

Young Peoples Academy Middlesex

Environmental Noise Survey and Outline BB93 Strategy Report

25787/ENS1

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For:
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Document Control

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Attachments

Appendix A – Acoustic Terminology

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1.0 Introduction

Hann Tucker Associates have been appointed to undertake manned and unmanned noise monitoring at Young Peoples Academy, Middlesex, in order to identify existing environmental noise levels around the proposed development area.

Existing background noise levels were measured and will be used to determine noise emission criteria for new plant/machinery in agreement with the planning requirements of the Local Authority.

This report presents the methodology and findings of our noise survey and our outline BB93 ventilation strategy assessment.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of a detailed 24 hour survey the existing L_{A10} , L_{A90} , L_{Aeq} and L_{Amax} environmental road, rail and air traffic noise levels at up to three (3) “secure” and accessible on-site positions, using fully computerised unmanned monitoring equipment.

To undertake supplementary attended measurements.

To present the above sets of environmental noise data in a combined report, with recommendations made for daytime and night-time plant noise emission limits (in line with BS4142 2014), following liaison with the Local Authority. The survey will also capture incident traffic noise levels suitable to be used in all subsequent analysis to establish sound performance specifications for the external building fabric elements (in line with BB93).

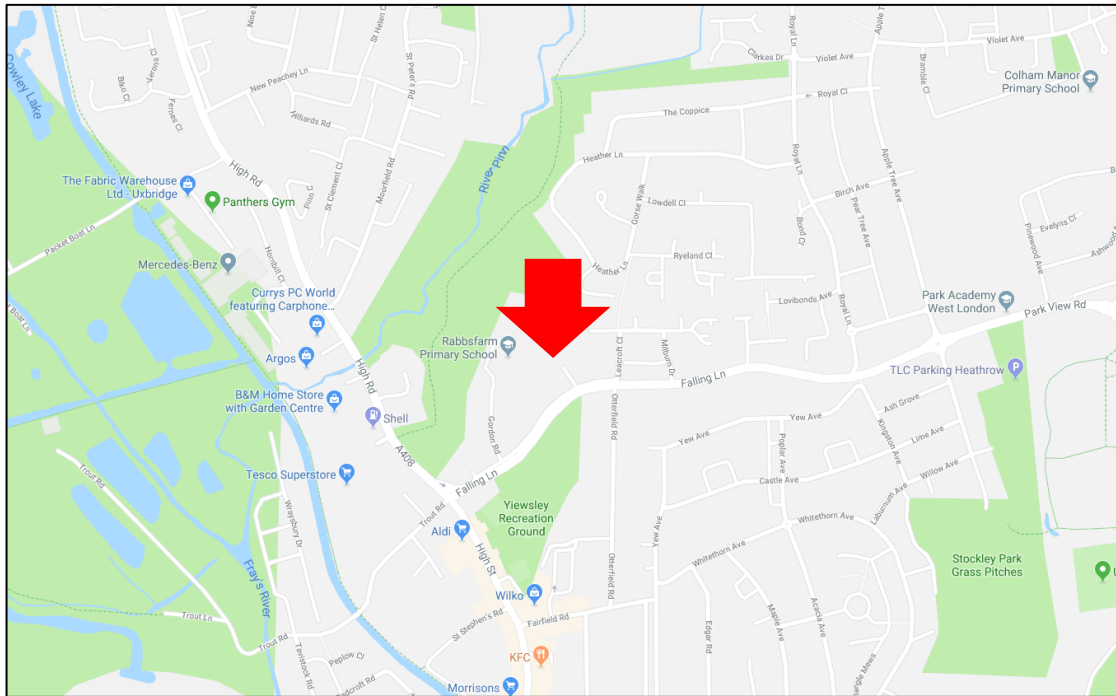
Based upon interpretation of the results of the noise survey, the internal noise criteria of BB93 and external plant criteria of BS4142 the report will include guidance on the likely impact the ambient noise levels will have on the architectural/engineering design.



