SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Report

Meadow High School, Hillingdon

Planning Assessment

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Project No 2220959

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Appendices

1.0 Introduction

1.1 Sharps Redmore have been instructed to provide a planning assessment in respect to the proposed development on the site at Meadow High School, Hillingdon. The site location is shown in Figure 1.1 below.

Figure 1.1: Site location

1.2 The proposals include the construction of a new 2-storey teaching block to the north of the existing site. The building will comprise of various teaching rooms, fitness room, common room and ancillary areas.

1.3 There have been construction works on the site for a separate development that includes new teaching spaces and MUGA, although it is understood that this development was completed in early September 2022. This recently completed teaching building is located to the south of the site. The MUGA will be located adjacent to the proposals. Sharps Redmore have not been involved in this other scheme, and it remains separate from the current proposals.

1.4 Drawings of the proposals are provided in Appendix A.

1.5 This report assesses:

- Atmospheric building services plant noise emissions to residences.
- External noise intrusion to the new school buildings.
- Activity noise from the proposed scheme, including external play/teaching areas.

1.6 The site itself is located on Royal Lane, Uxbridge. The surrounding area is generally residential. Immediately to the south of the site there is the Baitul Aman Mosque, and Hillingdon Community Centre. To the north east there is the Hillingdon Hospital.

1.7 The nearest existing noise sensitive receivers are:

- Baitul Aman Mosque and residential dwellings on Clarkes Drive to the south
- Residential dwellings on Royal Lane on the east
- Residential dwellings on Benson Close and Peel Way to the north.

1.8 Section 2 of the report outlines relevant acoustic guidelines. Section 3 provides details of the noise survey undertaken. Section 4 provides comment followed by conclusions in Section 5. Acoustic terminology is provided in Appendix B.

2.0 Assessment Criteria

National Policy

2.1 The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation".

2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below.

Table 2.1 Noise exposure hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate ad reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

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

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

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

Design Guidance

2.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) "*Guidelines for Community Noise"*.

ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

iii) Another method is described within BS 4142:2014+A1:2019 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Building Services Atmospheric Noise Emissions

2.7 The building is expected to be mechanically ventilated in certain areas. This building services plant needs to be controlled in noise level, not only within the building, but also atmospherically to the neighbours. The standard for the assessment of such plant is BS 4142: 2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound."*

2.8 This standard provides a method by comparison of the existing background noise level, L_{A90}, with the specific rating noise level, L_{Ar}, defined by the L_{Aeq} parameter. The rating level, L_{Ar} is the L_{Aeq} noise level plus a correction if the noise source if judged to have any characteristics which draw attention to itself at the receiver (up to + 6 dB may be applied for tonality, + 9 dB for impulsivity, + 3 dB for other features and + 3 dB for intermittency).

2.9 The method of assessment states that if the difference between the rating level of plant is 5 dB greater than the background level, then this is likely to be an indication of an adverse impact. If the rating level is 10 dB above the background level, then this is likely to be an indication of significant adverse impact. If the rating level is equal to or less than the background level, this indicates a low impact. The lower the rating level below the background level, the lower the likelihood of adverse impact. However, context is now a significant aspect of the assessment, as well as the uncertainty factor within the process in reaching any conclusion.

2.10 In line with NPPF guidance we would expect that any new noise will be designed such that, at most, it indicates a marginal/low impact to neighbouring noise sensitive properties. Without local policy guidance, we would typically recommend that the rated level of such plant is selected and attenuated as necessary so as not to exceed the pre-existing background level, L_{A90}, at the nearest neighbour's window.

Local Policy

2.11 The requirements of the London Borough of Hillingdon with respect to the noise impact from proposed mechanical services plant is outlined within the Supplementary Planning Document (2014) "*Development Control for Noise Generating and Noise Sensitive Development*".

"As a general rule, the Boroughs will seek to achieve the external noise standards detailed […] below;

Rating Level (L_{Ar},T_r) is at least 5 dB(A) below the Background Level L_{A90}"

External Noise Intrusion

2.12 In respect to planning issues acoustic criteria is addressed within Building Bulletin 93 (BB93) '*Acoustic Design of Schools: Performance Standards'*. The guidance contained within is required to be met as a regulatory requirement under Part E4 of the Building Regulations.

