a partially open window) from the expected external L_{Aeq} 30mins façade levels for comparison to the required IANL.

9.4.1 North Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Ensemble room 1, recording studio 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Control room – for recording 1, control room – not for recording	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Lecture room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Teaching space intended specifically for students with special hearing and communication needs ²	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
SEN calming room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Study room (individual study, withdrawal, remedial work, teacher preparation)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Libraries: Quiet study area	Not suitable for natural ventilation without further attenuation measures. Conventional



Resource area	double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Science laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Dining room	Suitable for natural ventilation
Kitchen	Suitable for natural ventilation
Office, medical room, staff room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
Changing area	Suitable for natural ventilation
Toilet	Suitable for natural ventilation

9.4.2 West Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation



	or attenuated façade ventilation system likely to be acceptable.
Ensemble room 1, recording studio 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Control room – for recording 1, control room – not for recording	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Lecture room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Teaching space intended specifically for students with special hearing and communication needs ²	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
SEN calming room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Study room (individual study, withdrawal, remedial work, teacher preparation)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Libraries: Quiet study area Resource area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Science laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Atrium, circulation space not intended for teaching and learning	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Sports hall, dance studio, gymnasium/activity studio	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Swimming pool	Suitable for natural ventilation



Meeting room, interviewing/counselling room, video conference room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Dining room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Kitchen	Suitable for natural ventilation
Office, medical room, staff room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Corridor, stairwell, coats and Locker area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Changing area	Suitable for natural ventilation
Toilet	Suitable for natural ventilation

9.4.3 South Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Ensemble room 1, recording studio 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Control room – for recording 1, control room – not for recording	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Lecture room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Teaching space intended specifically for students with special hearing and communication needs ²	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation



	or attenuated façade ventilation system likely to be acceptable.
SEN calming room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Study room (individual study, withdrawal, remedial work, teacher preparation)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Libraries: Quiet study area Resource area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Science laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Dining room	Suitable for natural ventilation
Kitchen	Suitable for natural ventilation
Office, medical room, staff room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
Changing area	Suitable for natural ventilation
Toilet	Suitable for natural ventilation



9.4.4 East Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Ensemble room 1, recording studio 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Control room – for recording 1, control room – not for recording	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Lecture room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Teaching space intended specifically for students with special hearing and communication needs2	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
SEN calming room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Study room (individual study, withdrawal, remedial work, teacher preparation)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Libraries: Quiet study area Resource area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Science laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation



	or attenuated façade ventilation system likely to be acceptable.
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Atrium, circulation space not intended for teaching and learning	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Sports hall, dance studio, gymnasium/activity studio	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Dining room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Kitchen	Suitable for natural ventilation
Office, medical room, staff room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Corridor, stairwell, coats and Locker area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Changing area	Suitable for natural ventilation
Toilet	Suitable for natural ventilation

9.4.5 Northeast Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.



Ensemble room 1, recording studio 1	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Control room – for recording 1, control room – not for recording	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Lecture room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Teaching space intended specifically for students with special hearing and communication needs2	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
SEN calming room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Study room (individual study, withdrawal, remedial work, teacher preparation)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Libraries: Quiet study area Resource area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Science laboratory	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Atrium, circulation space not intended for teaching and learning	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Sports hall, dance studio, gymnasium/activity studio	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Swimming pool	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation



	or attenuated façade ventilation system likely to be acceptable.
Meeting room, interviewing/counselling room, video conference room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Dining room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Administration and ancillary spaces:	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Kitchen	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Office, medical room, staff room	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Corridor, stairwell, coats and Locker area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Changing area	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.
Toilet	Not suitable for natural ventilation without further attenuation measures. Conventional double glazing with mechanical ventilation or attenuated façade ventilation system likely to be acceptable.

10.0 Conclusions

A detailed daytime fully manned environmental noise survey has been undertaken in order to establish the currently prevailing street level environmental noise climate around the site.

A detailed 24 hour daytime and night time fully automated environmental noise survey has been undertaken in order to establish the currently prevailing ground level environmental noise climate around the site.

Plant noise emission criteria have been recommended based on the results of the noise survey and in conjunction with the Local Authority's requirements.



