ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Proposed PlayZone
Unity Community Primary School

Reference: 11299/GK

Client & Architect
LABOSPORT GROUP

Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

Labosport appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment for the proposed PlayZone to be located at Unity Community Primary School, Allesley Drive, Manchester, M7 4YE.

This report identifies relevant planning and assessment criteria in the National Planning Policy (NPPF), Noise Policy Statement for England (NPSE), Planning Practice Guidance (PPG) and World Health Organisation 'Guidelines for Community Noise' (WHO 1999).

The assessment includes the prediction of noise emission from the PlayZone at the nearby noise-sensitive properties, based on noise level data from activities measured at existing AGPs.

2. The Site

The site is to be located within grounds associated with Unity Community Primary School. The nearest noise-sensitive receivers (NSRs) are approximately 20 metres away to the north east along Barrow Hill Road. There are also NSRs located to the west along Allesley Drive and to the southeast further along Barrow Hill Road.

The proposed hours of use are to be from 08:00 hours to 21:00 hours on Monday to Sunday.

The site and proposed PlayZone location can be seen on the figure below:

Figure 1: Proposed Site Plan with PlayZone Marked in Red and NSRs Marked in Blue

3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in December 2024. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 187 states:

"187. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and."

Paragraph 198 states:

"198. 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. "

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise and refers you to the NPSE.

3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise 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."*

The NPSE introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied as follows:

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 the 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.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits.

The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. Planning Practice Guidance, Noise

The Planning Practice Guidance (PPG) on noise referred to here is based on the current version (January 2019) as provided on the Planning Guidance Website. It states that, *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the PPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:

Table 1: PPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	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 and 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

The table does not provide any objective assessment which equates to the noted effect levels. However, the PPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people are based primarily on the level of noise.

4. Relevant Noise Guidance for AGP Assessment

There is no definitive guidance for a PlayZone site where activities can range from social games to exercise or small group sport.

The following sections outline what we consider to be relevant guidance and suitable noise criteria within the context of the planning policy.

This includes advice contained within the Sport England Design Guidance Note 'Artificial Grass Pitch (AGP) Acoustics – Planning Implications' which refers to the following documents.

4.1. World Health Organisation 'Guidelines for Community Noise'

The World Health Organisation 'Guidelines for Community Noise' published in 1999 gives the following description of community noise.

"Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.); from live or recorded music; sport events including motor sports; playgrounds; car parks; and domestic animals such as barking dogs."

This includes "sport events" and, as such, the use of AGP sites.

For noise levels internally and externally to dwellings it states:

"In Dwellings. The effect of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 LAeq for continuous noise and 45 LAmax for single sound events. Lower noise levels may be disturbing depending on the nature of the noise source. At night-time, outside sound levels about 1 metre from façades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedrooms open. This value was obtained by assuming the noise reduction from outside to inside with the window open is 15 dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB LAeq. The maximum sound pressure level should be measured with the sound pressure meter set at "fast"."

Based on the same methodology used to determine the night-time noise level (with a 15 dB(A) for an open window) outside a residential property, the daytime noise level about 1 metre from façades of living spaces should not exceed 50 dB LAeq.

Table 4.1 of the document provides guidelines for community noise in specific environments, suggesting noise levels at which adverse health and annoyance effects are likely. The relevant noise criteria are as follows:

Table 2: WHO Noise Criteria

Specific Environment	Critical Health Effect	$L_{eq(T)}$ dB(A)
Outdoor living area	Serious annoyance, daytime and evening	55
	Moderate annoyance, daytime and evening	50
Dwelling indoors	Speech intelligibility & moderate annoyance, daytime & evening	35

According to the WHO guidance, moderate annoyance is caused by noise levels exceeding 50 $L_{Aeq(T)}$ dB externally and 35 $L_{Aeq(T)}$ dB internally. With relation to the adverse effect level, we would consider this the threshold of the Lowest Observed Adverse Effect Level.

Therefore, where noise levels from the proposed development do not exceed 50 $L_{Aeq(T)}$ dB externally and 35 $L_{Aeq(T)}$ dB internally, the effect is below the Lowest Observed Adverse Effect Level and will have no adverse effect. The noise level of the AGP may be noticeable but not intrusive and is considered acceptable in planning terms.

The equivalent noise level is determined over a specific time period. The World Health Organisation guidelines for residential developments are typically equivalent noise levels calculated over a 16-hour daytime period.

In our opinion, an AGP 16-hour assessment period may not truly reflect the noise impact as it takes into account times of use and non-use. We would propose an alternative, more stringent but appropriate assessment time period of one hour, $L_{Aeq\ (1\ hour)}$, as this is the typical time period for a community sports session on an AGP. Therefore, we would suggest the more stringent target noise level of 50 dB $L_{Aeq\ (1\ hour)}$ is more suitable for the more sensitive evening time.

The WHO criteria were reviewed in a report by the National Physical Laboratory (reference CMAM16) which states:

"Exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached."

Therefore, it is not necessarily the case that where these levels are exceeded the noise will adversely affect nearby residential properties.

4.2. Transient Sounds

To assess noise from short-term sources, we have considered separately the noise from shouts, whistles and the impact of balls on the perimeter fence. There is no specific guidance for the maximum noise level of environmental noise during the daytime and, as such, we have taken a pragmatic approach in considering the most appropriate available guidance.

By assessing both the equivalent noise level for continuous use of the PlayZone and the maximum noise level of discrete events, we consider that this addresses the character of the noise.

4.3. Proposed Assessment Methodology

The aim of the assessment is to determine whether noise from the proposed pitch can be controlled to acceptable levels during the proposed hours of use.

It is proposed to assess the development against the WHO guidelines. Where the predicted noise level of the PlayZone is below the WHO guidelines threshold for the onset of 'moderate annoyance', in terms of the PPG, the development will have 'no observed adverse effect'.

Where noise from the PlayZone exceeds the WHO guidelines but does not exceed the existing noise climate, the increase in the ambient noise climate will be no more than 3 decibels and have a negligible impact.

The above impact is expected to have no observed effect on nearby residential properties. The PPG states that the perception of 'No Observed Adverse Effect' is 'present and not intrusive' and gives an example outcome as follows:

"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".

The 'No Observed Adverse Effect' level falls below the Lowest Observed Adverse Effect Level of the PPG.

It is also considered necessary to consider the maximum noise levels generated by the use. However, there is no directly appropriate criteria for daytime maximum noise levels and as such we provide this information and assessment for consideration by the Local Planning Authority.

5. Noise Levels of Pitch Use

The Mini-Pitch pitch size and layout is new and therefore it is not possible to determine noise levels from direct measurements of existing pitches. The following information collates data gathered from similar types of pitches and uses and determines likely noise emission levels from this facility.