2.13 The school is proposed to exclusively provide for students who have a special educational need. This is considered within BB93;

"For the purposes of this document, children with special hearing and communication needs may include, but are not limited to, children with permanent hearing impairment; or with severe and complex needs including:

- *speech language and communication difficulties*
- *visual impairments*
- *fluctuating hearing impairments caused by conductive hearing loss*
- *attention deficit hyperactivity disorders (ADHD)*
- *an auditory processing disorder or difficulty*
- *being on the autistic spectrum"*

"Pupils with special educational needs are generally even more sensitive to the acoustic environment than others. Consequently, required reverberation times are shorter, sound

insulation between adjacent spaces is higher and indoor ambient noise levels (and the capacity for distraction) are lower than in environments for other pupils."

2.14 The proposals will be subject to new-build criteria. These criteria are to be achieved when the rooms are furnished for normal use, but unoccupied.

2.15 All traditional teaching spaces within this scheme have been classed as a teaching space intended specifically for students with special hearing and communication needs.

2.16 BB93 specifies internal ambient noise levels (IANLs) - these are maximum acceptable limits (measured in $L_{Aeq,30minutes}$) for spaces that are completed and furnished, but unoccupied. The IANL figure does not account for noise arising from teaching activities but only from external noise ingress (e.g. road traffic noise) and noise from mechanical services plant. The relevant IANLs for each proposed space are presented below in Table 2.2

Table 2.2: Internal Ambient Noise Levels

Space	Internal ambient noise level ($L_{Aeq,30minutes}$ dB)
Classrooms (including science, music, food technology)	30
Group Room	30
Breakout Room	30
Quiet Study	30
Sensory Room	30
Therapy	30
Fitness Room	40
Common Room	40
Medical Room	40
Staff Workroom	40
Staff Social	40
Office	40
Hygiene Room	40
Corridors	45
Toilet	50

2.17 The values shown are $L_{Aeq,30\ mins}$ internal noise limits from BB93. An additional +5 dB can be allowed for as per guidance in BB93 where the spaces are naturally ventilated.

2.18 If a room's noise level is controlled by a combination of external noise via natural ventilation and mechanical plant, then the mechanical noise must remain at the same stricter limit. The 5dB allowance does not apply when the stricter limit is greater than or equal to 45 dB.

2.19 Unlike mainstream classrooms, rooms intended for students with SEN needs the normal noise limits cannot be exceeded for thermal comfort during the hottest days of the summer period within the school year. Therefore, preventing overheating should be considered in the ventilation strategy.

2.20 Furthermore, 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 with spaces with internal noise criteria up to 40 dB $L_{Aeq,30mins}$.

2.21 Activity noise from students and staff in and out of classrooms, playgrounds etc. are excluded from these internal noise limits, and therefore it is primarily the noise from the surrounding area on to facades which are of interest.

External Areas

2.22 Under Section 2 of the November 2015 advisory guide, advice is provided in respect to external play/teaching areas. In summary it recommends:

- 55 dB $L_{Aeq,30\ minutes}$ - upper limit in unoccupied playgrounds, playing fields etc.
- < 50 dB $L_{Aeq,30\ minutes}$ - at least one area suitable for outdoor teaching activities should be provided that is below this limit.

3.0 Survey Details

3.1 Sharps Redmore visited site on the 31st May and 1st June 2022 to conduct an environmental noise survey. The details and results of these are outlined ahead.

3.2 Measurements were taken by SR to measure existing ambient and background sound levels in order to assess the external façade and set plant noise limits.

3.3 Existing ground-borne vibration is not considered to be a concern on the proposed site, therefore measurements of vibration were not conducted.