Internal noise levels have been presented in accordance with Table 1 of BB93.

We have assessed potential room use and presented advice in relation to the likely required ventilation strategy.

Appendix A

The acoustic terms used in this report are defined as follows:

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
L _{eq,T}	L _{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, <i>T</i> .
L _{max}	L _{max} is the maximum sound pressure level recorded over the period stated. L _{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L _{eq} noise level.
L _p	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
L _w	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Harlington School

Position 1

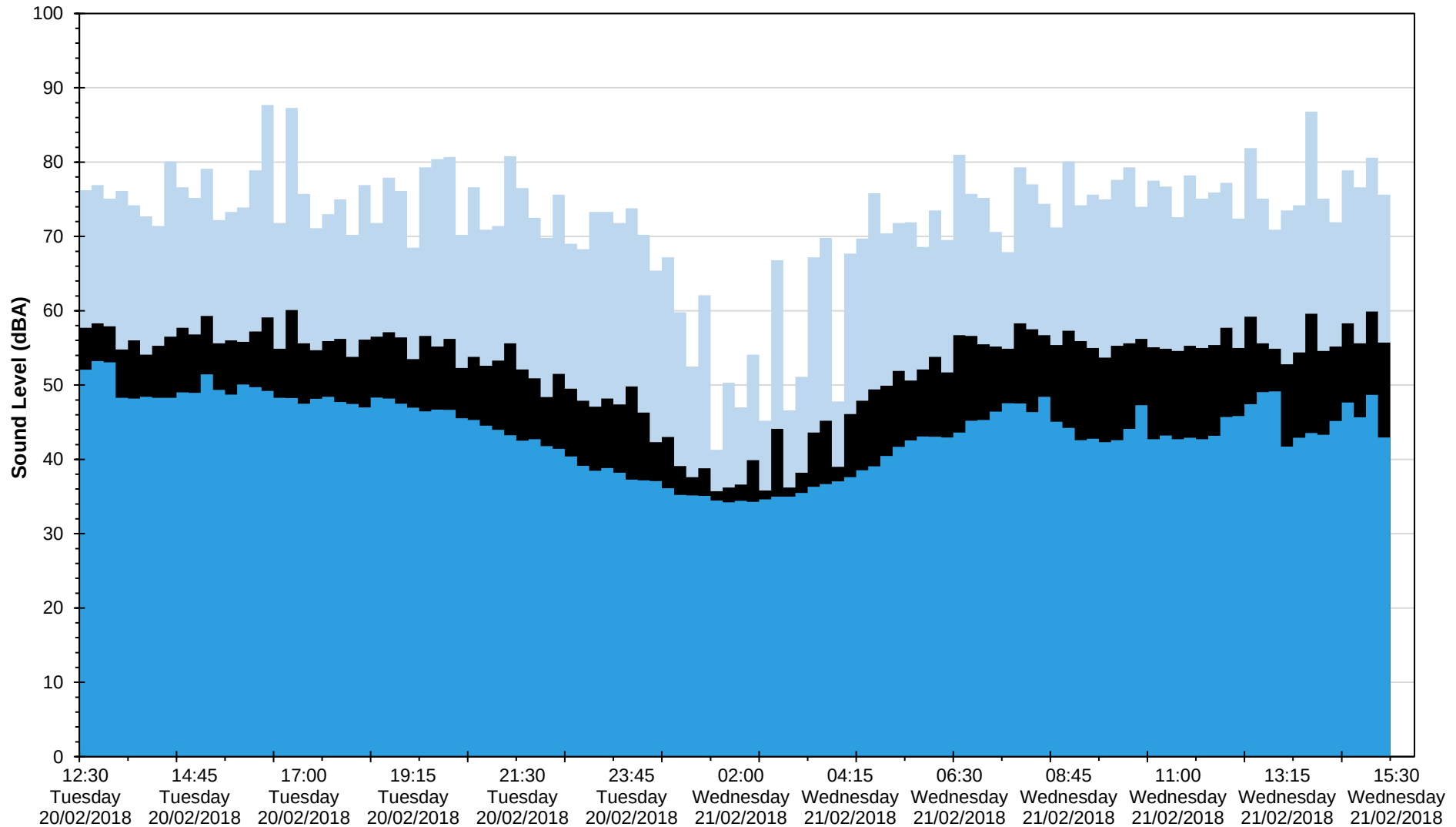
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Tuesday 20 February 2018 to Wednesday 21 February 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