5.1. **AGP Noise Levels**

An AGP (artificial grass pitch) is a full-size rugby, football or hockey pitch with artificial grass surrounded by a runoff area and weld mesh fencing around the perimeter.

Noise levels were measured at nine sports sessions on four separate AGPs. The measurements included football, hockey and rugby, with men, women and children participating in different sessions. The purpose of the measurements was to determine a 'typical' noise level for an AGP sports session.

Measurements were undertaken behind the goal line and to the side-line at the halfway line. It was found that noise levels at the halfway line were generally higher than behind the goal.

Noise levels from sporting activity were generally determined by people's voices. This is except for hockey where the balls hitting the backboard of the goal and perimeter boards of the pitch are the main noise sources. The mini pitch is primarily for football and is not considered suitable for hockey.

From the measurement data, a typical free-field noise level of 58 dB $L_{Aeq\ (1\ hour)}$ at a distance of 10 metres from the side-line at the halfway line has been determined as representative for noise from an AGP. The following table summarises the measurement data undertaken.

Table 3: Summary of Measured Noise Levels

Monitoring Session	AGP Activity	Measured Noise Level, $L_{Aeq\ (1\ hour)}$ dB
1	Rugby training on one half of the pitch with approximately 20 players and football training on the other half with approximately 20 players.	60
1	8-a-side training match on one half of the pitch only with the other half unused.	56
1	Football training for a single club of approximately 22 players. The start of the session involved heading drills before the full pitch was used to play an 11-a-side game.	56
1	Ladies Hockey Club training involving stick drills, passing etc, with multiple balls per team and therefore a lot of impact noise from stick on ball. Approximately 30 players on the pitch.	56
1	Ladies Hockey Club undertaking defence/attack drills on different halves of the pitch. Single ball used per team with less stick-on-ball impacts than previous training. Approximately 30 players on the pitch.	58
1	Men's 6-a-side social football match using half the pitch and hockey goals (12 players).	51
2	Under-16 football training with the pitch divided into four quarters and a total of approximately 50 players.	58 *
2	Two adult football games using half the pitch each with a total of 28 players.	56 *
2	Two 8-a-side adult football games using half the pitch each with a total of 32 players.	56 *

*During these measurements, noise levels were measured 10 metres from the halfway line (stated noise level) and 10 metres behind the goal line. The measured noise levels behind the goal line were at least 15 decibels lower than those measured at the halfway line.

The following sections provide information on the measurements undertaken to determine the typical AGP noise levels stated above.

5.1.1. Noise Monitoring Session 1 – 18th February 2014

Measurements were undertaken at two AGP pitches at Coombe Dingle Sports Complex in Bristol. The complex is owned and operated by the University of Bristol. The complex has one sand dressed pitch and a newer synthetic pitch.

Noise measurements were undertaken using CEL and B&K sound level meters. The equipment information and calibration status is as follows:

Table 4: Measurement Equipment – session 1

Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
Real Time Analyser, B & K Type 2250-A	3000994	12/03/13	K017112
Pre-Amplifier, B & K , Type ZC0032	14611	12/03/13	K017112
Microphone, B & K, Type 4189	2638388	12/03/13	K017112
Calibrator, B&K Type 4231	1934013	12/03/13	K017111
Real Time Analyser, CEL, Type 593	100972	17/06/2013	K031407
Pre-Amplifier, CEL, Type 527	3/0232063	17/06/2013	K031407
Microphone, GRAS 40AE	34509	17/06/2013	K031407
Calibrator, CEL, Type 284/2	5819051	17/06/2013	K031408

During the noise monitoring the conditions were calm, dry and overcast with an air temperature of 7 degrees centigrade. The conditions were considered suitable for noise monitoring.

Measurements of the synthetic pitch were undertaken at monitoring location 'A' 10 metres from the edge of the pitch on a slightly raised bund. The monitoring location had a full view of the pitch.

Measurements of the sand-based pitch were undertaken at monitoring location 'B' 10 metres from the edge of the pitch on a slightly raised bund. The monitoring location had a full view of the pitch.

After the monitoring session, when there was no use of the pitch a five-minute ambient noise measurement was undertaken, this was due to distant road traffic on the M5 to the south west.

The monitoring locations and pitches are shown below. The monitoring locations were selected to reduce, as far as feasible, noise contributions from the other pitch.

Figure 2: Monitoring Location Site Plan – session 1

The activities that took place during the monitoring session on each pitch are as follows:

Synthetic AGP

19:00 hours to 20:00 hours

Clifton Hockey Club Ladies First Team. For first 30 minutes exercise and running drills without sticks or balls. The most significant noise was from player's voices but some extraneous noise from the other pitch (rugby and football training) was observed. Approximately 15 players on the pitch.

The second 30 minutes of the session involved the first team on one half and the third team on the other. The activities involved stick drills, passing etc, with multiple balls per team and therefore a lot of impact noise from stick on ball. Approximately 30 players on the pitch.

20:00 hours to 21:00 hours

Clifton Hockey Club Ladies first and third teams (approximately 30 players) undertaking defence/attack drills on different halves of the pitch. Single ball used per team so less stick-on-ball impacts than previous training.

21:00 hours to 22:00 hours

Men's 6-a-side social football match using half the pitch and hockey goals. It was observed that noise from the other pitch during this session was significant at the monitoring location.

Sand-Dressed Pitch

19:00 hours to 20:00 hours

Rugby training on one half of the pitch with approximately 20 players and football training on the other half with approximately 20 players.

20:00 hours to 21:00 hours

8-a-side training match on one half of the pitch only with the other half unused.

21:00 hours to 22:00 hours

Football training for a single club of approximately 22 players. The start of the session involved heading drills before the full pitch was used to play an 11-a-side game.

Noise measurements were undertaken at monitoring locations 'A' and 'B'; the measured noise levels have been corrected for ambient noise determined from the noise measurements undertaken after the pitches were in use.

The pitch noise levels are as follows:

Table 5: Measured Noise Levels

Session Period	Synthetic pitch Location 'B'		Sand dressed pitch Location 'A'	
	$L_{Aeq\ (1\ hour)}$	$L_{Amax\ (fast)}$	$L_{Aeq\ (1\ hour)}$	$L_{Amax\ (fast)}$
19:00 to 20:00 hours	56	83	60	78
20:00 to 21:00 hours	58	86	56	82
21:00 hours to 22:00 hours	51	78	56	78

5.1.2. Noise Monitoring Session 2 – 5th March 2014

Measurements were undertaken at a 3G AGP pitch at Clifton College Sports Ground on the outskirts of Bristol. The complex has a number of artificial pitches, the newest one being the 3G pitch on which monitoring took place.

