



**ACOUSTIC CONSULTANTS LTD**

Proposed Artificial Grass Pitches  
Heron Eccles Playing Field

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# Environmental Noise Report

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Proposed Artificial Grass Pitches  
Heron Eccles Playing Field

# Environmental Noise Report

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## 1. Introduction

Surfacing Standards Limited appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the use of a proposed artificial grass pitches (AGP) at Heron Eccles playing fields in Allerton, Liverpool. The assessment considered the impact of environmental noise on the nearby noise sensitive residential properties.

The assessment includes the prediction of noise emission from the AGPs at the nearby noise-sensitive properties, based on noise level data from activities measured at existing AGPs. The predicted noise level is compared to current relevant noise guidance.

## 2. The Site

The proposal is to construct three AGP pitches within the centre of the Heron Eccles playing fields in Allerton, Liverpool. These will replace a number of existing natural turf pitches on the site.

The AGPs will be floodlit with proposed opening hours until 21:00 hours.

The playing fields are bordered by the rear of residential properties on all sides.



### 3. Planning and Noise

#### 3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and replaces the withdrawn Planning Policy Guidance Document 24 entitled 'Planning and Noise'. Section 11 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning.

Paragraph 109 states:

*"109. The planning system should contribute to and enhance the natural and local environment by:*

- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."*

Paragraph 123 states:

*"123. Planning policies and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The document does not prescribe any assessment methodology or criteria to assess the adverse affect of noise.



### 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.



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. National Planning Practice Guidance, Noise (NPPG)

The National Planning Practice Guidance (NPPG) on noise referred to here is based on the current version (January 2015) 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 NPPG 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: NPPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, 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.

The NPPG identifies that where noise is audible it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.



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 when taken into account against all other planning considerations.

Section 4 of this report identifies guidance which is considered to provide noise criteria equivalent to effect levels below the Lowest Observed Adverse Effect Level. This is where the perception of noise is “not noticeable” or “noticeable but not intrusive” as indicated in Table 1 above.

## 4. Relevant Noise Guidance

The following sections outline what we consider to be relevant guidance and suitable noise criteria within the context of national 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 L<sub>Amax</sub> 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 L<sub>Aeq</sub>.

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 <sub>eq</sub> dB(A)
Outdoor living area	Serious annoyance, daytime and evening	55 L <sub>Aeq(T)</sub> dB
	Moderate annoyance, daytime and evening	50 L <sub>Aeq(T)</sub> dB
Dwelling indoors	Speech intelligibility & moderate annoyance, daytime & evening	35 L <sub>Aeq(T)</sub> dB

According to the WHO guidance moderate annoyance is caused by noise levels exceeding 50 L<sub>Aeq(T)</sub> dB externally and 35 L<sub>Aeq(T)</sub> dB internally. With relation to the adverse effect level we would consider this 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 and MUGA 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 development 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,  $L_{Aeq(1 \text{ hour})}$ , 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  $L_{Aeq(1 \text{ hour})}$  is more suitable for the more sensitive evening time.

#### **4.2. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings**

British Standard 8233:2014 entitled "Guidance on sound insulation and noise reduction for buildings" came into effect on 28<sup>th</sup> February 2014 and supersedes British Standard 8233:1999.

Table 4 of the British Standard provides internal ambient noise levels for dwellings from noise sources 'without a specific character' and are based on existing guidelines issued by the World Health Organisation 1999. The British Standard provides no definition of noise 'without a specific character'.

No reference of guidance on sporting uses is given in the British Standard, unlike the WHO Guidelines. As such we propose that the definition of community noise is applicable to the proposed noise limits. The British Standard 8233:2014 provides the same guidance levels as the World Health Organisation document.



#### 4.3. **British Standard 4142:2014**

The British Standard 4142:2014 entitled "Method for rating and assessing industrial and commercial sound" was published on the 31<sup>st</sup> October 2014 and replaced British Standard 4142:1997. British Standard 4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature by comparing the Rating level of the noise under assessment against the Background Noise Level.

Within section 1 'Scope', paragraph 1.3 states:

*"The standard is not intended to be applied to the rating and assessment of sound from:  
a) recreational activities, including all forms of motorsport."*

Whilst a comparison with Background Noise Levels could be undertaken, there is no way of determining the impact on noise-sensitive properties or the likelihood of complaints from this noise type. It is therefore not considered appropriate to use the British Standard for the assessment of this type of activity and clearly should not be used.