24919/TH1

Harlington School

Position 2

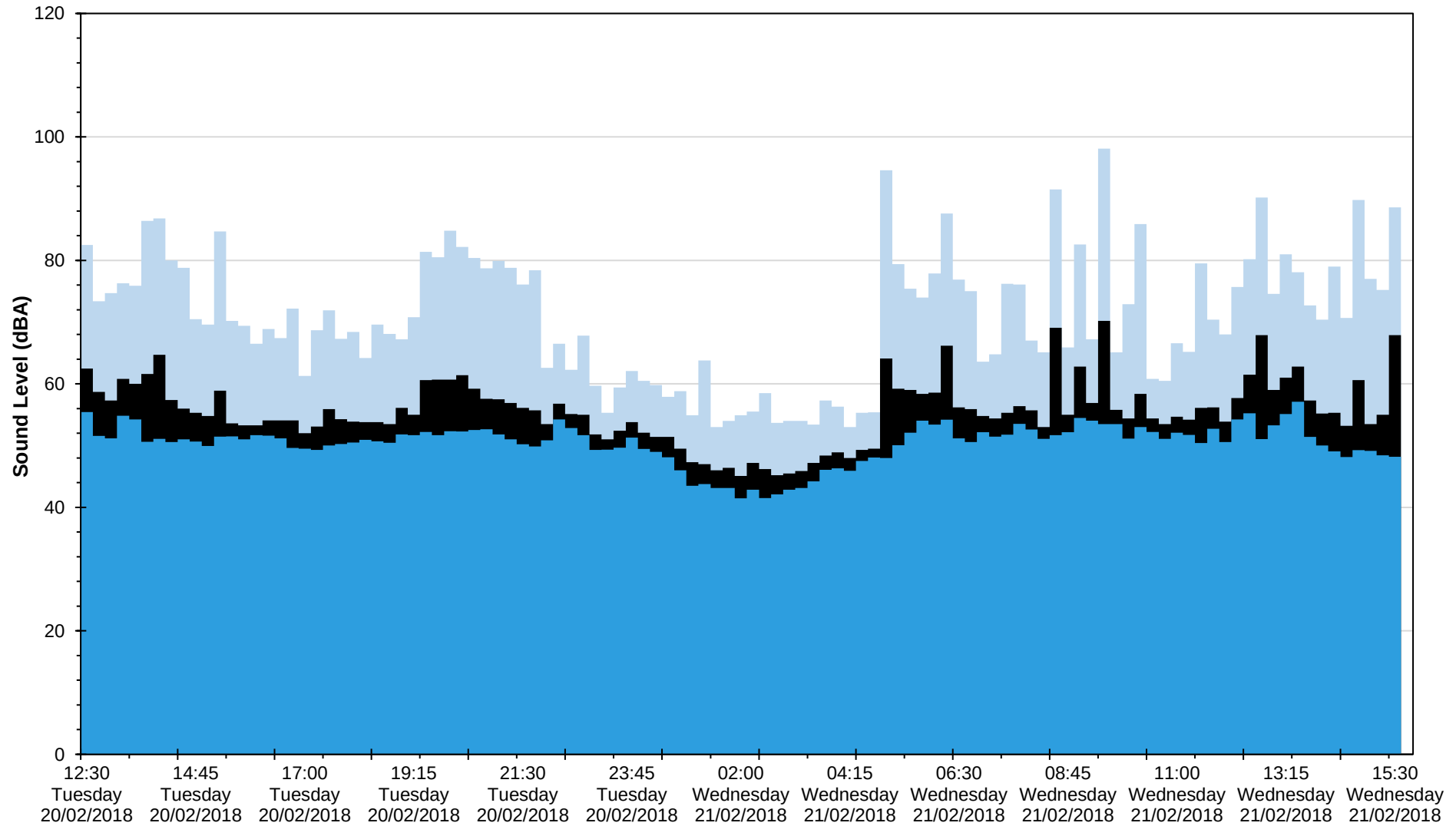
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Tuesday 20 February 2018 to Wednesday 21 February 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