3.4 The measurement locations are shown ahead in Figure 3.1.

Figure 3.1: Survey Measurement Locations

3.5 Unmanned measurements to assess the external façade and to set plant noise limits were taken at locations representative of the building facade and the nearest noise sensitive receiver (MP1 and MP2). Measurements made at MP1 and MP2 were made over a 24-hour period. Measurements made at MP1 are façade levels and have been corrected to free field levels.

3.6 There were ongoing construction works on a separate part of the site. Construction noise was audible during the measurement period, therefore the period that the construction works were ongoing have been excluded from the measurements (07:30-17:30 hours). Given the location, it is considered suitable to use the evening period as representative of the daytime period.

3.7 The existing and new building façade will only be assessed during daytime hours, when it is understood that the building will be occupied. Plant noise limits will be set during day time and night time hours to provide flexibility should the plant operate 24 hours a day.

3.8 Measurements were taken using Class 1 Norsonic 118 sound level meters. The equipment was field calibrated before and after the survey and no significant drift was noted. Weather conditions were suitable for the measurement of environmental noise, with low wind speeds and dry conditions.

3.9 A summary of the noise levels measured are provided below in Table 3.1. Graphical results are shown in Appendix C.

Table 3.1: Summary of Survey Results

Location	Logarithmically averaged $L_{Aeq,5\ minutes}$ dB		Typical $L_{A90,5minutes}$ dB		L_{Afmax} Typical dB
	Day* (07:00-23:00)	Night (23:00-07:00)	Day* (07:00-23:00)	Night (23:00-07:00)	Day* (07:00-23:00)
MP1	45	44	42	38	54
MP2	46	45	43	38	60

* with construction noise excluded

3.10 Measurements on the site have been conducted by Hann Tucker Associates previously in November 2016. The survey was undertaken for another development on the site. The reporting is available to publicly view online on the London Borough of Hillingdon website.

3.11 It was considered necessary to undertake new survey work given the time lapsed and the development work that has been undertaken on the site since 2016. The measurements are generally consistent with those measured and reported previously by Hann Tucker Associates.

4.0 Assessment

4.1 This section reviews the acoustic aspects of the proposed scheme in respect to criteria and issues outlined above.

Atmospheric Building Services Noise

4.2 The scheme is expected to include mechanical services plant to some extent. There is the possibility that these will be located;

- In plantrooms
- Mounted onto the roof
- Internally with inlets/outlets around the building façade
- In plant compounds

4.3 Such plant will include appropriate vibration isolation, particularly to control structure borne noise to sensitive spaces within the proposed development itself as appropriate.

4.4 Exact plant locations, specifications and manufacturers noise data is not yet available and therefore a comprehensive mechanical services plant assessment is not possible.

4.5 Based on the noise survey the following noise limits at the nearest noise sensitive receptors are proposed for the scheme. These are rated levels, L_{Ar}, which equates to the typical background noise level, minus 5 dB as per the London Borough of Hillingdon requirements. As such this would result in a likely low impact to neighbours.

Table 4.1: Rated level L_{Ar} at noise sensitive receptors

Time period	Noise limit (L_{Ar} dB) at nearest noise sensitive receptors
07:00-23:00	38
23:00-07:00	33

4.6 A suitably worded condition that enables a scheme to be submitted to demonstrate compliance could be applied by Hillingdon Council to control this in line with other applications within the local authority. An example of which is shown below.

"Prior to use/occupation of the development hereby permitted, details shall be submitted to and approved in writing by the Council, of the external sound level emitted from plant/ machinery/ equipment and mitigation measures as appropriate. The measures shall ensure that the external sound level emitted from plant, machinery/ equipment will be 5dB below the lowest existing background sound level to prevent any adverse impact. The assessment shall be made in accordance with BS 4142:2014+A1:2019 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at design duty. Approved details shall be implemented prior to occupation/use of the development and thereafter be permanently retained.

Reason - To prevent any significant disturbance to residents of nearby properties and comply with development plan policies."

4.7 Depending on the noise level of the installed plant this may require acoustic enclosures or time clocks to reduce the running capacity at night. The requirements of the acoustic attenuation required for the mechanical services plant to achieve the adopted criteria should be assessed as the design develops and as part of a scheme to be submitted.