Noise measurements were undertaken using Svantek and B&K sound level meters. The equipment information and calibration status is as follows:

Table 6: Measurement Equipment – session 2

Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
Real Time Analyser, B & K Type 2250-A	3000994	12/03/13	K017112
Pre-Amplifier, B & K , Type ZC0032	14611	12/03/13	K017112
Microphone, B & K, Type 4189	2638388	12/03/13	K017112
Calibrator, B&K Type 4231	1934013	12/03/13	K017111
Sound Level Meter, Svantek 959	14784	08/04/13	K0200009
Calibrator, CEL, Type 110	045169	08/04/13	K020983
Microphone, GRAS 40AE	98073	08/04/13	K0200009

During the noise monitoring the conditions were calm, dry and overcast with an air temperature of 8 degrees centigrade. The conditions were considered suitable for noise monitoring.

Measurements of the pitch were undertaken at monitoring location 'A' 10 metres behind the goal line of the pitch and monitoring location 'B' 10 metres from the halfway line of the pitch. The monitoring locations had a full view of the pitch.
The monitoring locations are shown below.

Figure 3: Monitoring Location Site Plan – session 2

The activities that took place during the monitoring session are as follows:

18:00 hours to 19:00 hours

Under-16 football training with the pitch divided into four quarters and a total of approximately 50 players.

19:00 hours to 20:00 hours

Two adult football games using half the pitch each with a total of 28 players.

20:00 hours to 21:00 hours

Two 8-a-side adult football games using half the pitch each with a total of 32 players.

Noise measurements were undertaken at monitoring locations 'A' and 'B'; the pitch noise levels are as follows:

Table 7: Measured Noise Levels

Session Period	Monitoring location 'A' Behind Goal Line		Monitoring location 'B' On Halfway Line	
	$L_{Aeq(1\ hour)}$	$L_{Amax(fast)}$	$L_{Aeq(1\ hour)}$	$L_{Amax(fast)}$
18:00 to 19:00 hours	42 dB	71 dB	58 dB	82 dB
19:00 to 20:00 hours	39 dB	71 dB	56 dB	76 dB
20:00 to 21:00 hours	39 dB	65 dB	56 dB	85 dB

5.2. Noise from Small Pitch Sports Use

To determine noise levels from small pitch games measurements of a P.E. Secondary School session were undertaken at Khalsa Academy in Berkshire on 18th October 2017. The purpose of the survey was to measure noise from the use of a sports pitch.

The site noise survey was undertaken general following the guidance of BS7445-1. Measurements were undertaken using a Type 1 sound level meter. The equipment and calibration status is as follows:

Table 8: Sound Monitoring Equipment

Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
NTI XL2 Sound Level Meter	A2A-11053-E0	10/03/2016	42439
NTI MA220 Pre-Amp	5871	10/03/2016	42439
NTI Microphone Capsule	9276	10/03/2016	42439
Larson Davis Calibrator CAL200	12605	--	--

The equipment was checked before and after use with the calibrator and no drift was detected.

During the site noise survey the weather conditions were overcast and calm with an air temperature of approximately 14 degrees Celsius. It was raining prior to the survey and the ground was damp during the measurements. The conditions are considered suitable for environmental noise monitoring and are not expected to have adversely affected the measured noise levels.

To determine the noise generated by a single pitch noise monitoring was undertaken at a distance of 10 metres from the sideline at the halfway line.

During the noise survey two sports sessions were measured, these were both netball games and training on the hard standing courts of netball court dimensions. The main source of noise from these activities was from the voices of pupils and teachers.

The following table gives the measured noise level over the monitoring period for both measured sessions.

Table 9: Measured Noise Levels

Monitoring Session	**Equivalent Noise Level $L_{Aeq,T}$ (dB)**	**Maximum Noise Level $L_{AF,max}$ (dB)**
1	61	81
2	59	79

5.3. Noise Monitoring Session 3 – 18th July 2023

Measurements were undertaken at a basketball court in Victoria Park, Bristol.

Noise measurements were undertaken using NTi sound level meters. The equipment information and calibration status is as follows:

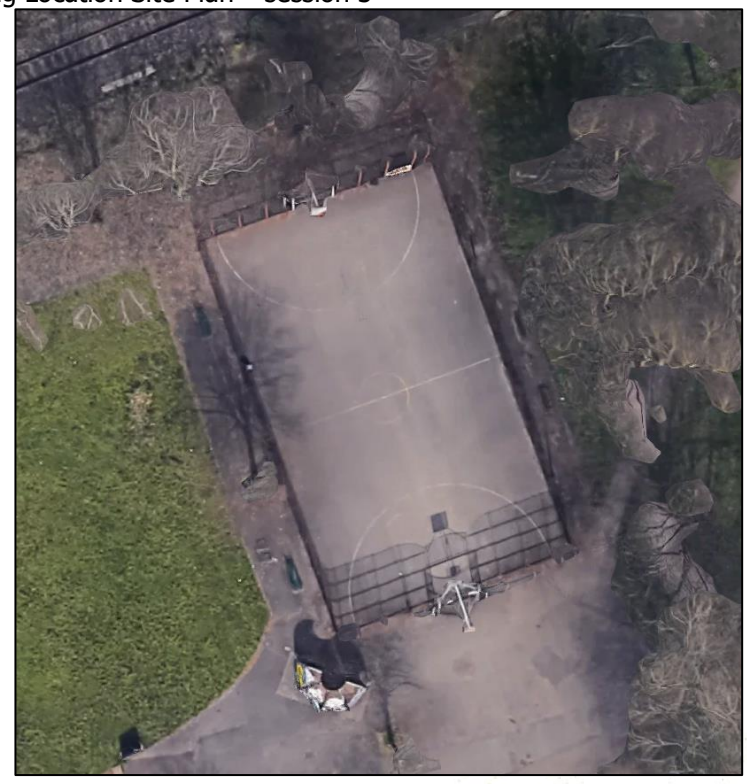
Table 10: Measurement Equipment – session 3

Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-11041-E0	07/07/2023	44799
Pre-Amp, NTI, MA220	1822	07/07/2023	44799
Microphone, NTI, MC230	9583	07/07/2023	44799
Calibrator, Larson Davis, CAL200	18273	30/01/2023	43115
SLM, NTI, XL2	A2A-13617-E0	30/03/2022	40614
Pre-Amp, NTI, MA220	7727	30/03/2022	40614
Microphone, NTI, MC230A	A16151	30/03/2022	40613
Calibrator, Larson Davis, CAL200	12605	07/07/2023	44797

During the noise monitoring the conditions were calm, dry and overcast with an air temperature of 21 degrees centigrade. The conditions were considered suitable for noise monitoring.

Sound level meters were placed 10m from the centre of the court on the halfway line and 10m behind the net.

