SPORT ENGLAND

Design
Guidance Note

Creating a sporting habit for life



Artificial Grass Pitch (AGP) Acoustics -

Planning Implications

New Guidance for 2015

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Foreword

Sport England believes that good facilities are fundamental to developing sporting opportunities for everyone, from the youngest beginner to the international class athlete. The facilties whether large or small can encourage civic pride and assist the process of revitalising deprived neighbourhoods. Facilities that are well designed, built to last and well maintained are a pleasure to use and give an ample return on the time and money invested in their construction and day to day use.

Good design needs to be based on a sound understanding of such issues as the current trends and practices within individual sports, the wider leisure industry and the lessons to be learnt from previously built schemes.

Good design needs to be embraced within the earliest vision statement for a particular project and enshrined in the initial briefing stage through to the final detailed specifications and operational arrangements.



Sport England's Design Guidance Notes aim to:

- ***Increase awareness of good design in sports facilities***
- ***Help key building professions, clients, user representatives and other stakeholders to follow best practice***
- ***Encourage well designed sports facilities that meet the needs of sports and are a pleasure to use.***

Sport England Design Guidance Notes aim to promote a greater general understanding of overall design concepts, an appreciation of technical issues and the critical factors that need to be considered in reaching the appropriate solution for a particular project. They also advise where further information, advice and expertise may be found and point to benchmark examples.

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Artificial Grass Pitch (AGP) Acoustics - Planning Implications

Design Guidance Note

1.0 Introduction

Artificial grass pitches (AGPs) are a key part of the modern sporting landscape and provide valuable facilities for local communities.

This guidance expands on the general technical advice already available from Sport England [1]. It provides details of acoustic implications associated with such facilities and follows on from an acoustic research programme involving detailed analysis of relevant noise guidance documents and site testing in a range of locations. It proposes appropriate noise criteria and assessment methods and outlines practical measures that can be applied to reduce noise in particularly sensitive areas.

There is no previous guidance or assessment methodology specifically relating to noise from AGPs and this guidance considers the issues from first principles. It offers a simple explanation for those wishing to develop such facilities and provides a more consistent approach for Local Authority noise assessments and limits that might be set for proposals adjacent to sensitive residential areas. It highlights the importance of considering the potential for disturbance to neighbours early in the planning and design stages.

It is important that the potential for disturbance to neighbours is considered at an early stage in the planning and design of the AGP



[1] See *Section 8 Further Information* and SE website at: https://www.sportengland.org/facilities-planning/planning-for-sport/

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2.0 Planning Context



The National Planning Policy Framework (NPPF) [2] was published in March 2012. Paragraph 123 states:

'...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...'

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. It enables 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. The policy statement applies to all forms of noise including environmental, neighbour and neighbourhood noise and sets out the long term vision of Government policy. This is supported by three noise policy aims as set out in the following extract:

> *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.*

When considering development of an AGP, address the issues of noise criteria set out by:

- ***The National Planning Policy Framework***
- ***Local planning authority planning policies***

[2] See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

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3.0 Relevant Noise Guidance

With no specific noise criteria for an AGP, the following documents are considered the most relevant and the most commonly applied for the assessment of AGP noise.

World Health Organisation 'Guidelines for Community Noise'

The World Health Organisation (WHO) *'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:

> *To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB L_{Aeq}. The maximum sound pressure level should be measured with the sound pressure meter set at "fast".*

Based on a 15 decibel sound reduction of a partially open window, the noise level outside a residential property during the daytime about 1 metre from façades of living spaces should not exceed 50 dB L_{Aeq}.

The WHO document also provides guidance for outdoor living areas. It states that to avoid 'moderate annoyance' during the daytime and evening the noise level should not exceed 50 dB $L_{Aeq(T)}$.

World Health Organisation guidelines for residential development are typically calculated over a 16 hour daytime period. For an artificial grass pitch, a 16 hour assessment period may not truly reflect the noise impact as it takes into account times of use and non-use. It is suggested an appropriate assessment time period is for one hour, $L_{Aeq(1\ hour)}$ as this is typically the time period for a community sports session on an AGP.

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.

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Comparison of AGP noise against existing noise climate

In some circumstances, an alternative assessment methodology may be appropriate such as where there are changes to an existing natural turf or AGP pitch, or where existing noise levels in the area are high.

The IOA/IEMA [3] Working Party Consultation Draft 2002 categorises the significance of a change in noise level. Although this is currently at a draft stage, it provides some helpful guidance on the impact of changes in noise levels.

A 'slight' impact is considered for an increase less than 3 decibels. This generally conforms with the withdrawn Planning Policy Guidance Document 24 statement that a change of 3 dB(A) is the minimum perceptible under normal conditions.

Where noise from the new source (the AGP) does not exceed the existing noise climate the increase in noise will be no more than 3 decibels. This is the minimum that can normally be perceived. The noise levels are both to be measured using the L_{Aeq} parameter over the same time period, T.

In some instances it may be beneficial to use both a comparative and absolute assessment method.



Typical noise levels

Noise levels were measured during nine sports sessions on three separate AGPs. The sessions included football, hockey and rugby and participation by men, women and children. The purpose was to determine a 'typical' noise level generated from a 'typical' AGP sports session.

Noise level measurements were taken at a distance of 10 metres behind the mid-way points along goal lines and sidelines. They were found to be highest behind the sideline halfway line.

The most significant noise levels were found to be generally derived from the voices of players, with the exception of hockey where impact noises of balls hitting perimeter strike boards and goal back boards were more noticeable. Such impact noises can be mitigated by incorporating shock absorbing noise reduction measures. Assuming such mitigation measures, the most significant noise source from typical AGP sports sessions is therefore voice and as such, a typical noise level can be determined.

