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PROPOSED ARTIFICIAL GRASS PITCH GATEACRE ACADEMY LIVERPOOL

ENVIRONMENTAL NOISE REPORT

Reference: 6131/DO/pw

August 2015





**Proposed Artificial Grass Pitch, Gateacre Academy
Environmental Noise Report**

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Issue Number

1st Issue

Date

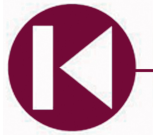
17th August 2015



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1.0 INTRODUCTION

Surfacing Standards Limited appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the use of a proposed Artificial Grass Pitch (AGP) at the Gateacre Academy in Liverpool.

The proposal is to construct an AGP pitch on existing school playing fields which is suitable for Rugby and Football use.

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

2.0 THE SITE

The proposal is to construct an AGP pitch on existing school playing fields.

The proposed hours of use are until 22:00 hours, seven days per week.

The site is bordered by school grounds to the South East and South West and roads to the North East and North West.

The nearest residential properties are approximately 40 metres to the South West on Chislehurst Avenue and 60 metres to the north east on Shrewton Road.



3.0 PLANNING AND NOISE

3.1 National Planning Policy Framework

The National Planning Policy Framework was published in March 2012 and replaces the withdrawn Planning Policy Guidance Document 24 entitled 'Planning and Noise'.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.

The NPSE does not provide any assessment criteria for the noted effect levels.

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.”



3.3 National Planning Practice Guidance, Noise (NPPG)

The National Planning Practice Guidance 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.

4.0 RELEVANT NOISE GUIDANCE

There is no specific noise guidance for sports pitch developments. The following sections outline relevant guidance and propose noise criteria within the context of national planning policy.

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.”



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_{Amax} 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 1: WHO noise criteria

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

On this basis, to enable casual conversation during the daytime community noise, of which sporting activity would be a part should not exceed 50 dB LAeq at the façade of a residential property or in the external amenity area.

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

For a sports pitch a 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 appropriate assessment time period of one hour, L_{Aeq(1 hour)}.



Therefore we would suggest the lower target noise level of 50 dB $L_{Aeq}(1 \text{ hour})$ is suitable for the more sensitive evening time.

This WHO criteria was 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 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 28th 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'. 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 31st 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.

5.0 NOISE LEVELS OF AGP USE

Noise levels were measured at nine sports sessions on four separate artificial grass pitches. 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 a 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.

The following table summarises the measurement data undertaken.

Table 2: Summary of Measured Noise Levels

Sport Pitch 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.

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 sideline at the halfway line has been determined as representative for noise from a sports pitch and is used in the noise modelling assessment.

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 and have not been considered further.

6.0 NOISE MODELLING METHODOLOGY

The measured noise emission data has been 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 sports pitch noise was measured (Coombe Dingle in Bristol). The noise map in Figure 1 show 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