Figure 4: Monitoring Location Site Plan – session 3



Measured Noise Levels

Noise measurements were undertaken at monitoring locations 'A' and 'B'; the pitch noise levels are as follows:

Table 11: Measured Noise Levels

Monitoring location 'A' Behind Hoop		**Monitoring location 'B' At Halfway**	
$L_{Aeq(1\ hour)}$	**$L_{Amax(fast)}$**	**$L_{Aeq(1\ hour)}$**	**$L_{Amax(fast)}$**
54 dB	73 dB	55 dB	77 dB

6. Noise Modelling Methodology

The measured AGP noise emission data has been used to generate a noise map of the site, in order to predict the noise level at the nearby noise-sensitive residential properties.

The modelling has been undertaken using noise mapping software CadnaA by DataKustik. This uses the calculation method of ISO 9613 to predict noise levels.

The assessment is based on the noise modelling methodology using an area source covering the playing surface as the noise source. The area source is at a height of 1.5 metres representative of head height.

To validate the modelling methodology, we have created a noise map of one of the sites where AGP noise was measured (Coombe Dingle in Bristol). The noise map in Figure 5 shows the noise propagation of an area source created from 30 moving point sources. The second noise map in Figure 6 shows the noise propagation of 30 individual point sources spread across the playing surface.

Figure 5: Noise Model Using an Area Source

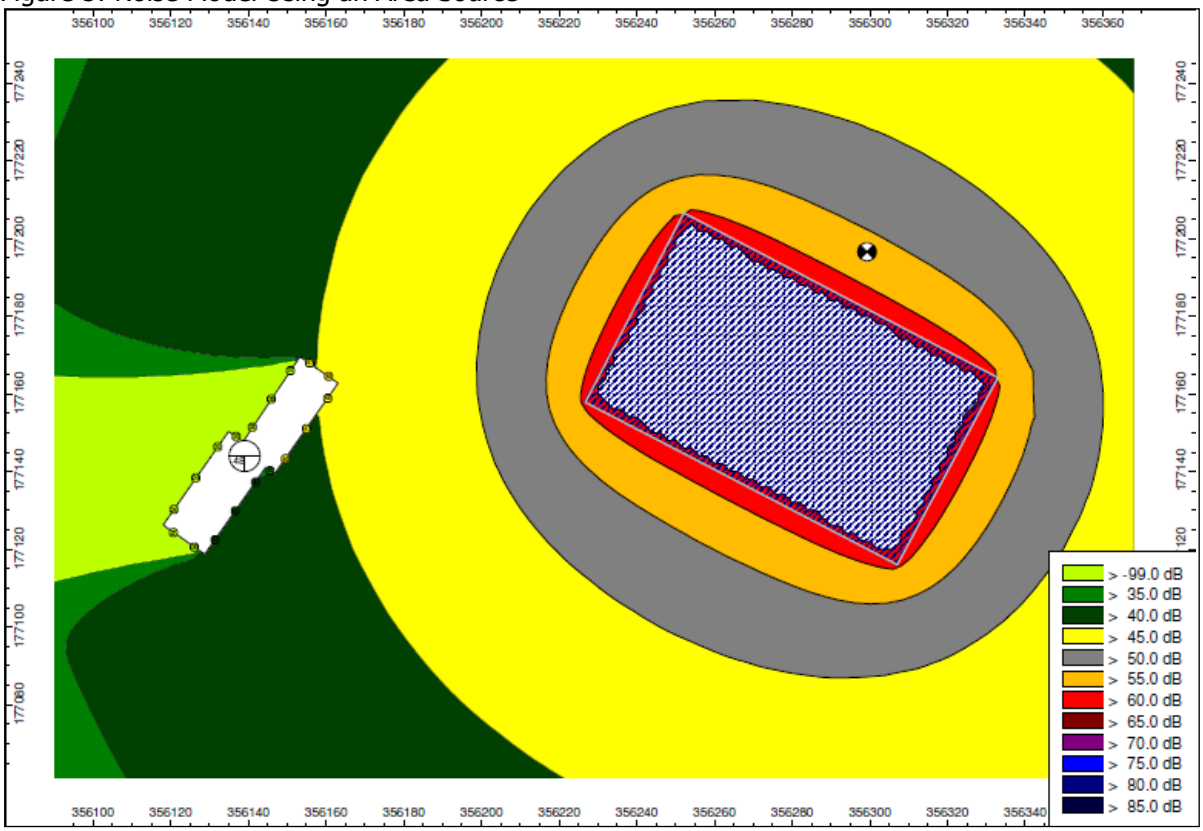
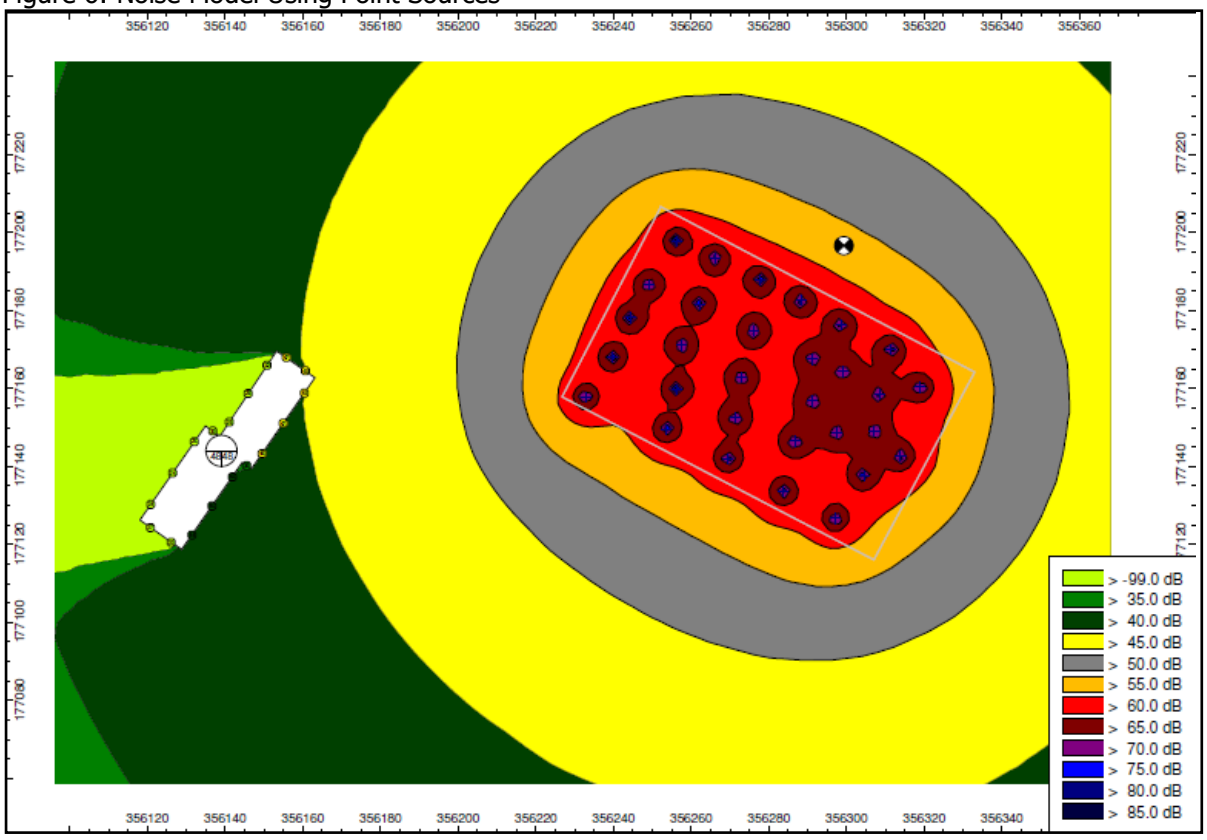


Figure 6: Noise Model Using Point Sources



As can be seen from the two maps, there is no significant difference in the noise propagation and as such, it is our opinion that an area source is suitable for noise modelling of AGPs.