Noise intrusion

4.8 The external noise levels anticipated on the façade outside of classrooms are not expected to vary significantly with height, and are of the order of 45 dB L_{Aeq}. An open window can provide between 10-12 dB of attenuation, therefore, with the existing external noise levels and the internal noise level criteria that needs to be met, a system of natural ventilation would exceed the criteria outlined earlier, particularly in the teaching areas.

4.9 It is therefore recommended that a hybrid mechanical ventilation system is allowed for in classrooms/teaching areas and natural ventilation through opening windows could be allowed for in ancillary spaces.

4.10 The build-up of the new teaching building is proposed to be a metal framing system with brick outer leaf. Given the existing noise levels on the site, this construction can be accommodated, and plasterboard linings can be allowed for on the inner face as required to meet the internal noise criteria.

4.11 With regard to glazing, it is expected that double glazed window systems will be sufficient to meet the internal noise criteria. Both the specifications for the external wall and the window systems would be confirmed with further design as the scheme develops, however generally the site is able to operate as an education facility without significant noise control measures being applied.

External Areas

4.12 The noise survey results indicate that the existing external noise environment would be suitable for external teaching areas and play areas, and are in line with the guidance provided within BB93.

4.13 The new outside teaching area and play area are generally positioned on the north side of the site, and in an underpass within the proposed building footprint. These proposed areas of the school site are in line with the existing use. It is unreasonable to expect that students will be outside all day, and it is anticipated that students will be outside during regulated hours and supervised accordingly. Given that there is no change of use in this area, the proposals are unlikely to cause any significant impact.

5.0 Conclusions

5.1 Sharps Redmore have assessed the proposed development on the site at Meadow High School, Hillingdon.

5.2 A noise survey has been conducted across the site during the normal hours of use of the school and to account for extended hours of operation for mechanical services plant.

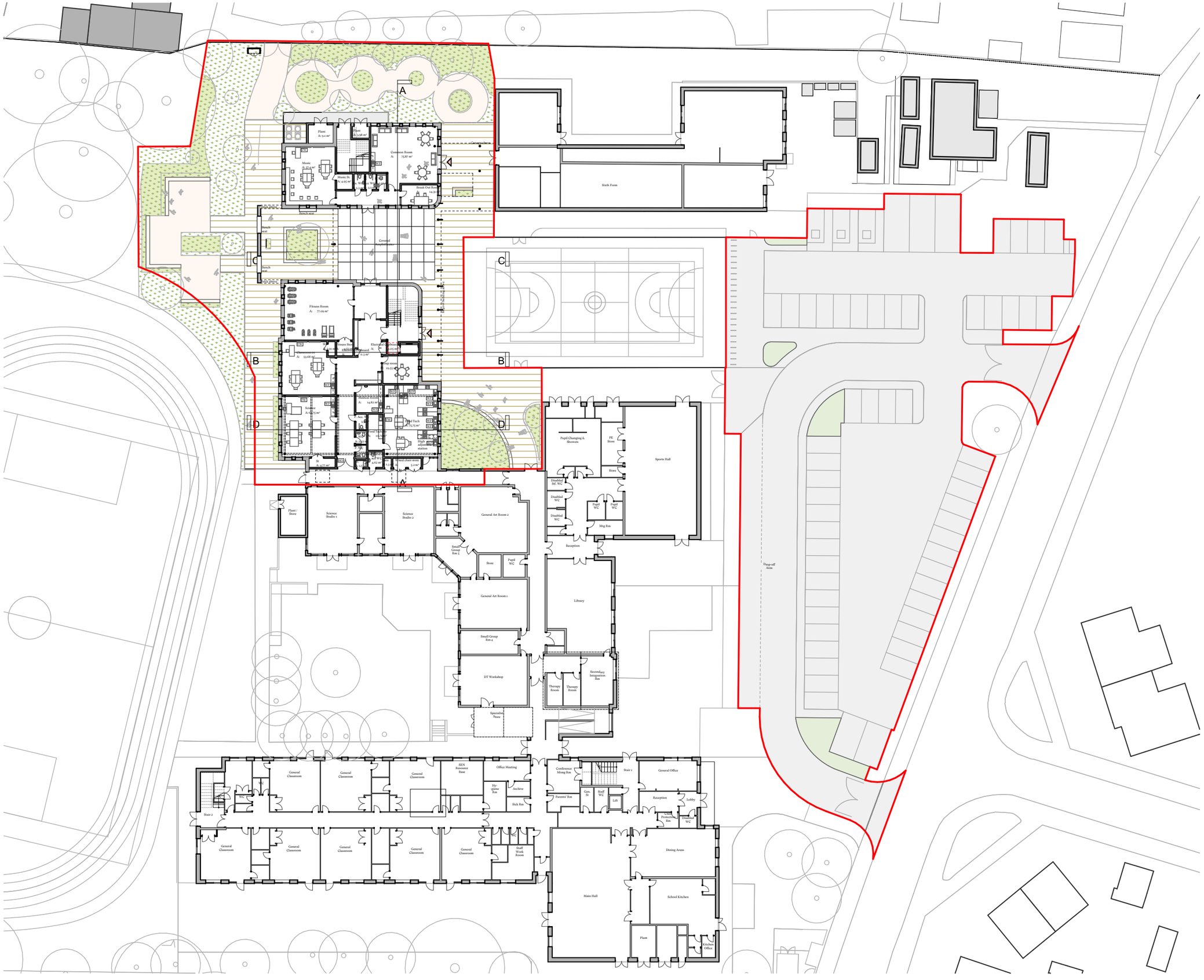
5.3 Noise incident upon the school is mainly from local road traffic. The survey and assessment indicate that a mix of a naturally ventilated and a hybrid ventilated façade would be most suitable for the proposed development to meet the internal noise criteria.

