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**ST JOSEPH'S
COLLEGE**

**ARTIFICIAL
GRASS PITCHES**

**NOISE IMPACT
ASSESSMENT**

**16 DECEMBER
2019**

1250-AF-00001-01

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NOISE IMPACT ASSESSMENT**

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1. INTRODUCTION

- 1.1.1 St Joseph's College, Reading has commissioned AF Acoustics Ltd. to undertake a noise impact assessment of the artificial grass pitches (AGP), as the college wish to increase the opening time from 19:30 to 21:00.
- 1.1.2 This report presents the results of the baseline noise survey, undertaken to establish the existing noise levels affecting the site. The survey results have been used to assess if noise from the AGP will affect the residents at the nearest residential receptor.

2. SITE DESCRIPTION

2.1 Location

- 2.1.1 St Joseph's College, Reading is located at Upper Redlands Rd, Reading. The site is shown in Figure 2.1 below. The site is in a mainly residential location. The artificial grass pitches are bound to the north by residential properties. To the east are the rear properties of Cardigan Gardens and St William of York, Church. To the west are the main school buildings and to the south is Upper Redlands Road.



FIGURE 2.1: LOCATION MAP

- 2.1.2 It is proposed to extend the opening times of the two southern outdoor pitches from 19:30 until 21:00. The northern AGP will still close at 19:30.

3. GUIDANCE

3.1 Noise Policy Statement for England (NPSE)

- 3.1.1 The Noise Policy Statement for England (March 2010), sets out the long term vision of Government noise policy.
- 3.1.2 The vision of the NPSE is to 'Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development.' This vision is supported by three key aims:
- avoid significant adverse impacts on health and quality of life;
 - mitigate and reduce to a minimum other adverse impacts on health and quality of life; and
 - where possible, contribute to the improvement of health and quality of life.
- 3.1.3 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace (occupational noise).
- 3.1.4 The NPSE had adopted the following concepts, to help consider whether noise is likely to have 'significant adverse' or 'adverse' effects on health and quality of life:

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

- 3.1.5 However, the NPSE goes on to state that:

'it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

3.2 National Planning Policy Framework

- 3.2.1 The Ministry of Housing, Communities and Local Government revised the National Planning Policy Framework (NPPF) in July 2018. This framework updated the previous NPPF released in 2012 which previously replaced most national planning policy, circulars and guidance, including Planning Policy Guidance 24: Planning and Noise.
- 3.2.2 The NPPF defines the Government's planning policy for England and sets out the framework, within which local authorities must prepare their local and neighbourhood plans, reflecting the needs and priorities of their communities. Paragraph 170 of the NPPF requires Local Authorities to develop local policies and make decisions which aim to prevent new and existing development from contributing to, being put at unacceptable risk from, or being

adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

- 3.2.3 Paragraph 180 of the NPPF requires that planning policies 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:

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

- 3.2.4 Paragraph 182 of NPPF introduces the “Agent of Change” principle and states that planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities and that existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

3.3 Professional Practice Guidance on Planning & Noise (ProPG)

- 3.3.1 Professional Practice Guidance on Planning & Noise (ProPG), 2017, was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system. The guidance document encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.
- 3.3.2 The ProPG recommends a 2-stage approach, an initial noise risk assessment of the proposed development site and where the results indicate that noise requires further consideration a full assessment in the form of an Acoustic Design Statement (ADS).
- 3.3.3 The main emphasis of the ProPG is the encouragement of good acoustic design, such as site layout, building massing, orientation and internal layout, at an early stage of the development process. Good acoustic design will reduce the reliance on using the closed windows to ensure suitable internal noise levels and mitigate the impact of noise on external amenity areas such as gardens.

3.4 BS 8233:2014

- 3.4.1 BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ contains a number of design criteria and guideline levels for the protection of new or planned development against external noise. The guidelines are designed to achieve desirable resting/ sleeping conditions in bedrooms and good listening conditions in other rooms. Those criteria which are most relevant to residential environment are reproduced in Table 3.1.

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

TABLE 3.1: DESIGN TARGETS FOR INDOOR AMBIENT NOISE LEVELS

3.4.2 It should also be noted that BS 8233:2014 states that “regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night.” However, no numerical values for internal $L_{Amax,F}$ levels in dwellings are stated within BS 8233.