7. PlayZone Noise Emission Prediction

7.1. Noise Modelling Parameters

A noise model has been generated of the development site. The PlayZone location and surrounding area has been determined from the provided drawings.

The surrounding area has been determined from Google Maps imagery.

The buildings in the vicinity of the proposals have been built within the model. The height of these buildings has been determined via Google Maps imagery.

The noise from an PlayZone is primarily from voice. The noise source is at a height of 1.5 metres above the ground (approximately head height).

The noise level from PlayZone use is determined to be 58 dB $L_{Aeq,\ 1\ hour}$ at 10 metres.

Third-order reflections are calculated.

The variation in topography is determined to be flat from Google Maps.

Any sound reduction provided by boundary fences is not considered in the modelling as it cannot be demonstrated that the construction complies with the requirements of ISO 9613.

The noise map in the figure below shows noise emission from the proposed PlayZone at ground floor level (1.5 metres above the ground), which is typical of a 'daytime' habitable room in a house and external amenity areas.

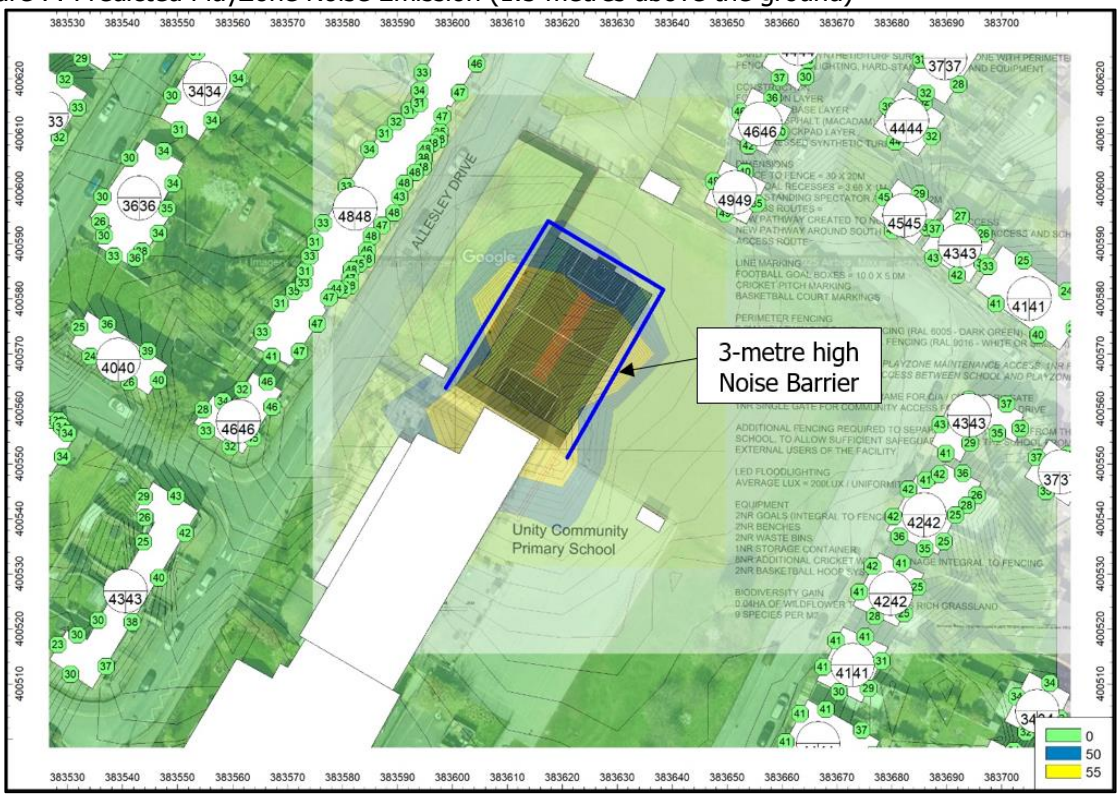
7.2. Noise Barrier

Based on the close proximity of the proposed PlayZone to the surrounding dwellings, it will be necessary to install a noise mitigating perimeter barrier along the northern, western and eastern perimeters of the PlayZone.

The barrier is required to have a height of at least 3 metres and must have a surface mass of at least 10kg/m^2. It must be close boarded and have no gaps. The noise barrier is indicated in blue on the following noise map.

7.3. Predicted Noise Levels

Figure 7: Predicted PlayZone Noise Emission (1.5 metres above the ground)



With the parameters and barrier described above, the highest predicted noise level from the proposed PlayZone is 49 dB $L_{Aeq,\ 1\ hour}$ at the ground floor of the nearest noise-sensitive dwelling.

The predicted noise level is below the proposed criterion of 50 dB $L_{Aeq,\ 1\ hour}$ derived from WHO 1999 as being the threshold for the onset of moderate community annoyance.

The World Health Organisation provides a sound reduction through an open window of 15 dB(A) which results in a predicted internal equivalent noise level of 34 dB $L_{Aeq,\ 1\ hour}$.

The highest predicted noise level in the gardens is 47 dB $L_{Aeq,\ 1\ hour}$, which is within the proposed criterion of 50 dB $L_{Aeq,\ 1\ hour}$.