### 5. **Noise Levels of AGP Use**

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 sideline 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 person'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. This pitch surface will not be suitable for Hockey and therefore we would not expect this type of use.

From the measurement data a typical free-field noise level of 58 dB  $L_{Aeq}(1 \text{ hour})$  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

AGP Activity	Measured Noise Level, $L_{Aeq}(1 \text{ hour})$ dB
Rugby training on one half of the pitch with approximately 20 players and football training on the other half with approximately 20 players.	60
8 a-side training match on one half of the pitch only with the other half unused.	56
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
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
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
Men's 6 a-side social football match using half the pitch and hockey goals (12 players).	51
Under sixteen football training with the pitch divided into four quarters and a total of approximately fifty players.	58 *
Two adult football games using half the pitch each with a total of 28 players.	56 *
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 half way line.



## 6. Noise Modelling Methodology

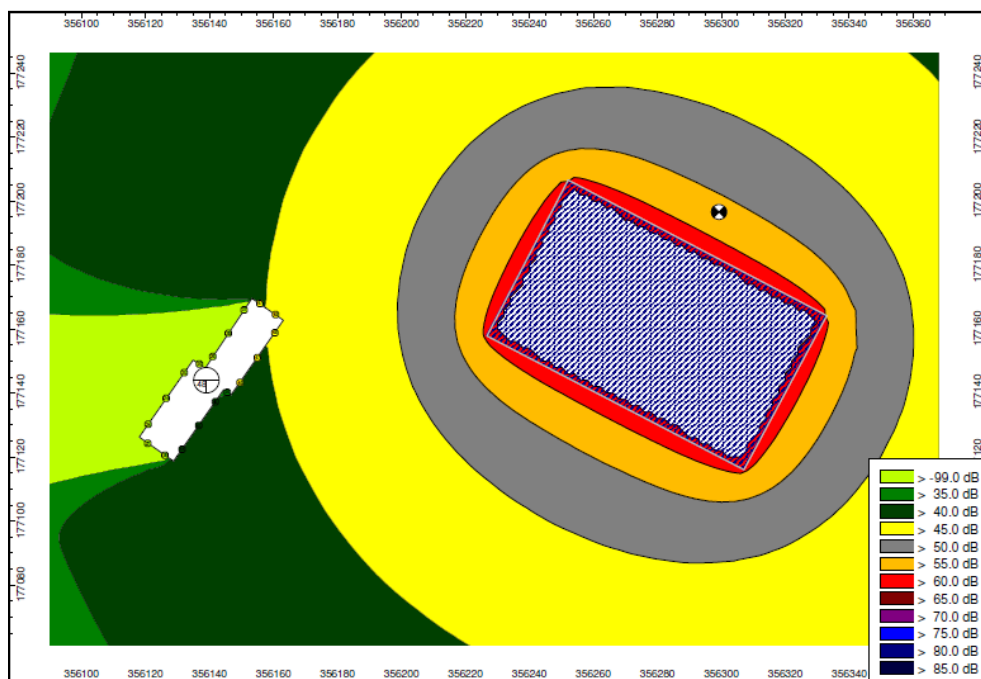
The measured AGP noise emission data has been used to generate a noise map of the site to predict the noise level at the nearby noise sensitive residential properties.

The modelling has been undertaken using noise mapping software Cadna:A by Datakustik. This uses the calculation method of ISO 9613 to predict noise levels.