24919/TH2

Harlington School

Position 3

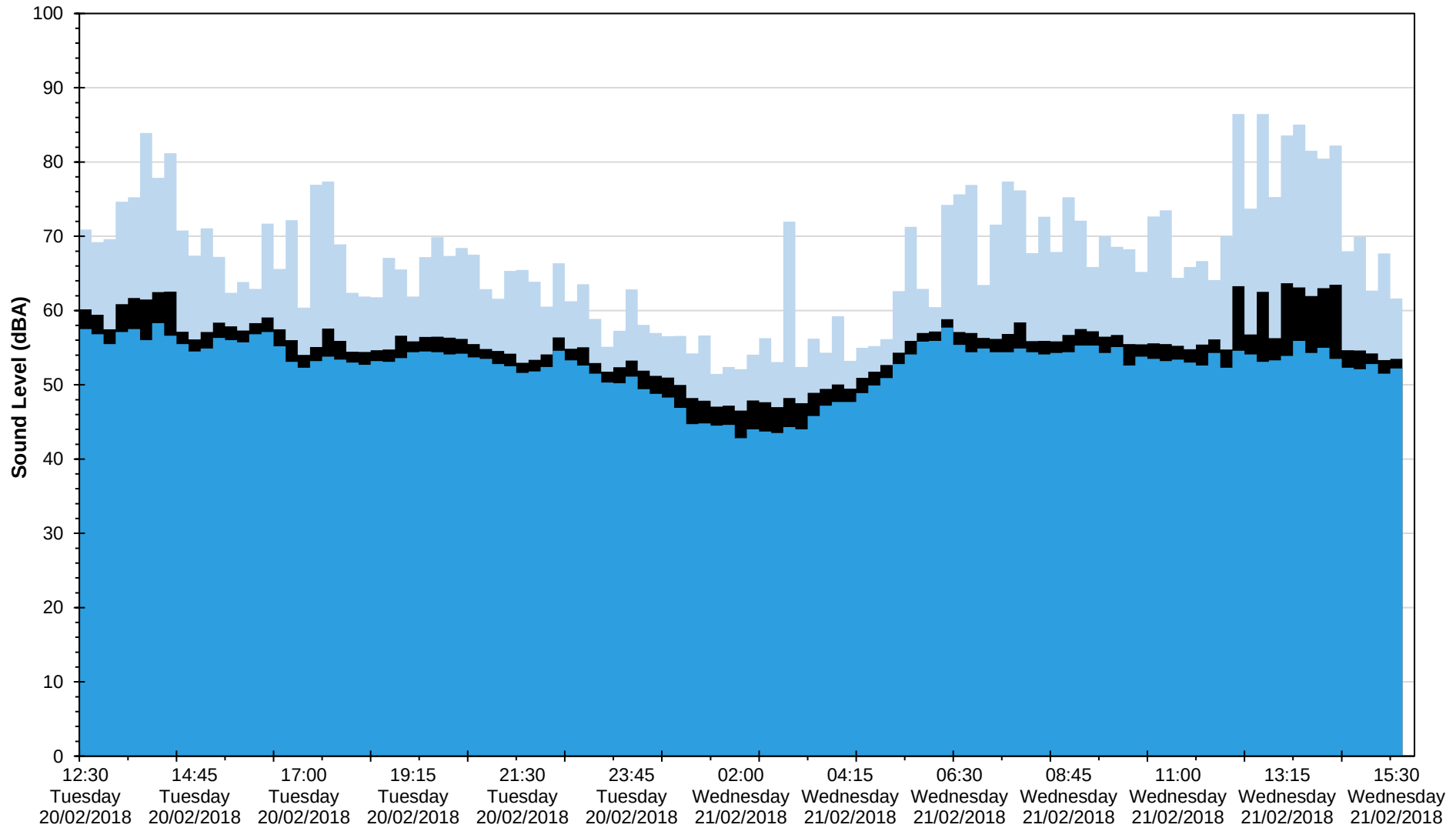
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Tuesday 20 February 2018 to Wednesday 21 February 2018