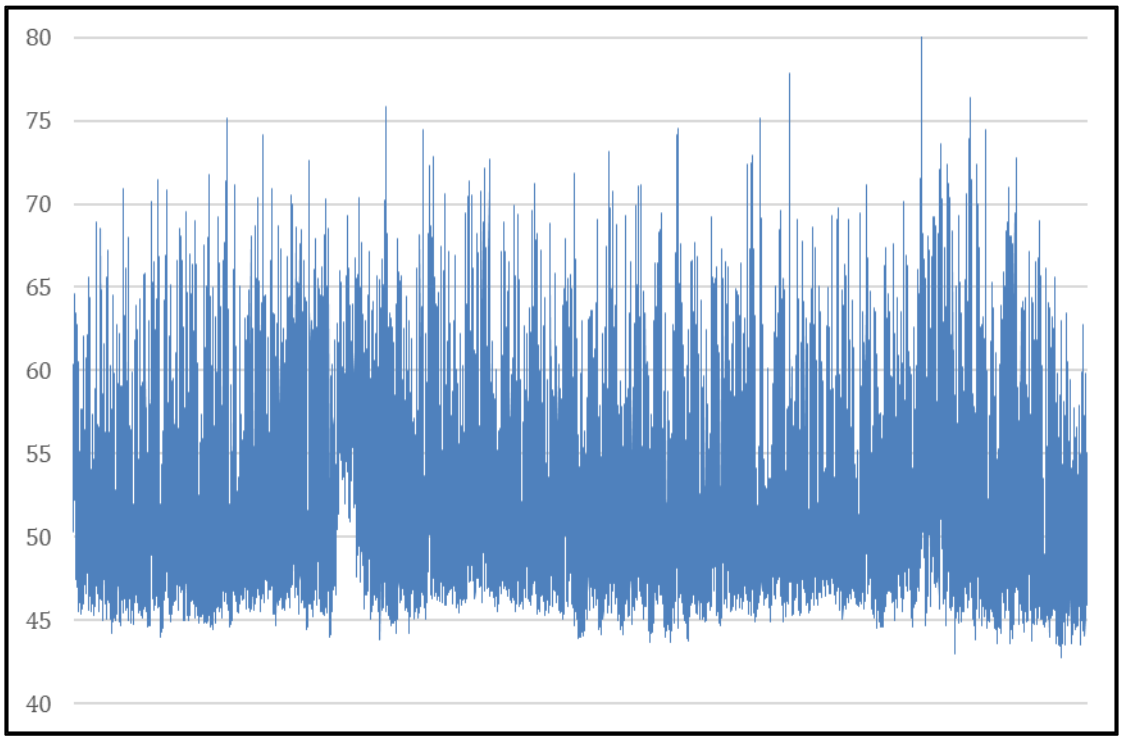
7.4. Assessment of Transient Noise Levels

The following section addresses four noise sources, that from voice, impact of ball on fence, balls bouncing and the basketball hitting the backboard.

In our opinion, considering the maximum noise level parameter as well as the equivalent noise level would address the character of the noise. Maximum noise levels would include sounds that make up the general noise from an AGP and would also determine the equivalent noise level. Examples of this would be the voices of players and coaches and impacts of balls on the fences.

The following figure shows the time trace (100ms) of noise from one of the measured AGP sessions stated in the noise impact assessment previously provided during the one-hour measurement period. During this measurement exercise there was football training for a single club of approximately 22 players. The start of the session involved heading drills before the full pitch was used to play an 11-a-side game. During the monitoring exercise maximum noise levels were generated by occasional shouts, whistles and balls hitting the fence.

Figure 8: Time Trace of AGP Session

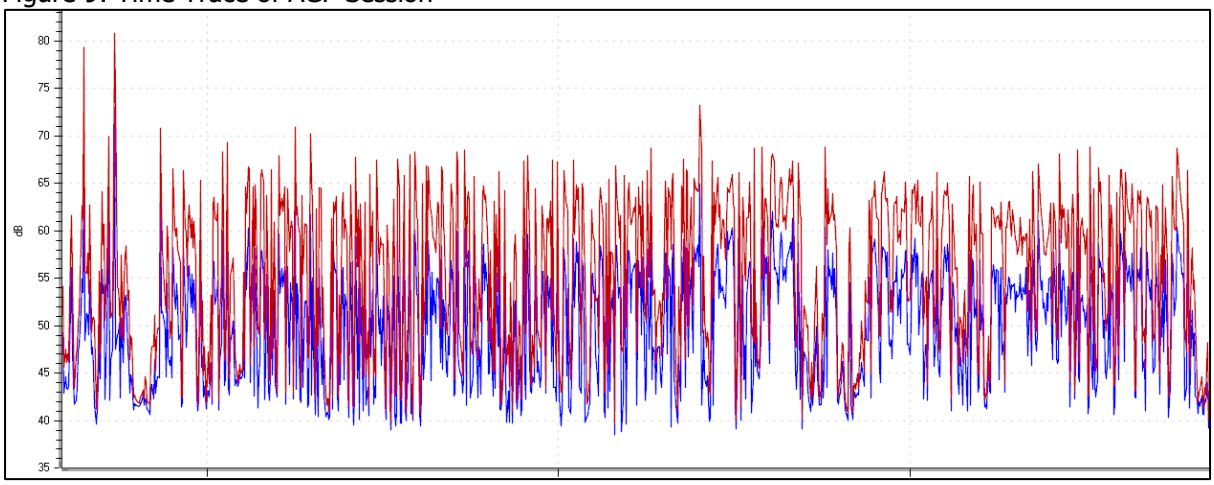


The maximum noise levels are typically in the range of 70-75 dB(A).

It is not possible to accurately undertake a prediction for a maximum noise level in the same way as an equivalent noise level. This is because the maximum noise level by its nature takes place at a finite location whereas the equivalent noise level over a time period takes place over many locations across the pitch.

The following figure shows the time trace (100ms) of noise from monitoring session 3 stated in the noise impact assessment previously provided during the measurement period. During this measurement exercise there was basketball activity including balls bouncing and shots hitting the backboard and hoop. The following time trace includes noise from balls bouncing and the ball hitting the backboard.

Figure 9: Time Trace of AGP Session



The following considers four noise sources, that from voice, impact of ball on fence, balls bouncing and the basketball hitting the backboard.

7.5. Noise from Voice

If we consider the maximum noise level from voice, a typical level of shouting is in the order of 90dB(A) at 1 metre.

Noise modelling has been undertaken using noise mapping software Cadna:A by Datakustik. This uses the calculation method of ISO 9613 to predict noise levels. Predictions have been undertaken to determine the maximum noise levels from an individual point source at multiple locations around the pitch.

With the parameters and barrier described above, the highest predicted maximum noise levels from voices at the window of the nearest NSR façade is 60 dB(A).

7.6. Noise from Ball Impact

Noise is generated when a ball hitting the fence panel causes it to rattle against the supporting post and adjoining and overlapping adjacent fence panel. To minimise this noise, it is recommended that neoprene isolators are located between the panels and the posts.