3.4.3 With regards to external amenity areas, BS 8233 recommends that “it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.” The Standard also states that these guideline values are not always achievable in all circumstances and therefore a compromise between elevated noise levels and the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.5 World Health Organisation Noise Guidelines

3.5.1 The guidelines presented in the World Health Organization (WHO) document reflect conclusions drawn up after consideration of international research evidence on the health effects of exposure to noise. The guidelines define the goal of noise management as ‘to maintain low noise exposures such that human health and well-being are protected’, with ‘specific objectives to develop criteria for the maximum safe exposure levels and to promote noise assessment and control as part of environmental health programmes’.

3.5.2 These WHO guideline values are based on precautionary limits for community noise in specific environments and are reproduced below.

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB L_{AFMAX}
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

TABLE 3.2: WHO COMMUNITY NOISE GUIDELINE VALUES

3.5.3 It should be noted that the above values generally apply to ‘anonymous’ or everyday levels of environmental noise from road traffic, trains and aircraft. Human reaction to tonal and low frequency noise may be underestimated by the dB(A) noise level and hence lower limits may apply.

3.6 Sport England - Artificial Grass Pitch (AGP) Acoustics - Planning Implications New Guidance for 2015 – Design Guidance Note

- 3.6.1 Sports England produced a guidance note for planning implications for artificial Grass pitches to Increase awareness of good design in sports facilities, help key building professions, clients, user representatives and other stakeholders to follow best practice and to encourage well designed sports facilities that meet the needs of sports and are a pleasure to use.
- 3.6.2 The guidance provides details of acoustic implications associated with such facilities and follows on from an acoustic research programme involving detailed analysis of relevant noise guidance documents and site testing in a range of locations. It proposes appropriate noise criteria and assessment methods and outlines practical measures that can be applied to reduce noise in particularly sensitive areas.
- 3.6.3 The guidance sets out that *‘The determining noise criteria for AGPs proximity to residential properties, to avoid moderate annoyance in the daytime and evenings, as set by the World Health Organisation’s ‘Guidelines for Community Noise’: = 50 dB L_{Aeq(1 hour)} upper noise limit external to residential properties and within external living areas.’*
- 3.6.4 Noise levels were measured, by Sports England and published in the design guidance note, during nine sports sessions on three separate AGPs. The sessions included football, hockey and rugby and participation by men, women and children. The purpose was to determine a ‘typical’ noise level generated from a ‘typical’ AGP sports session.

3.7 Possible NOEL, LOAEL and SOAEL Noise Standards

- 3.7.1 It is acknowledged that the NPSE and the Planning Practice Guidance both advise caution when attempting to set objective standards in relation to LOAEL and SOAELs.
- 3.7.2 That said, the guideline values for noise within the WHO documents are set at the level of the lowest adverse health effect (the critical health effect) and as such, the values could form the basis of the LOAEL as referenced in the NPSE and PPG. Targeting the WHO guidelines levels as the LOAEL should, therefore, provide a robust basis for assessment. No levels are provided within the WHO guidance that may be directly applicable to the SOAEL and any such threshold levels will, as indicated in the above guidance, vary depending on the specific circumstances of the development and the noise climate in which it is located. A NOEL would be expected to be a calculated noise level below the WHO guidelines.

4. NOISE SURVEY AND MEASUREMENTS

4.1 Attended Noise Survey

- 4.1.1 An attended noise survey was undertaken by Gerard Finn of AF Acoustics at St Joseph's School, Reading.
- 4.1.2 The duration of the survey was between 19:17 and 21:15 on 2 December 2019. The measurement location was located at the side of 119 Blenheim Gardens, overlooking the artificial grass pitches. This location is considered the nearest residential property to the artificial pitches that wish to alter their opening hours.
- 4.1.3 This measurement location is labelled as ST1 in Figure 4.1. The measured noise levels are considered free-field levels. Measurements were carried out in accordance with the requirements of BS 7445-2:1991 and ISO 1996-2:1987.
- 4.1.4 Initial inspection of the site showed that the noise profile at the ST1 monitoring location was dominated by local road traffic on Upper Redlands Road. A number of youths congregating in the church car park also added occasionally to the measured noise levels.
- 4.1.5 The sound level meter had calibration checks before and after the measurement survey to generate a calibration level of 114 dB at 1 kHz. The equipment calibration was verified before and after the survey and no calibration drift was observed. The microphone was fitted with a windshield.
- 4.1.6 The equipment used is shown in Table 4.1.