■ L_{Amax}

■ L_{Aeq}

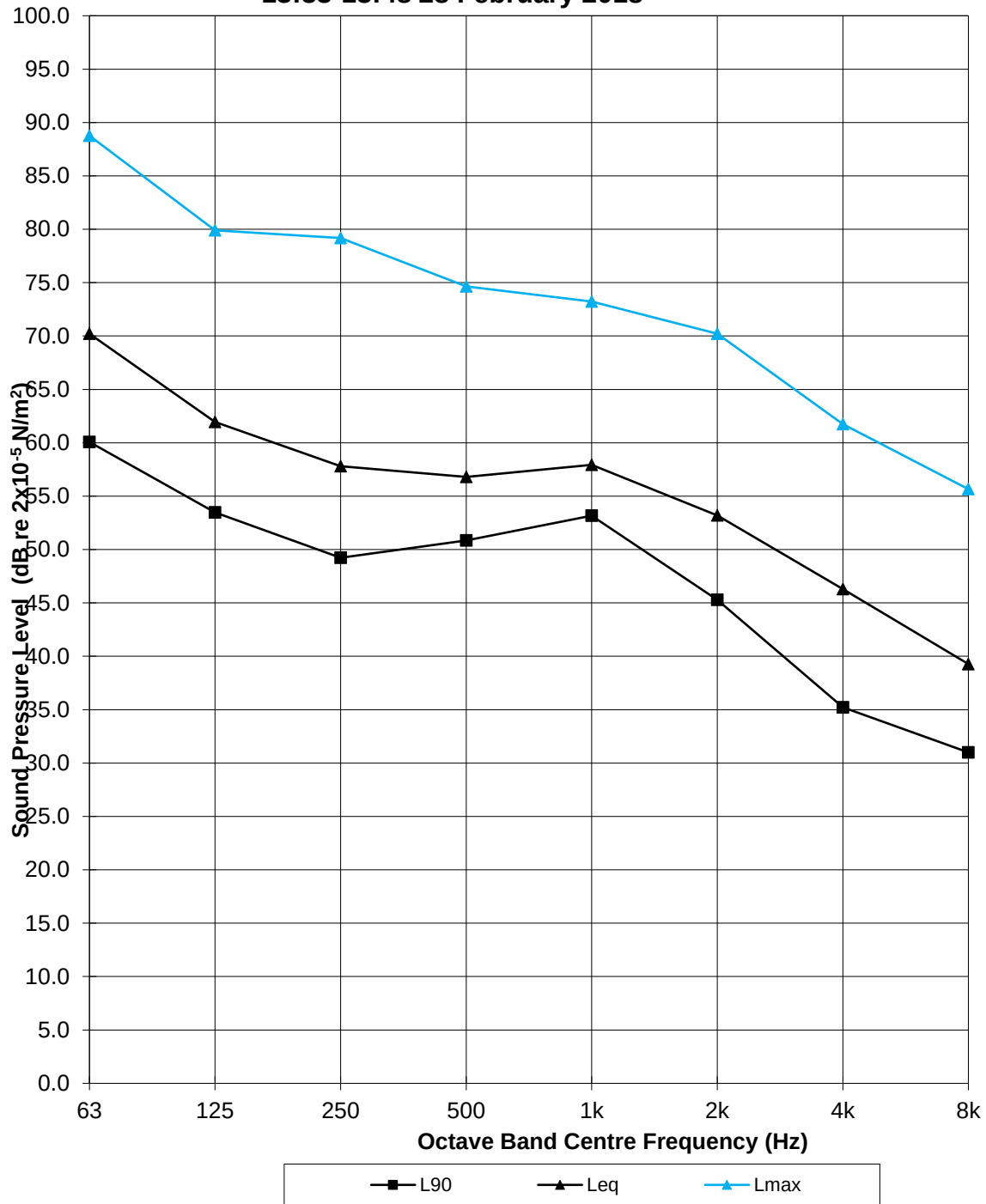
■ L_{A90}



Date and Time

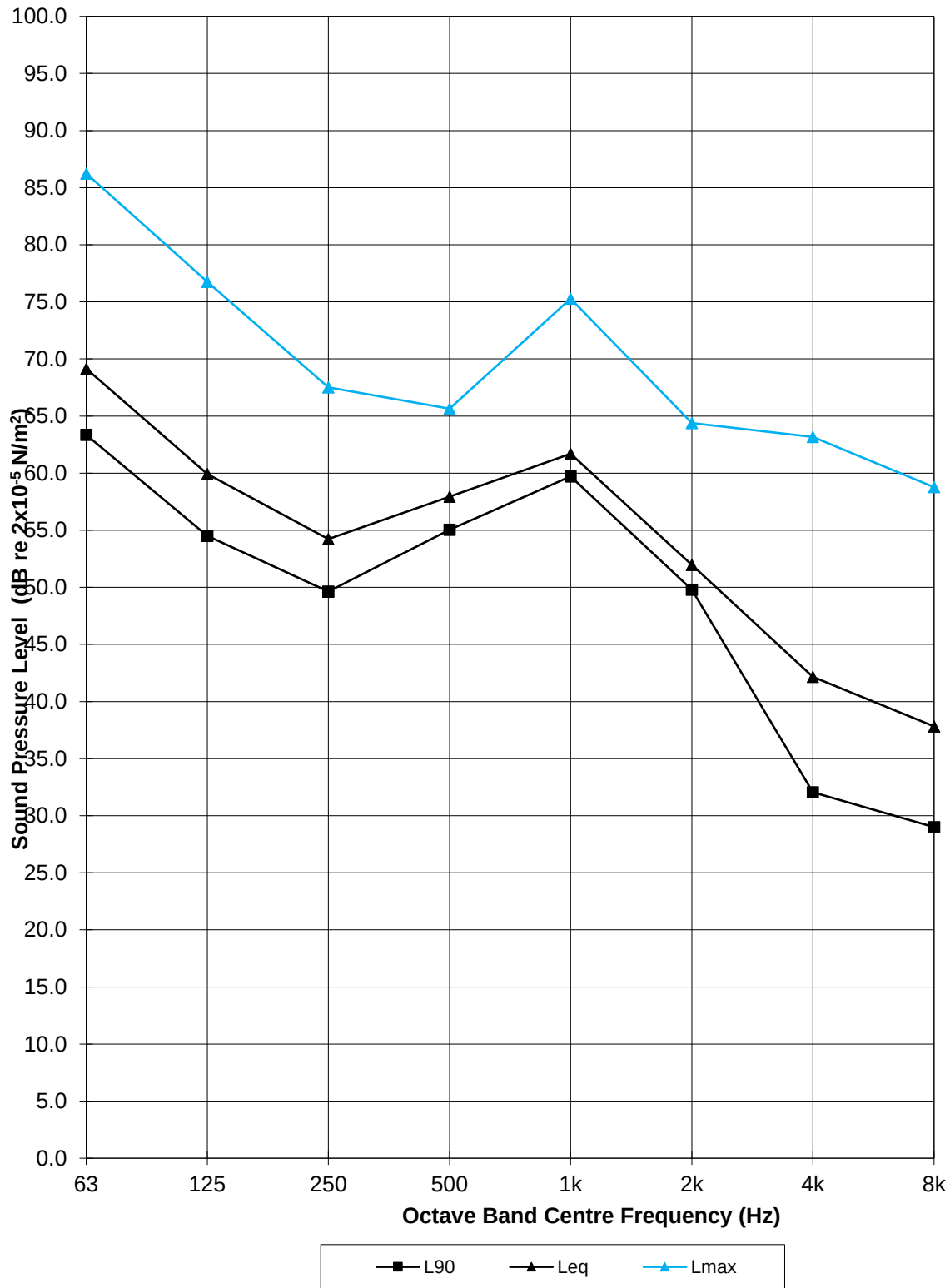
24919/TH3

Harlington School, Hayes
Manned measurement- Position A
 L_{A90} , L_{Aeq} and L_{Amax}
13:33-13:48 28 February 2018