3.0 Site Description

3.1 Location

The site is located in Middlesex and falls under the jurisdiction of the London Borough of Hillingdon Council. See the Location Map below.



Location Map (Map data ©2018 Google)

3.2 Description

The site is bordered by Rabbsfarm Primary School to the west and a large open field to the north. Residential housing is found to the south of the site, separating it from Falling Lane. Further residential housing can be found to the east of the site. The site is shown in the plan below.



Site Plan (Imagery©2018 Infoterra Ltd & Bluesky, The GeoInformation Group, 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 Luke Brough MSc, BSc(Hons), TechIOA, MAES.

5.1 Unmanned Survey

5.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 16:30 hours on 27 June 2018 to 15:30 hours on 29 June 2018.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were light and the sky was clear. We understand that generally throughout the survey period the weather conditions were similar. 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 2 positions around the development site. The measurement positions are described in the table below.

Position No	Description
1	The microphone was attached to a fence approximately 1.5m above the ground in the north west area of the site.
2	The microphone was attached to a fence approximately 1.5m above the ground in the north east area of the site.
3	The microphone was attached to a fence approximately 1.5m above the ground in the south area of the site.

The measurement positions are shown on the plan below.



Site plan showing measurement positions (Imagery©2018 Infoterra Ltd & Bluesky, The GeoInformation Group, 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	107417	Calibration on 16/05/2017
Position 1 Type 1 Preamp	Larson Davis	PRM902	4158	Calibration on 16/05/2017
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3804	Calibration on 16/05/2017
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	132146	Calibration on 24/07/2017
Position 2 Type 1 Preamp	Larson Davis	PRM902	4215	Calibration on 24/07/2017
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3838	Calibration on 24/07/2017
Position 3 Type 1 ½" Condenser Microphone	PCB	377B02	104946	Calibration on 21/03/2018
Position 3 Type 1 Preamp	Larson Davis	PRM902L	3949	Calibration on 21/03/2018
Position 3 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3699	Calibration on 21/03/2018

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 0.1 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 between approximately 15:30 hours and 16:00 hours on 29 June 2018.



During the survey period the wind conditions were light and the sky was clear. Road surfaces were dry throughout the of the survey period.

Measurements were taken of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over periods of not less than 10 minutes in each hour. 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_{eq} octave band spectra (from 63Hz to 8kHz) were taken for daytime period 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 Position 4 and Position 5. The measurement positions were 1m above ground level at the north and south of the site, as shown below.



Site plan showing measurement positions (Imagery©2018 Infoterra Ltd & Bluesky, The GeoInformation Group, 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
Type 1 Precision Sound Analyser Meter	Brue! & Kjaer	2260	2370433	Calibration on 23/11/2016
Type 1 ½" Condenser Microphone	Brue! & Kjaer	4189	2650666	Calibration on 23/11/2016
SLM Calibrator	Brue! & Kjaer	4231	2205779	Calibration on 30/11/2017

The sound level meter was mounted on a tripod and fitted with a 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 0.1 dB).

6.0 Results

6.1 Results of Unmanned Survey

6.1.1 L_{A90} Noise Levels

The results have been plotted on Time History Graphs 25787/TH1 to 25787/TH3 enclosed presenting the 15 minute A-weighted (dBA) L₉₀, 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 x 10 ⁻⁵ Pa)		
	Daytime (07:00 – 19:00) Hours	Evening (19:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	41	39	35
2	41	39	35
3	45	40	36

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



Position	Modal Average Measured L_{A90} Background Noise Level (dB re 2×10^{-5} Pa)		
	Daytime (07:00 – 19:00) Hours	Evening (19:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	42	41	37
2	42	41	36
3	46	43	37

6.1.2 L_{eq} Noise Levels

In order to compare the results of our survey with suitable guidelines it is necessary to convert the measured $L_{Aeq(15 \text{ minute})}$ noise levels into single figure daytime $L_{Aeq(12\text{-hour})}$ (07:00-19:00 hours), evening $L_{Aeq(4\text{-hour})}$ (19:00-23:00 hours), and night-time $L_{Aeq(8\text{-hour})}$ (23:00-07:00 hours) levels.