Name	Serial Number	Last Calibrated
Norsonic 118 Class 1 Sound Level Meter	31382	February 2018
Norsonic 1206 Pre-amplifier	30416	February 2018
Gras 40AF Microphone	150690	February 2018
Norsonic 1251 Sound Calibrator	30900	March 2019

TABLE 4.1: NOISE MEASUREMENT EQUIPMENT

4.2 Location

4.2.1 The monitoring location is shown below in Figure 4.1.

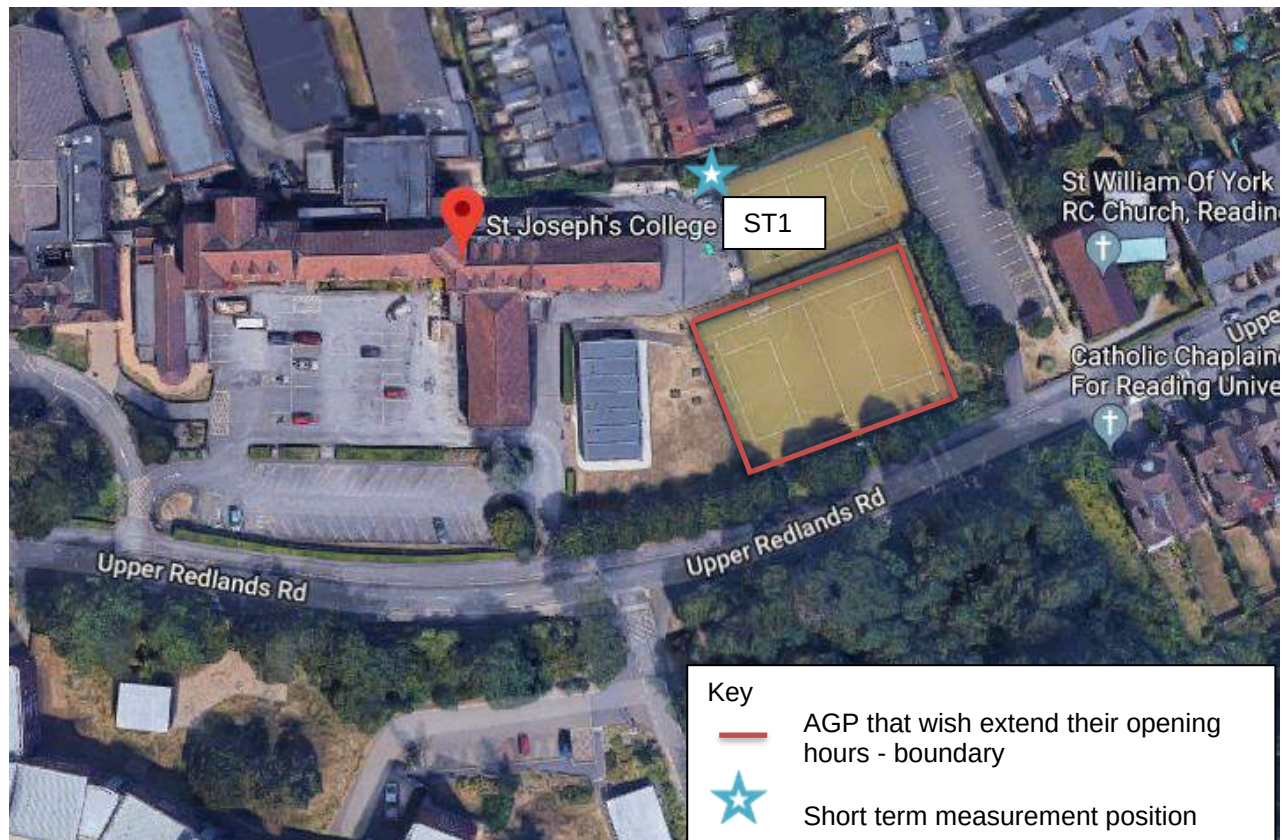


FIGURE 4.1 : NOISE MONITORING LOCATION

4.3 Measurement Weather Conditions

4.3.1 The weather during the unattended noise survey was dry and cold, with the measured temperature 2°C, average wind speeds remained below 3 ms⁻¹.