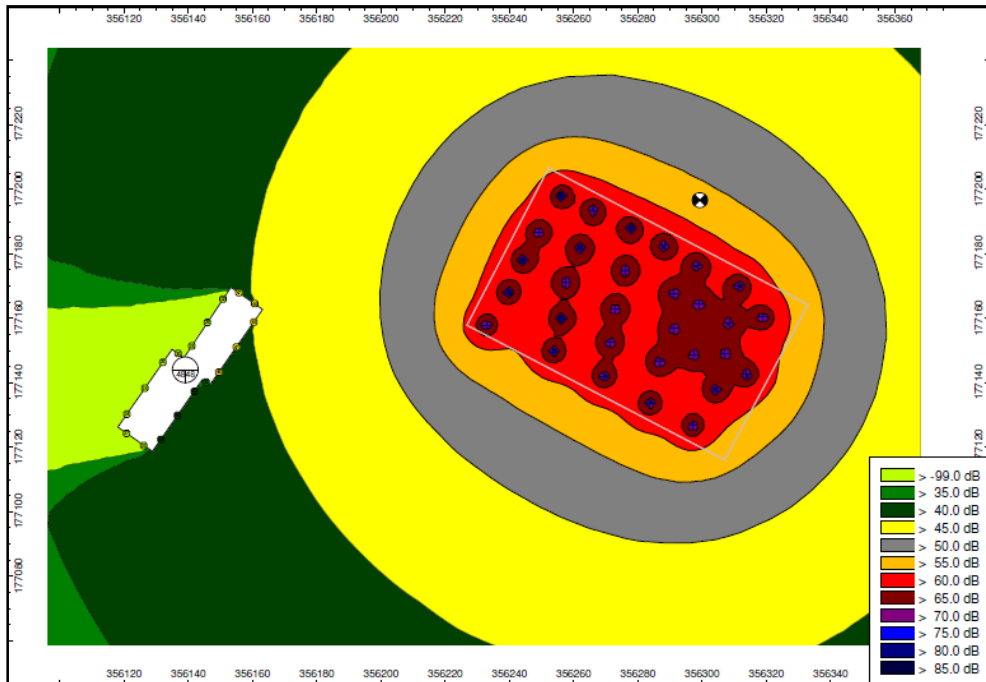
The assessment is based on the noise modelling methodology using an area source covering the playing surface as the noise source. The area source is at a height of 1.5 metres representative of head height.

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 1 shows the noise propagation of an area source created from thirty moving point sources. The second noise map (Figure 2) shows the noise propagation of thirty individual point sources spread across the playing surface.

**Figure 1: Noise model using an area source**



**Figure 2: 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 AGP pitches.

## 7. AGP Noise Emission Prediction

A noise model has been generated of the development site. The topography of the site and surrounding area is generally considered to be flat.

The ground is considered to be 'soft' (i.e grass) for the purposes of the assessment, except for roads, playgrounds and car parks, where a ground absorption of zero has been assumed.

Residential and none residential buildings in the vicinity of the playing fields have been built within the model.