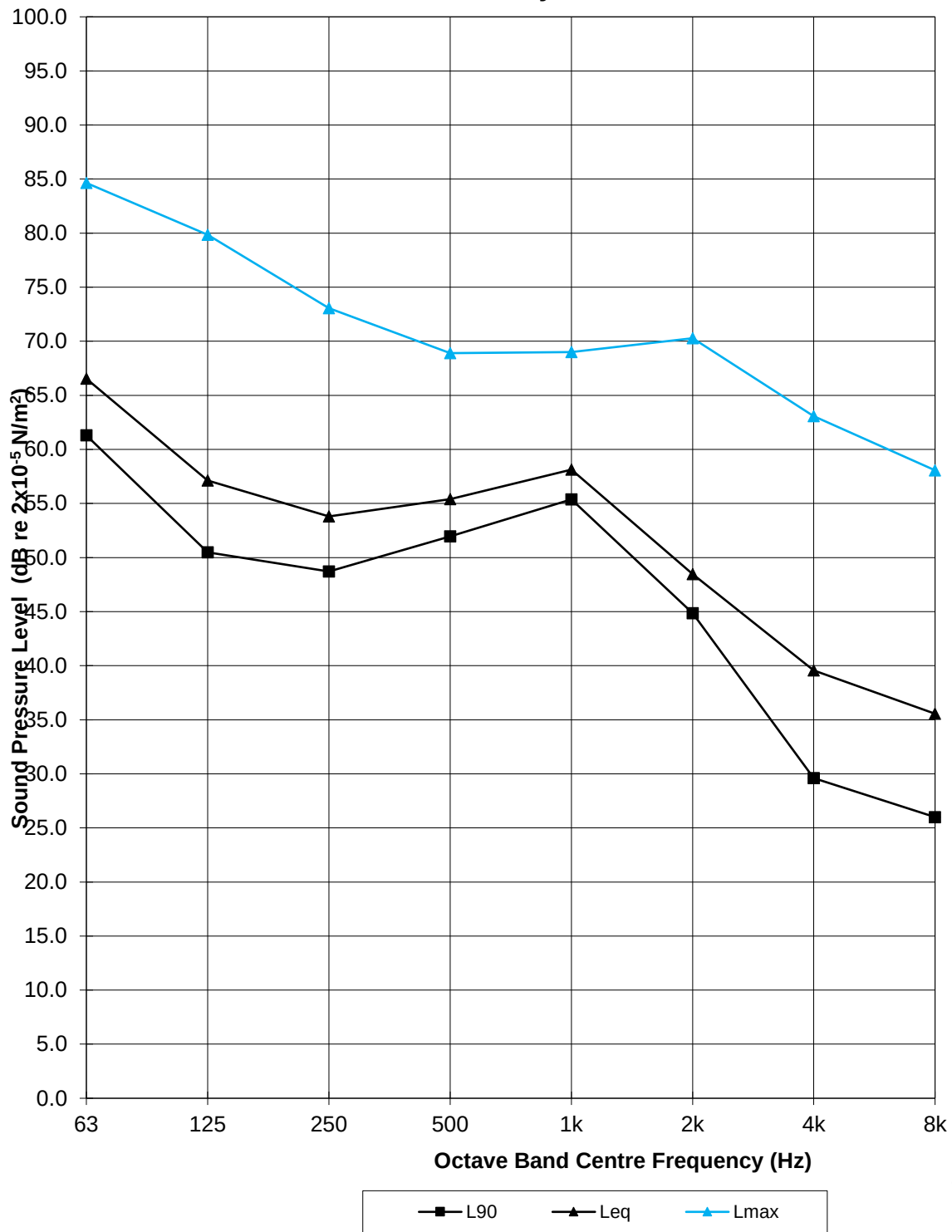


G1.1

Harlington School, Hayes
Manned measurement- Position B
 L_{A90} , L_{Aeq} and L_{Amax}
14:13-14:28 28 February 2018



Harlington School Hayes
Manned measurement- Position C
 L_{A90} , L_{Aeq} and L_{Amax}
14:36-14:51 28 February 2018



G1.3