The daytime $L_{Aeq(12\text{-hour})}$, evening $L_{Aeq(4\text{-hour})}$ and night-time $L_{Aeq(8\text{-hour})}$ noise levels for each position are presented in the tables below.

Position	Daytime (07:00 – 19:00) Hours $L_{Aeq(12\text{-hour})}$	Evening Hours (19:00 – 23:00) $L_{Aeq(4\text{-hour})}$	Night-Time (23:00 – 07:00) Hours $L_{Aeq(8\text{-hour})}$
1	54	45	43
2	51	45	42
3	53	49	45

6.2 Results of Manned Survey

The results have been plotted on Graph 25787/G1 enclosed presenting the 15 minute A-weighted (dBA) L_{eq} levels at the measurement position throughout the duration of the survey.

The measured daytime data is presented in the table below.

Position	$L_{Aeq,10min}$	$L_{1,10min}$
4	43	48
5	47	55

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 from the surrounding road network and passing aircraft.



7.2 Manned Survey

As above, during the survey period the dominant noise sources were noted to be traffic from the surrounding road network and passing aircraft.

8.0 Plant Noise Emission Criteria

The site falls within the London Borough of Hillingdon Council's jurisdiction. Their advice regarding plant noise emissions is taken from the London Borough of Hillingdon Noise Supplementary Planning Document 2006:

"...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."

Based on the results of the noise survey and the advice above, we recommend the following plant noise emission levels to be achieved with all plant running simultaneously at 1m external to the nearest noise sensitive façade.

Plant Noise Emission Criteria (dB re 2x10 ⁻⁵ Pa)		
Daytime (07:00 – 19:00) Hours	Evening (19:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
36	34	30

It should be noted that the above criteria are subject to final approval by the London Borough of Hillingdon Council.



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 L_{A1} , 30mins. This is achieved by default for spaces with IANLs up to 40 dB L_{Aeq} , 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
Condition	Condition	Noise Level Limit
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 convactor 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 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 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.

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

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 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 below and shown in the site plan below.

Boundary	Measurement Position	$L_{Aeq,T}$
North	1	54
East	2	51
South	3	53
West	4	43



Site plan showing measurement positions and measurement boundary (Imagery©2018 Infoterra Ltd & Bluesky, The GeoInformation Group, Map data ©2018 Google)

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 Proposed Ventilation Strategy For New Builds

9.4.1 North Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Suitable for natural ventilation.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Suitable for natural ventilation
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Suitable for natural ventilation
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	Suitable for natural ventilation
Lecture room	Suitable for natural ventilation
Teaching space intended specifically for students with special hearing and communication needs	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)	Suitable for natural ventilation
Libraries: Quiet study area Resource area	Suitable for natural ventilation
Science laboratory	Suitable for natural ventilation
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Suitable for natural ventilation
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Suitable for natural ventilation
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Suitable for natural ventilation
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Suitable for natural ventilation
Dining room	Suitable for natural ventilation
Administration and ancillary spaces:	Suitable for natural ventilation
Kitchen	Suitable for natural ventilation
Office, medical room, staff room,	Suitable for natural ventilation
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
Changing area,	Suitable for natural ventilation
Toilet	Suitable for natural ventilation