4.4 Results – Attended

- 4.4.1 A summary of the time-averaged ambient noise levels and background noise level, along with typical maximum noise level are presented in Table 4.2 below. The $L_{Amax,F}$ maximum noise level is the 90th percentile of the measured maximum noise levels. The results of the continuous noise monitoring survey are presented in graphical form in Figure A1 of Appendix A.

Time period	Measured Noise Levels (dB re 2.0 x 10 ⁻⁵ Pa)		
	$L_{Amax,S}$	$L_{Aeq,T}$	$L_{A90,T}$
19:17 – 21:15	61	50	45
19:30 – 21:00	61	50	45

TABLE 4.2: SUMMARY OF UNATTENDED NOISE MEASUREMENTS

5. SITE SUITABILITY ASSESSMENT

5.1 External Noise Levels

- 5.1.1 Noise levels were measured, by Sports England and published in the design guidance note, during nine sports sessions on three separate AGPs. The sessions included football, hockey and rugby and participation by men, women and children. The purpose was to determine a 'typical' noise level generated from a 'typical' AGP sports session.
- 5.1.2 Noise level measurements were taken at a distance of 10 metres behind the mid-way points along goal lines and sidelines. They were found to be highest behind the sideline halfway line.
- 5.1.3 The most significant noise levels were found to be generally derived from the voices of players, with the exception of hockey where impact noises of balls hitting perimeter strike boards and goal backboards were more noticeable. Such impact noises can be mitigated by incorporating shock absorbing noise reduction measures. Assuming such mitigation measures, the most significant noise source from typical AGP sports sessions is, therefore, voice and as such, a typical noise level can be determined.
- 5.1.4 From the measurement data presented by Sport England, a typical free-field noise level of 58 dB $L_{Aeq(1 \text{ hour})}$ at a distance of 10 metres (m) from the sideline halfway marking has been determined as representative for noise from an AGP. The Plan of noise levels presented by Sport England is shown in Figure A2 of Appendix A.
- 5.1.5 The nearest property at 119 Blenheim Gardens is 56 m from the AGP that the college wish to increase their opening times.
- 5.1.6 In accordance with the Sport England Artificial Grass Pitch (AGP) Acoustics - Planning Implications New Guidance for 2015 – Design Guidance Note the noise levels from the AGP would be 45 dB $L_{Aeq(1 \text{ hour})}$. As there are two pitches adjacent to each other, 3dB should be added to account for the potential doubling of noise levels. This is considered a worst-case scenario. Therefore the calculated noise level from the AGPs would be 48 dB $L_{Aeq(1 \text{ hour})}$.
- 5.1.7 Sport England Design Guidance note states *'The determining noise criteria for AGPs proximity to residential properties, to avoid moderate annoyance in the daytime and evenings, as set by the World Health Organisation's 'Guidelines for Community Noise': = 50 dB $L_{Aeq(1 \text{ hour})}$ upper noise limit external to residential properties and within external living areas.'*
- 5.1.8 The calculated noise levels are below the World Health Organisation's 'Guidelines for Community Noise' of 50 dB $L_{Aeq(1 \text{ hour})}$ and are 2 dB below the measured noise levels measured outside 119 Blenheim Gardens.
- 5.1.9 Based on a 15 decibel sound reduction of a partially open window, the noise level inside the nearest residential living room receptor at 119 Blenheim Gardens would be expected to be 33 dB $L_{Aeq,T}$. This predicted noise level is below the design target for indoor ambient noise levels as set out in BS8233 and the WHO community guideline values.
- 5.1.10 Based on the predicted noise levels at the nearest residential receptor, it is expected that noise from the AGP can be classed as a NOEL *'Where 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.'*