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

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



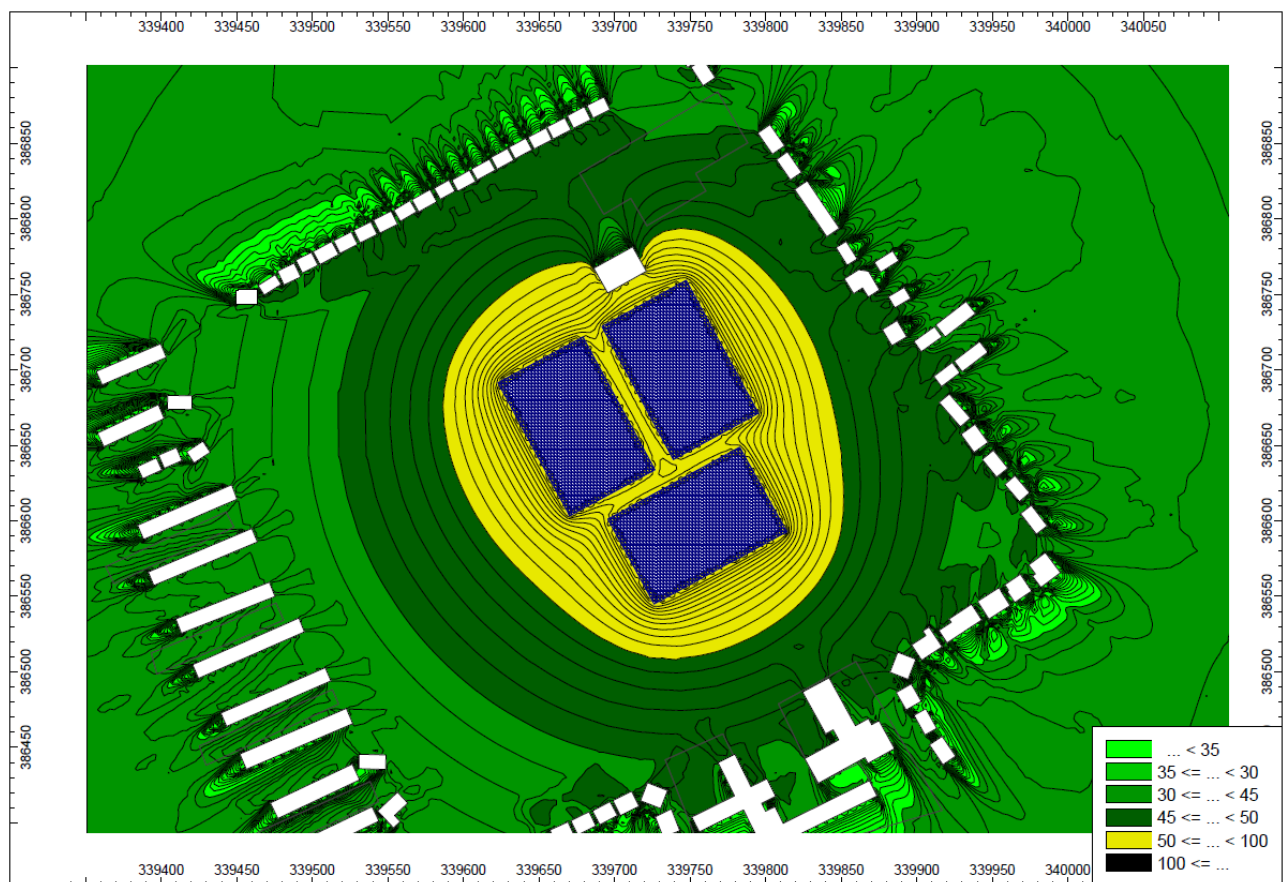


Noise maps show noise emission from the AGP predicted at ground floor level (1.5 metres above the ground) typical of a daytime habitable room in a house and external amenity areas.

## 8. Sports Pitch Noise Assessment

The following figure shows the predicted noise emission from the AGPs.

Figure 3: Predicted AGP Noise Emission



The highest predicted noise level from the proposed AGP at the façade of the most exposed nearby noise-sensitive properties is 48 dB  $L_{Aeq}(1 \text{ hour})$ . The predicted noise levels in the gardens of the nearby noise sensitive properties is 49 dB  $L_{Aeq}(1 \text{ hour})$ .

The World Health Organisation states a sound reduction through an open window of 15 dB(A) which results in an internal Equivalent Noise Level of 33 dB  $L_{Aeq}(1 \text{ hour})$ . This is below the World Health Organisation guidance which states *"To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB  $L_{Aeq}$ ."*



The predicted Equivalent Noise Level of 49 dB  $L_{Aeq}(1 \text{ hour})$  is below the level of community noise for moderate community annoyance in outside living areas (such as gardens), stated in World Health Organisation 1999 as 50 dB.

On the above basis the proposal is considered acceptable in environmental noise terms. Noise emission is adequately controlled at the nearby residential properties and is not expected to affect nearby residents adversely by way of noise.

## 9. 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 past 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 user 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 sports centre. This will allow the complaint to be investigated and addressed quickly.

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

Staff at the centre 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 recommended that all perimeter fencing is fixed to the support posts with neoprene isolators.

## 10. Limitations

The report limits itself to addressing solely on the environmental noise aspects as included in this report. We provide advice only in relation to noise 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.

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.

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.

## 11. Summary and Conclusions

Surfacing Standards Limited appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the use of a proposed artificial grass pitches (AGP) at Heron Eccles playing fields in Allerton, Liverpool. The assessment considered the impact of environmental noise on the nearby noise sensitive residential properties.

The proposal is to construct three AGP pitches within the centre of the Heron Eccles playing fields in Allerton, Liverpool. These will replace a number of existing natural turf pitches on the site. The AGPs will be floodlit with proposed opening hours until 21:00 hours. The playing fields are bordered by the rear of residential properties on all sides.



The highest predicted noise level from the proposed AGP at the façade of the most exposed nearby noise-sensitive properties is 48 dB  $L_{Aeq}(1 \text{ hour})$ . The predicted noise levels in the gardens of the nearby noise sensitive properties is 49 dB  $L_{Aeq}(1 \text{ hour})$ .

The World Health Organisation states a sound reduction through an open window of 15 dB(A) which results in an internal Equivalent Noise Level of 33 dB  $L_{Aeq}(1 \text{ hour})$ . This is below the World Health Organisation guidance which states *"To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB LAeq."*

The predicted Equivalent Noise Level of 49 dB  $L_{Aeq}(1 \text{ hour})$  is below the level of community noise for moderate community annoyance in outside living areas (such as gardens), stated in World Health Organisation 1999 as 50 dB.

A noise management plan has also been proposed.

On the above basis the proposal is considered acceptable in environmental noise terms. Noise emission is adequately controlled at the nearby residential properties and is not expected to affect nearby residents adversely by way of noise.



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