9.4.2 East Boundary

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Suitable for natural ventilation.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Suitable for natural ventilation
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Suitable for natural ventilation
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	Suitable for natural ventilation
Lecture room	Suitable for natural ventilation
Teaching space intended specifically for students with special hearing and communication needs	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)	Suitable for natural ventilation
Libraries: Quiet study area Resource area	Suitable for natural ventilation
Science laboratory	Suitable for natural ventilation
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Suitable for natural ventilation
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Suitable for natural ventilation
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Suitable for natural ventilation
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Suitable for natural ventilation
Dining room	Suitable for natural ventilation
Administration and ancillary spaces:	Suitable for natural ventilation
Kitchen	Suitable for natural ventilation
Office, medical room, staff room,	Suitable for natural ventilation
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
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	Suitable for natural ventilation.
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Suitable for natural ventilation
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Suitable for natural ventilation
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	Suitable for natural ventilation
Lecture room	Suitable for natural ventilation
Teaching space intended specifically for students with special hearing and communication needs	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)	Suitable for natural ventilation
Libraries: Quiet study area Resource area	Suitable for natural ventilation
Science laboratory	Suitable for natural ventilation
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Suitable for natural ventilation
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Suitable for natural ventilation
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Suitable for natural ventilation
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Suitable for natural ventilation
Dining room	Suitable for natural ventilation
Administration and ancillary spaces:	Suitable for natural ventilation
Kitchen	Suitable for natural ventilation
Office, medical room, staff room,	Suitable for natural ventilation
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
Changing area,	Suitable for natural ventilation
Toilet	Suitable for natural ventilation

**9.4.4 West Boundary**

Type of Room	New Build
Secondary school: Classroom, general teaching area, seminar room, tutorial room, language laboratory	Suitable for natural ventilation
Open plan: (See also section 1.8) Teaching area, resource/breakout area	Suitable for natural ventilation
Secondary music classroom 1, small and large practice/group 1, performance/recital room 1	Suitable for natural ventilation
Ensemble room 1, recording studio 1	Suitable for natural ventilation
Control room – for recording 1, control room – not for recording	Suitable for natural ventilation
Lecture room	Suitable for natural ventilation
Teaching space intended specifically for students with special hearing and communication needs ²	Suitable for natural ventilation
SEN calming room	Suitable for natural ventilation
Study room (individual study, withdrawal, remedial work, teacher preparation)	Suitable for natural ventilation
Libraries: Quiet study area Resource area	Suitable for natural ventilation
Science laboratory	Suitable for natural ventilation
Design and technology: Resistant materials, CAD/CAM area, electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Suitable for natural ventilation
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	Suitable for natural ventilation
Atrium, circulation space not intended for teaching and learning	Suitable for natural ventilation
Sports hall, dance studio, gymnasium/activity studio	Suitable for natural ventilation
Swimming pool	Suitable for natural ventilation
Meeting room, interviewing/counselling room, video conference room	Suitable for natural ventilation
Dining room	Suitable for natural ventilation
Administration and ancillary spaces:	Suitable for natural ventilation
Kitchen,	Suitable for natural ventilation
Office, medical room, staff room,	Suitable for natural ventilation
Corridor, stairwell, coats and Locker area	Suitable for natural ventilation
Changing area,	Suitable for natural ventilation
Toilet	Suitable for natural ventilation



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. Additional manned measurements have been taken to supplement this data.

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).

L_{A1} - If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for $n\%$ of the time, hence L_{A1} is the (A-weighted) level exceeded for 1% of the time and as such can be regarded as the 'maximum level'.

$D_{nT,w}$ - Weighted Standardised Level Difference (dB)

A single number quality characterising the on site airborne sound insulation performance of a construction, including transmission of sound via flanking paths (e.g. adjoining floors/walls).

The higher the $D_{nT,w}$ of a construction, the better its airborne sound insulation performance; the higher the $D_{nT,w}$ requirement, the more stringent the criteria.

Since the level of reverberation in a "receive" room affects the difference in sound level across a wall or floor on site, $D_{nT,w}$ and $L'_{nT,w}$ include a correction for the "receive" room reverberation time (allowing comparison of values measured in various conditions).

RT, RT_{60}, T or T_{60} - Reverberation Time (secs)

The time, in seconds, for a sound to decay by 60dB.

T_{mf} - T_{mf} (secs)

The arithmetic average of the reverberation time in the 500Hz, 1kHz and 2kHz bands.