6. CONCLUSION

- 6.1.1 St Joseph's College, Reading has commissioned AF Acoustics Ltd. to undertake a noise impact assessment of the artificial grass pitches, as the college wish to increase the opening time from 19:30 to 21:00.
- 6.1.2 This report presents the results of the baseline noise survey, undertaken to establish the existing noise levels affecting the site. The survey results have been used to assess, in conjunction with Sport England guidance, if noise from the AGP will affect the residents at the nearest residential receptor.
- 6.1.3 Based on the measured noise levels and the predicted noise levels from the AGP, based on the guidance from Sport England have been calculated.
- 6.1.4 The calculated noise levels are below the World Health Organisation's 'Guidelines for Community Noise' of 50 dB $L_{Aeq(1 \text{ hour})}$ and are 2 dB below the measured noise levels measured outside 119 Blenheim Gardens.
- 6.1.5 The noise level inside the nearest residential living room receptor at 119 Blenheim Gardens would be expected to be 33 dB $L_{Aeq,T}$. This predicted noise level is below the design target for indoor ambient noise levels as set out in BS8233 and the WHO community guideline values.
- 6.1.6 Based on the predicted noise levels at the nearest residential receptor, it is expected that noise from the AGP can be classed as a NOEL *'Where 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.'*
- 6.1.7 The limitations to this report are presented in Appendix C.