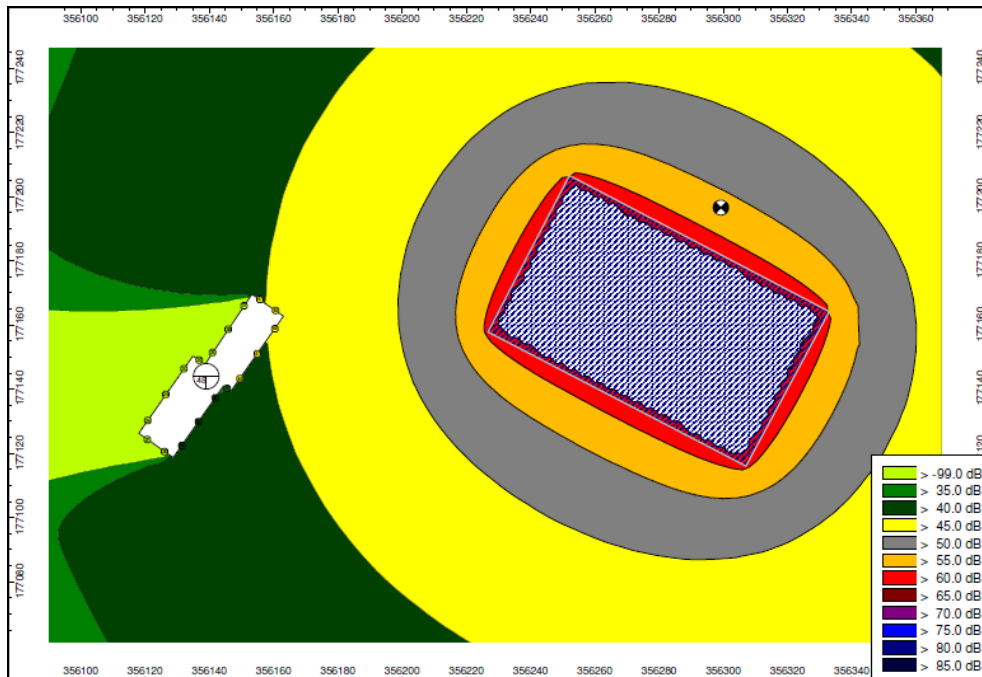
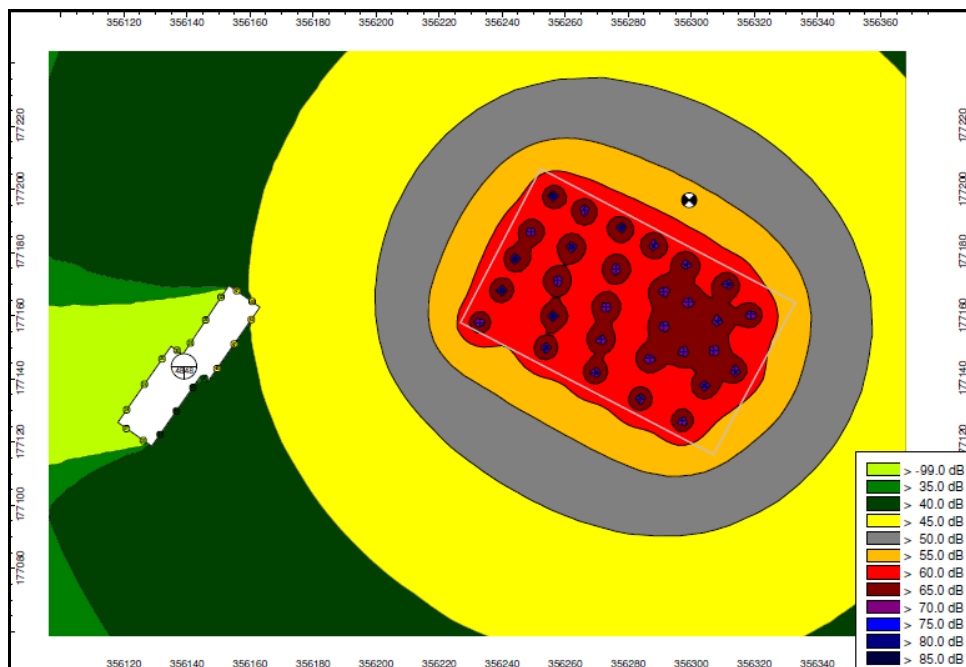


Figure 2: Noise model using point sources



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 sports pitches.



7.0 PREDICTED NOISE LEVELS

A noise model has been generated of the development site. The ground is considered to be generally flat. The ground is considered to be 'soft' (i.e. grass) for the purposes of the assessment. Car parks, roads, playgrounds and other areas of hard standing are considered to be 'hard (i.e. reflective of sound).

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).