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Position 1

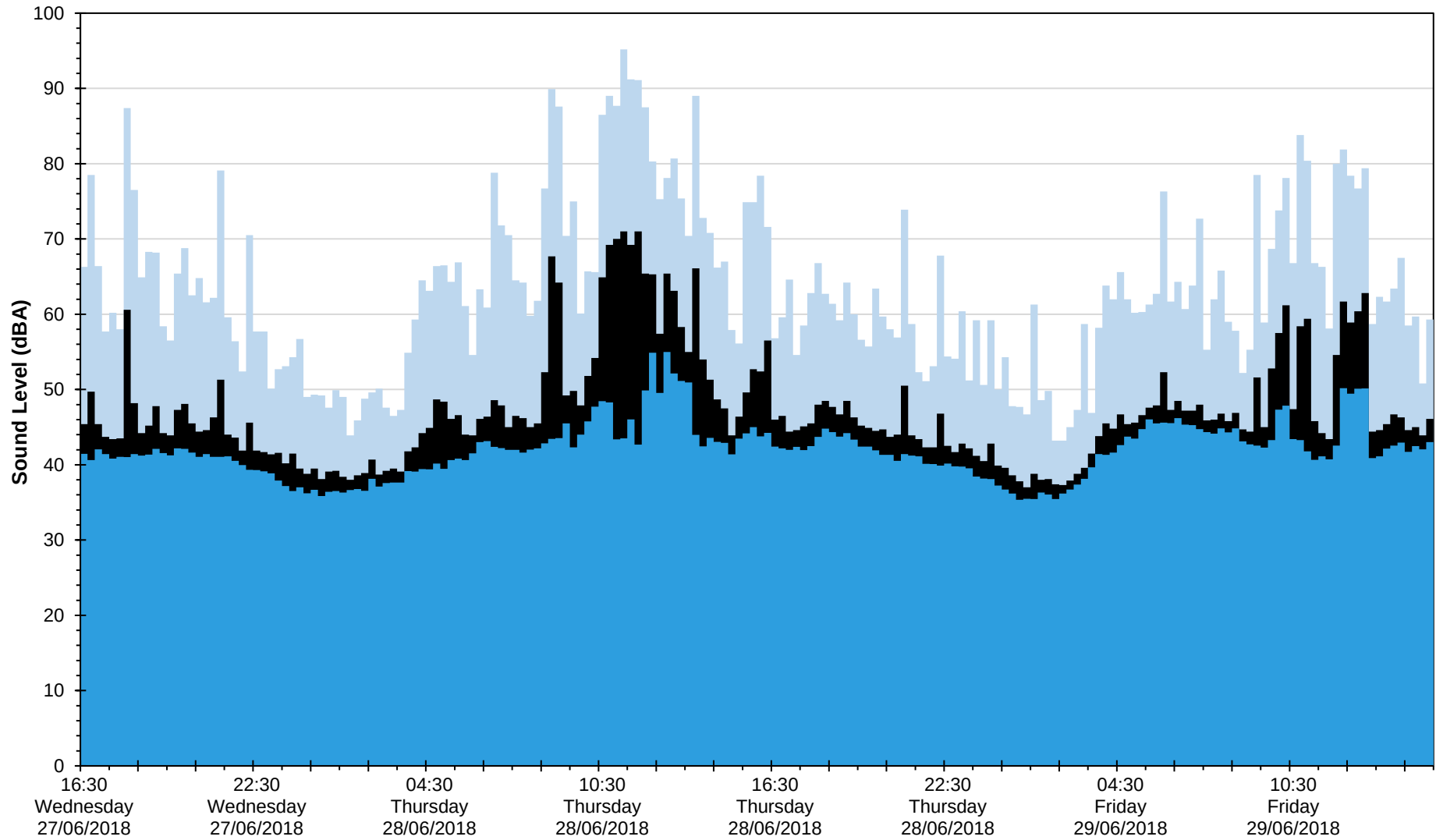
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Wednesday 27 June 2018 to Friday 29 June 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