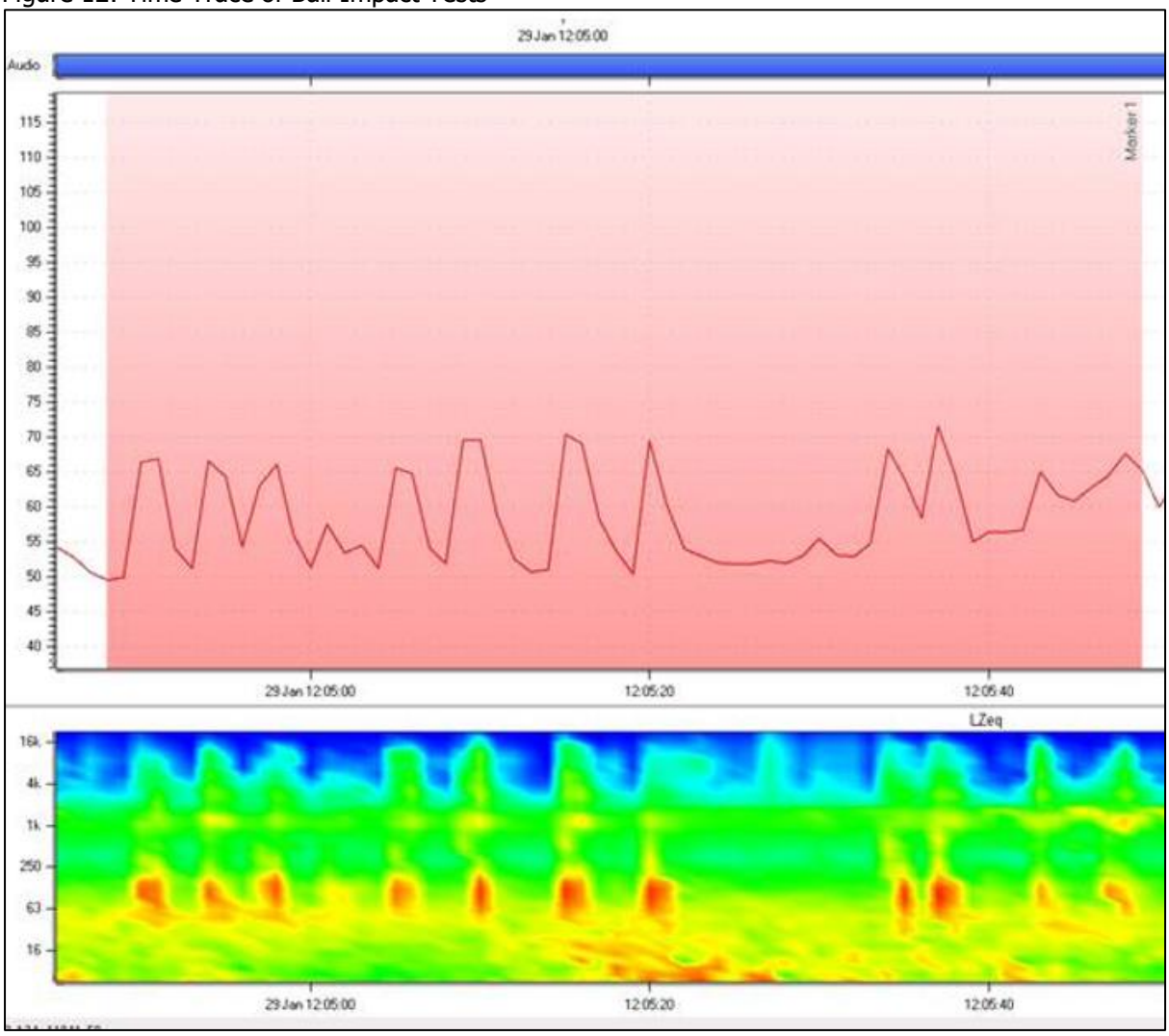
Measurements of ball impacts upon a fence were undertaken at a recently completed AGP in Swindon, Wiltshire. The fence under tests was 4.5 metres tall with neoprene isolators between the panels and posts as proposed for this project. The neoprene isolators, fence and monitoring set-up is shown in the figures below.

Figure 10: Image Showing Neoprene Isolators

Figure 11: Fence and Tests Set-up

Figure 12 shows the time trace and spectral content of the fence impact tests.

Figure 12: Time Trace of Ball Impact Tests



The typical level of a loud ball impact is around 66-70 dB $L_{Amax(fast)}$ at 20 metres.

To determine the possible level of ball impact on a fence, noise modelling has been undertaken using noise mapping software Cadna:A by DataKustik. This uses the calculation method of ISO 9613 to predict noise levels.

With the parameters and barrier described above, the highest predicted maximum noise levels from ball impacts at the window of the nearest NSR façade to the north on Barrow Hill Road is 65 dB(A).

7.7. Noise from Ball Bouncing

Measurements have been previously undertaken in monitoring session 3 to determine the noise level from a basketball bouncing. The measured maximum noise level was 70dB $L_{Amax(fast)}$ at a distance of 10 metres.

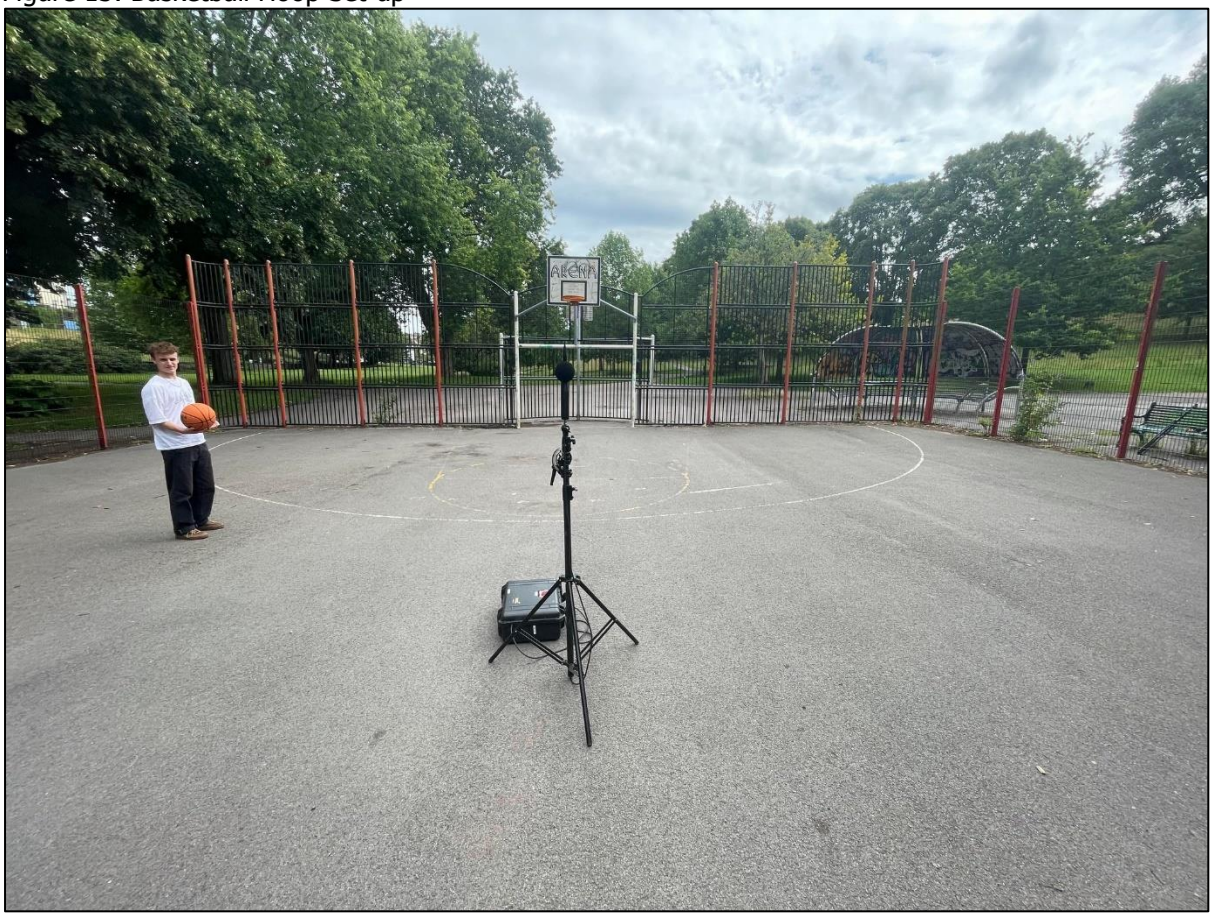
Noise modelling has been undertaken using noise mapping software Cadna:A by Datakustik. This uses the calculation method of ISO 9613 to predict noise levels. Predictions have been undertaken to determine the maximum noise levels from an individual point source at multiple locations around the pitch.