5.4 Overall 'rating' limits are proposed for cumulative atmospheric plant noise emissions based on the requirements of the Local Authority and a BS 4142:2014+A1:2019 assessment approach.

5.5 An assessment has been made of the proposed external play/teaching areas, and concludes that this will not cause a significant impact due to the existing noise levels and existing use.

5.6 The acoustic assessment indicates that the proposed scheme is not likely to give rise to significant impacts on the noise sensitive receivers, and the site can accommodate the proposals without significant noise control measures being required.

Appendix A
Proposed Drawings



Notes:

N

Rev	Date	Issue	Drawn	Check
D	14/10/2022	Design Update	AK	RD
C	10/10/2022	Update for design team	AK	RD
B	09/09/2022	Stage 3 Costing Update	AK	RD
A	25/08/2022	Stage 3 Option Development	AK	RD
--	22/06/2022	Stage 2 Issue		RD
DRA FT	01/06/2022	Stage 2 Issue of Information to QS		

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Client :
London Borough if Hillingdon

Address :
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Date :
22/06/2022

Scale @ A3 :
1:500

Drawing Title :
Proposed Site Plan

Drawing No. :
4267 CDC XX GF DR A (GA) 001

Rev. :
D

Appendix B
Acoustic Terminology

B1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

B2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

B3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

B4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p. Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p.

B5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

B6 The main noise indices in use in the UK are:

- L_{A90}: The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.
- L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.
- L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.
- L_{Amax}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

B7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

L_{AeqT} = SEL + 10 log n - 10 log T dB.