25787/TH1

Young Peoples Academy

Position 2

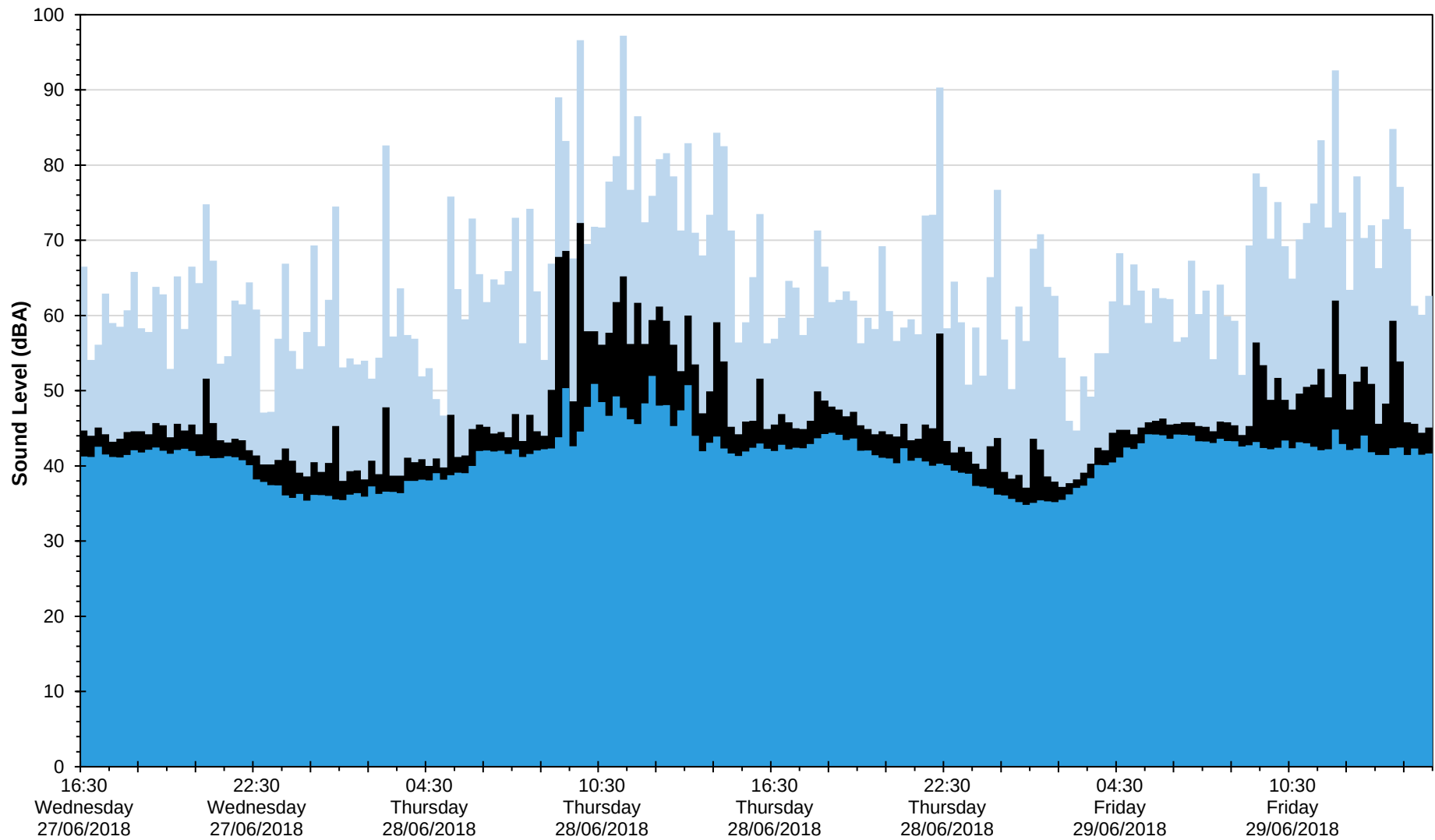
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Wednesday 27 June 2018 to Friday 29 June 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