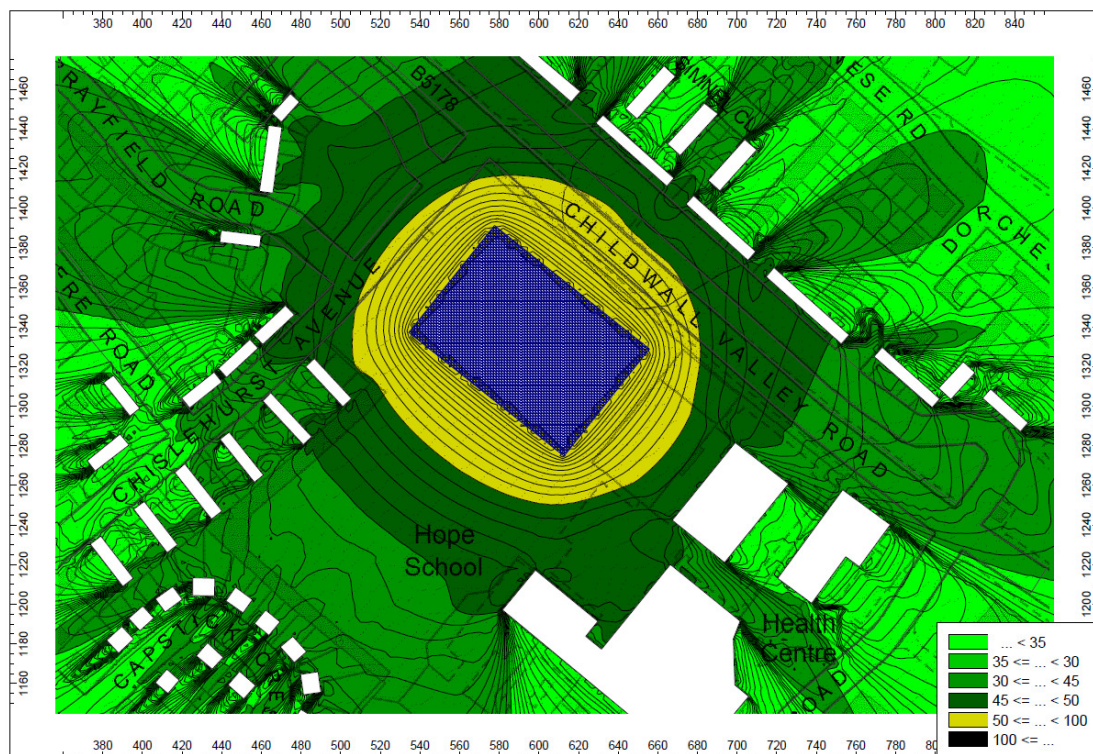
There is a proposed 1.5 metre high acoustic bund between the pitch and the houses to the South.

Potential sound attenuation provided by garden fences has not been considered as it is not possible to confirm their construction will achieve the requirements of an acoustic barrier.

The following noise map shows 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.

The 50 decibel contour is identified as the boundary between the yellow and green areas.

Figure 3: Predicted Sports Pitch Noise Emission





The highest predicted noise level from the proposed pitch at the façades of the nearby noise sensitive properties and in the gardens is 49 dB LAeq(1 hour).

8.0 AGP NOISE ASSESSMENT

Noise from the AGPs has been predicted at the nearby noise sensitive residential properties at ground floor level (1.5 metres above the ground). The noise model includes contour lines of 1 decibel increments, the 50 dB contour is identified as the border of yellow and dark green.

The predicted noise level is below the level of community noise for moderate community annoyance in outside living areas (such as gardens) stated in World Health Organisation 1999 of 50 dB.

The World Health Organisation states a sound reduction through an open window of 15 dB(A) which results in an internal Equivalent Noise Level within 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."*

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 adversely affect nearby residents by way of noise.

9.0 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.

10.0 SUMMARY AND CONCLUSIONS

Surfacing Standards Limited appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the use of a proposed AGP as it affects the nearby noise sensitive residential properties.

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

The proposal is to construct an AGP pitch on existing school playing fields which is suitable for Rugby and Football use.

The site is bordered by school grounds to the South East and South West and roads to the North East and North West. The nearest residential properties are approximately 40 metres to the south west on Chislehurst Avenue and 60 metres to the north east on Shrewton Road.

Noise from the pitch has been predicted at the nearby noise sensitive residential properties. The predicted noise level is below the level of community noise for moderate community annoyance in outside living areas (such as gardens) stated in World Health Organisation 1999 of 50 dB.

The World Health Organisation states a sound reduction through an open window of 15 dB(A) which results in an internal Equivalent Noise Level within 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."*

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