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APPENDIX A: FIGURES

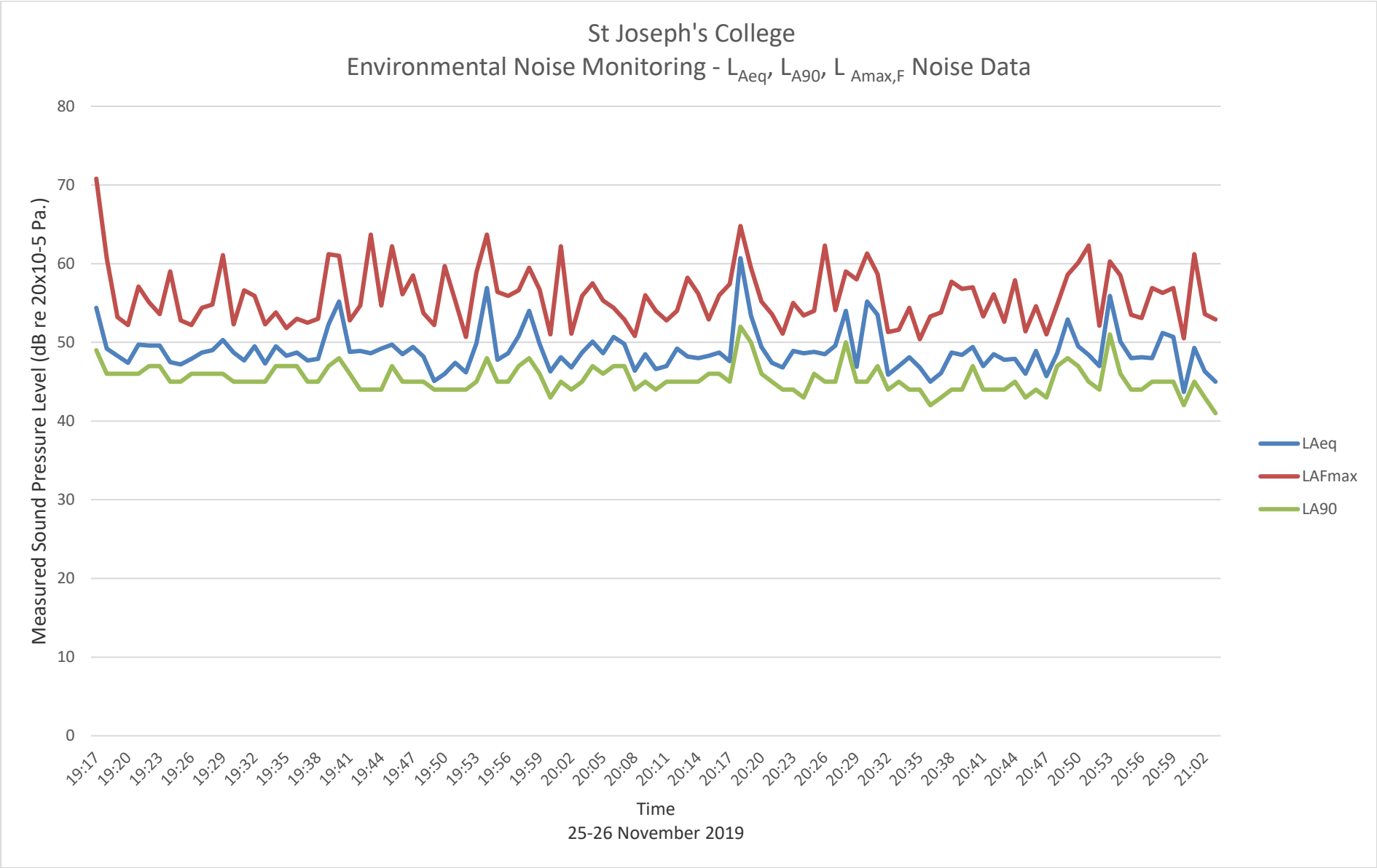


FIGURE A1: NOISE MEASUREMENT RESULTS LT1

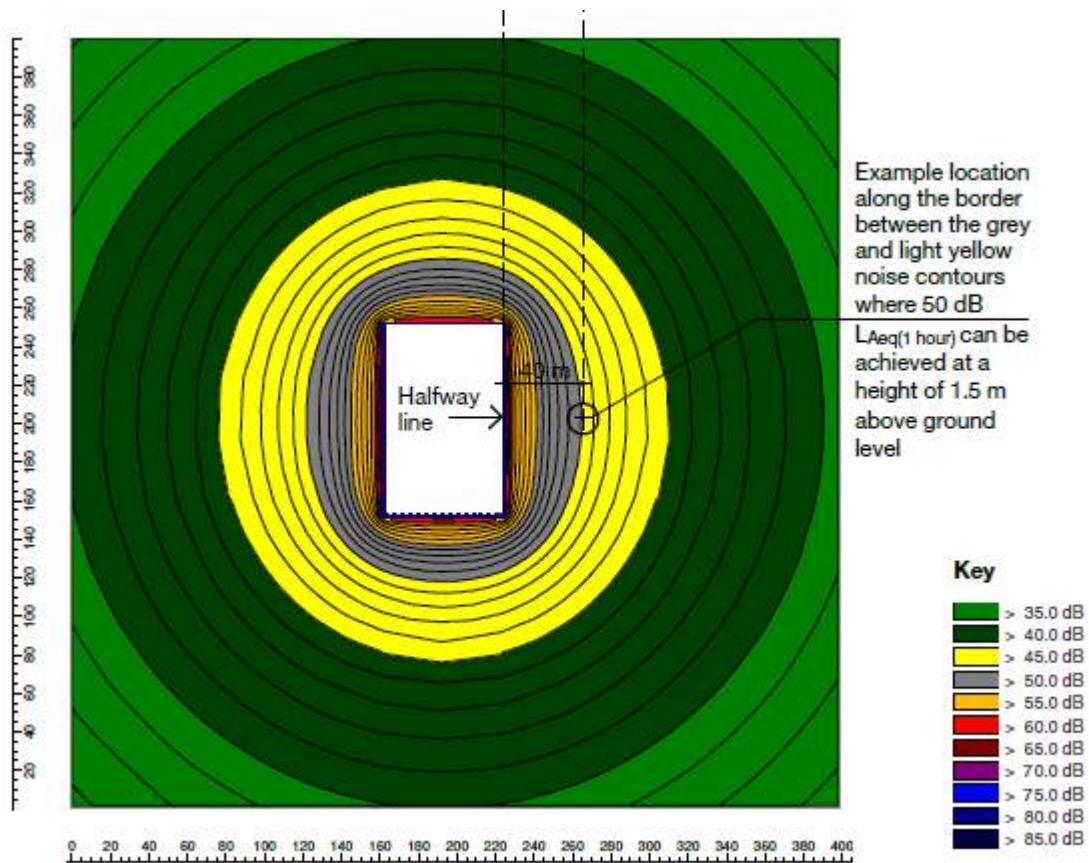


FIGURE A2: PLAN OF TYPICAL NOISE CONTOURS FOR AN AGP IN AN OPEN AREA MEASURED AT A HEIGHT OF 1.5 M ABOVE GROUND LEVEL

APPENDIX B: TERMINOLOGY RELATING TO NOISE

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale.
Sound Power Level (L_w)	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).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Specific Noise	The noise source under investigation for assessing the likelihood of complaints.
Rating Level	The specific noise level plus any adjustment for the characteristic features of the noise.
Free field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX C: LIMITATIONS TO THE REPORT

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of AF Acoustics Ltd. AF Acoustics Ltd accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/or AF Acoustics Ltd and agree to indemnify AF Acoustics Ltd for any and all loss or damage resulting therefrom. AF Acoustics Ltd accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations AF Acoustics Ltd reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.