Where

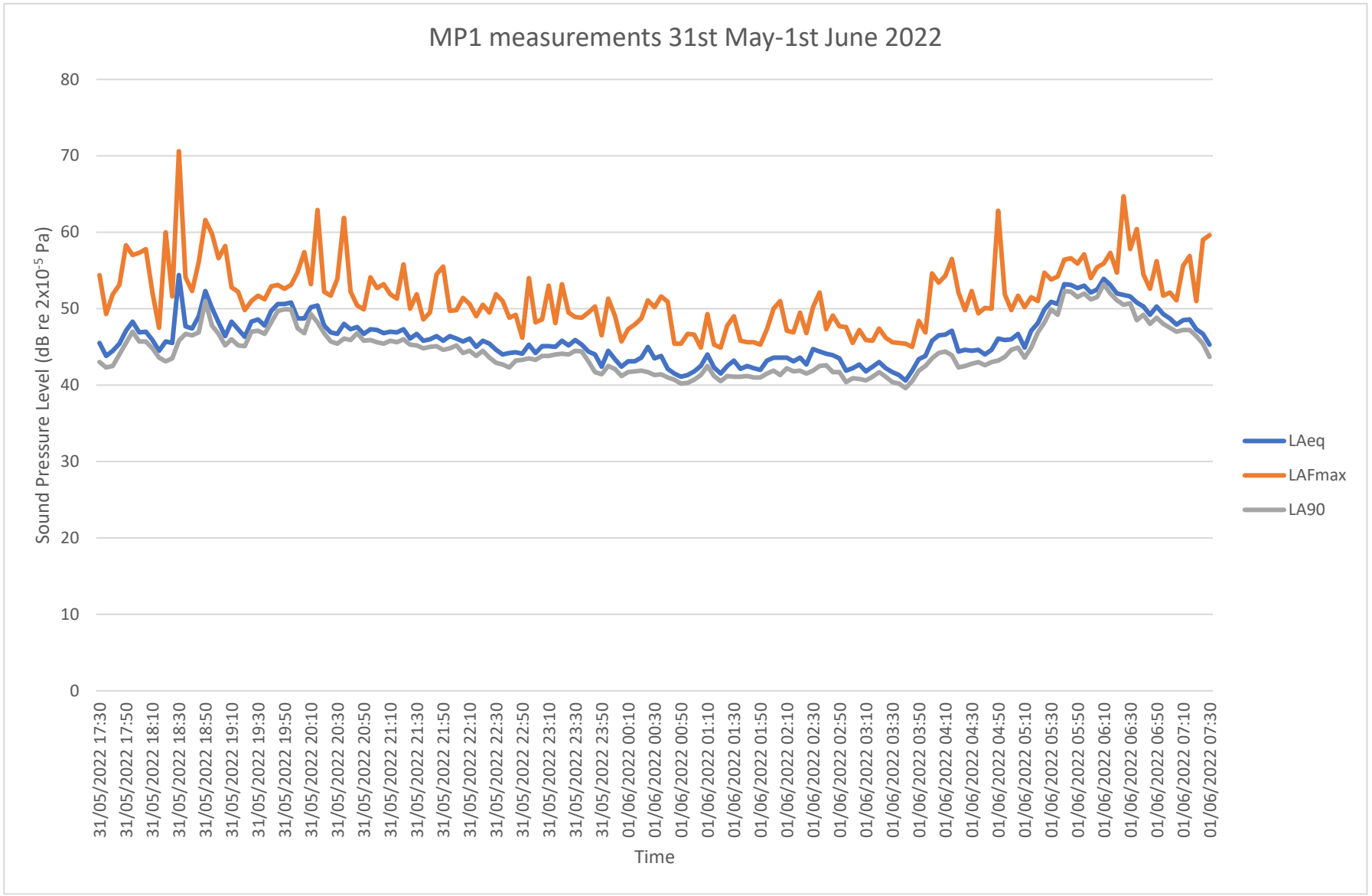
n = Number of events in time period T.

T = Total sample period in seconds.