25787/TH2

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Position 3

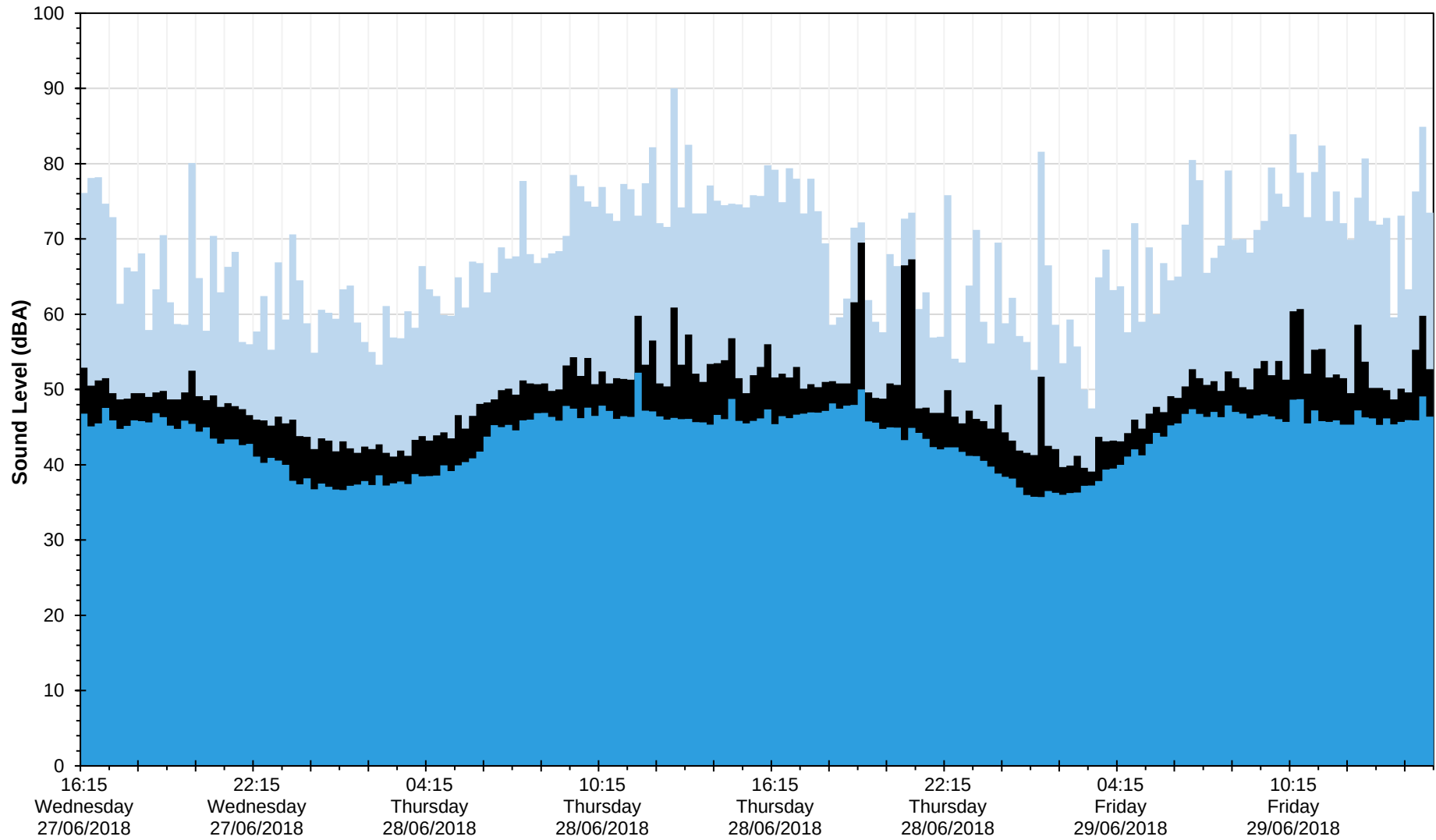
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Wednesday 27 June 2018 to Friday 29 June 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

25787/TH3

Manned Measurements - Young Peoples Academy - 29/06/2018