With the parameters and barrier described above, the highest predicted maximum noise levels from a ball bouncing at the window of the NSR façade is 56 dB(A).

7.8. Noise from ball hitting backboard

Measurements have been undertaken at monitoring session 3 to determine the maximum noise levels from balls hitting the backboard/rim. The measured maximum noise level was 58 dB $L_{Amax(fast)}$ at a distance of 10 metres.

Figure 13: Basketball Hoop Set-up



Noise modelling has been undertaken using noise mapping software Cadna:A by Datakustik. This uses the calculation method of ISO 9613 to predict noise levels. Predictions have been undertaken to determine the maximum noise levels from an individual point source at multiple locations around the pitch.

The highest predicted maximum noise levels, from a ball hitting the backboard, at the window of the NSR façade is 47 dB(A).

7.9. Assessment of Maximum Noise Levels

There are no specific noise criteria for maximum noise levels from this type of noise during the day. There is a night-time maximum noise criterion of 45dB $L_{Amax(fast)}$ for bedrooms at night in BS8233:2014 and WHO1999. With sound reduction through an open window this would equate to 60dB $L_{Amax(fast)}$ outside a dwelling.

During the daytime, a higher maximum noise level is likely to be permissible but is not stated in any relevant guidance documents. The difference between the daytime and night-time equivalent noise criteria in both WHO and BS8233:2014 is 5 decibels, it may therefore be that a 5 decibel increase to the maximum noise level is appropriate.

With the parameters and barrier described above, the predicted maximum noise levels from voice, balls bouncing, fence impact and hitting the backboard are all within the criteria of 65dB $L_{Amax(fast)}$ externally and thus, considered acceptable.

8. Noise Management Plan

The assessment undertaken in this report considers noise levels against relevant criteria to avoid an adverse effect on nearby residential properties.

In addition to the level of noise, it is also important to consider the content. From experience, we have found that where complaints have been made it is often due to anti-social behaviour such as swearing. Anti-social behaviour is not necessarily related to the noise level and is something that cannot effectively be 'engineered out'.

As such, it is proposed that a noise management plan is implemented as part of the development.

The noise management plan should include a method of informing the users that swearing and anti-social behaviour is unacceptable and that the centre reserves the right to dismiss users from the pitch and ban future use if this is the case.

It is advised that neighbours are given a facility to report excessive noise or anti-social behaviour directly to the operator. This will allow the complaint to be investigated and addressed quickly.

It is important that complaints are investigated swiftly, that action is taken where necessary and that the complainant is kept informed of progress, especially where it is not possible to address or resolve complaints straight away.

Staff at the site should have a written action plan to deal with complaints. This would include the ability to warn or ban user groups from the pitches. A log of complaints should also be kept.

It is also advised that all perimeter fencing is fixed to the support posts with a neoprene isolator installed to fully isolate the panels from the posts. This measure greatly reduces the 'rattling' associated with ball impacts on metal fencing.

9. Summary and Conclusions

Labosport appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment for the proposed PlayZone to be located at Unity Community Primary School, Allesley Drive, Manchester. The assessment considered the impact of environmental noise on the nearby noise-sensitive residential properties.

The proposed hours of use are 08:00-22:00 Monday to Sunday. The nearest noise-sensitive residential receivers in respect to the proposed PlayZone are understood to be dwellings to the north east on Barrow Hill Road and to the west along Allesley Drive.

The assessment includes the prediction of noise emission from the proposed PlayZone at the nearby noise-sensitive properties, based on noise level data from activities measured at existing pitches.

Noise levels were measured at nine sports sessions on four separate AGPs. The measurements included football, hockey and rugby, with men, women and children participating in different sessions. The purpose of the measurements was to determine a 'typical' noise level for an AGP sports session.

A noise model has been generated of the development site, utilising these previous measurements as its basis.

ACL have suggested a noise barrier to control noise levels to be within the criteria. This barrier is described in section 7.2.

From the model, the highest predicted noise level from the proposed PlayZone is 49 dB $L_{Aeq,\ 1\ hour}$ at the ground floor of the nearest noise-sensitive dwellings to the north east.

The predicted noise levels are within the proposed criterion of 50 dB $L_{Aeq,\ 1\ hour}$ derived from WHO 1999 as being the threshold for the onset of moderate community annoyance.

The World Health Organisation provides a sound reduction through an open window of 15 dB(A) which results in a predicted internal equivalent noise level of 34 dB $L_{Aeq,\ 1\ hour}$ at the nearby dwellings to the west.

The highest predicted noise level in the gardens is 47 dB $L_{Aeq,\ 1\ hour}$, which is within the proposed criterion of 50 dB $L_{Aeq,\ 1\ hour}$.

The predicted maximum noise levels from voice, fence impact, ball bouncing and hitting the backboard all meet the proposed criterion and are thus considered acceptable.

With regards to planning policy, we would expect that the development would potentially be present but not intrusive and would result in *'no observed adverse effect'.* This is defined in the PPG as *"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."*

Based on the above, the proposals are considered acceptable in terms of noise.

10. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$– A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t1}^{t2}[p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 µPa); and
$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).

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