B8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

60 - 20 Log 160/10 = 60 - 24 = 36 dB

Appendix C
Unattended Noise Survey Measurement Results


MP1 measurements 31st May-1st June 2022
Sound Pressure Level (dB re 2x10-5 Pa)
80
70
60
50
40
30
20
10
0
31/05/2022 17:30
31/05/2022 17:50
31/05/2022 18:10
31/05/2022 18:30
31/05/2022 18:50
31/05/2022 19:10
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01/06/2022 06:10
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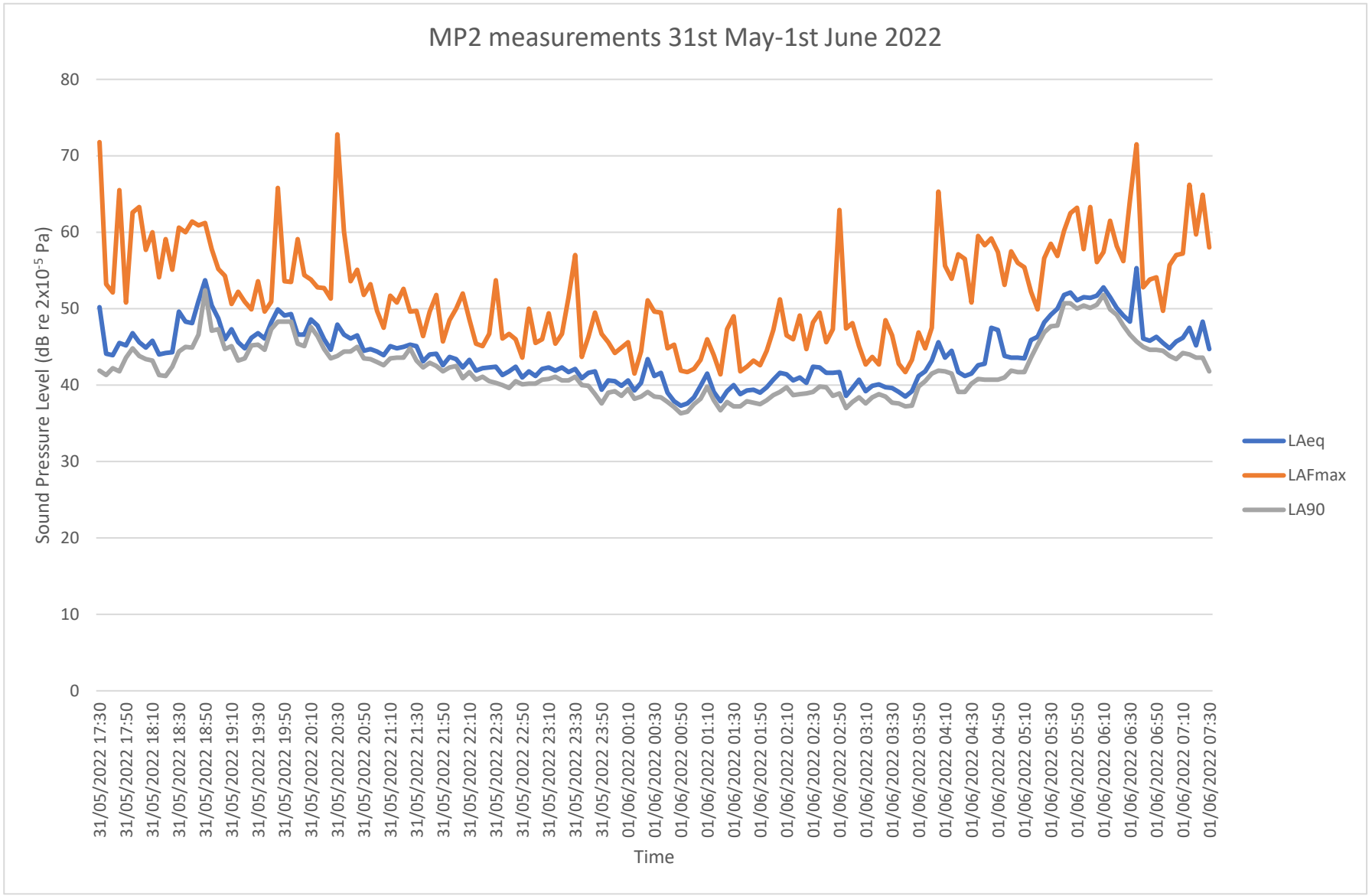
01/06/2022 07:30
Time
LAeq
LAFmax
LA90


MP2 measurements 31st May-1st June 2022
Sound Pressure Level (dB re 2x10-5 Pa)
80
70
60
50
40
30
20
10
0
31/05/2022 17:30
31/05/2022 17:50
31/05/2022 18:10
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Time
LAeq
LAFmax
LA90