The most significant noise source from typical AGP sports sessions is voice

From the measurement data, a typical free-field noise level of 58 dB $L_{Aeq(1\ hour)}$ [4] at a distance of 10 metres (m) from the sideline halfway marking has been determined as representative for noise from an AGP.

A typical free-field noise level from an AGP (at 10 m from the sideline halfway marking)

= 58 dB $L_{Aeq(1\ hour)}$

[3] Institute of Acoustics (IOA) / Institute of Environmental Management & Assessment (IEMA)

[4] Equivalent noise level $L_{Aeq(T)}$, is an average of the varying noise levels over a time period T, in this case, 1 hour as the duration of a typical AGP session.

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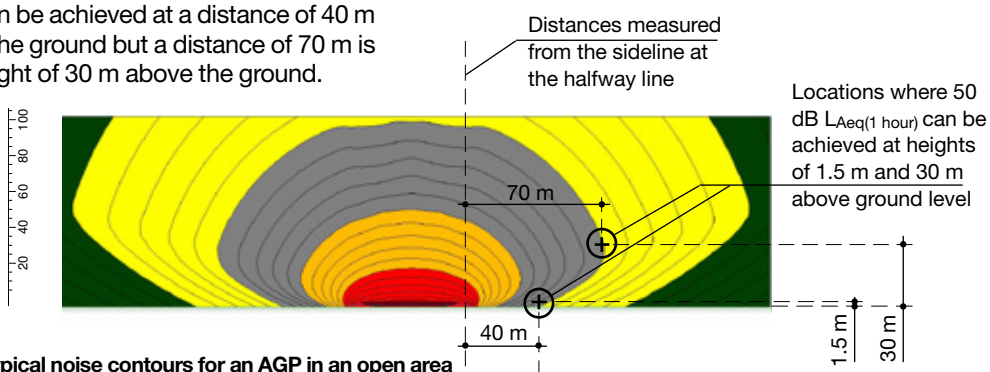
AGP noise emission

The noise map below is based on the measured noise emission level of 58 dB $L_{Aeq(1\ hour)}$ at a distance of 10 m from an AGP and shows the propagation of noise calculated at a height of 1.5 m in an open area - for example, on an existing playing field. The 50 dB $L_{Aeq(1\ hour)}$ noise contour is shown as the border between the grey and light yellow.

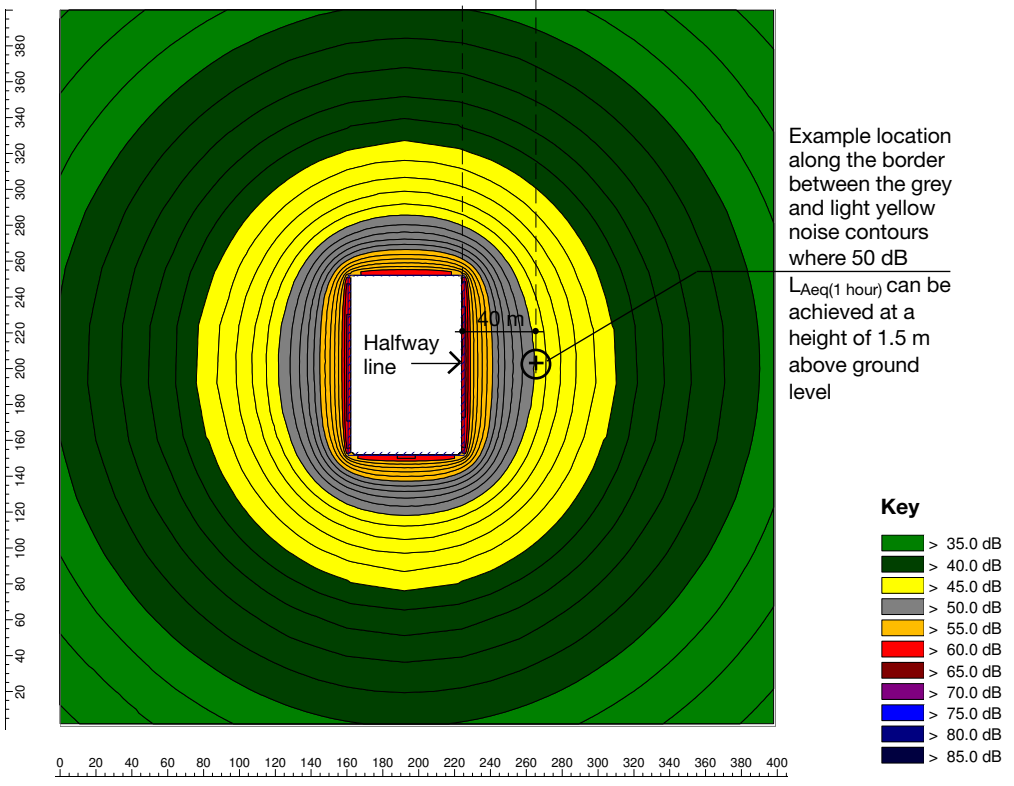
The cross section below shows that at greater heights, the noise level is higher. This would need to be considered where the site is surrounded by blocks of flats with dwellings at high level.

When a site is in an open location, noise levels of 50 dB $L_{Aeq(1\ hour)}$ can be achieved at a distance of 40 m at 1.5 m above the ground but a distance of 70 m is required at a height of 30 m above the ground.

Where a site for a proposed pitch is surrounded by dwellings at high level e.g. blocks of flats, the evidence that noise levels increase at greater heights should be carefully considered



Cross section of typical noise contours for an AGP in an open area



Plan of typical noise contours for an AGP in an open area measured at a height of 1.5 m above ground level

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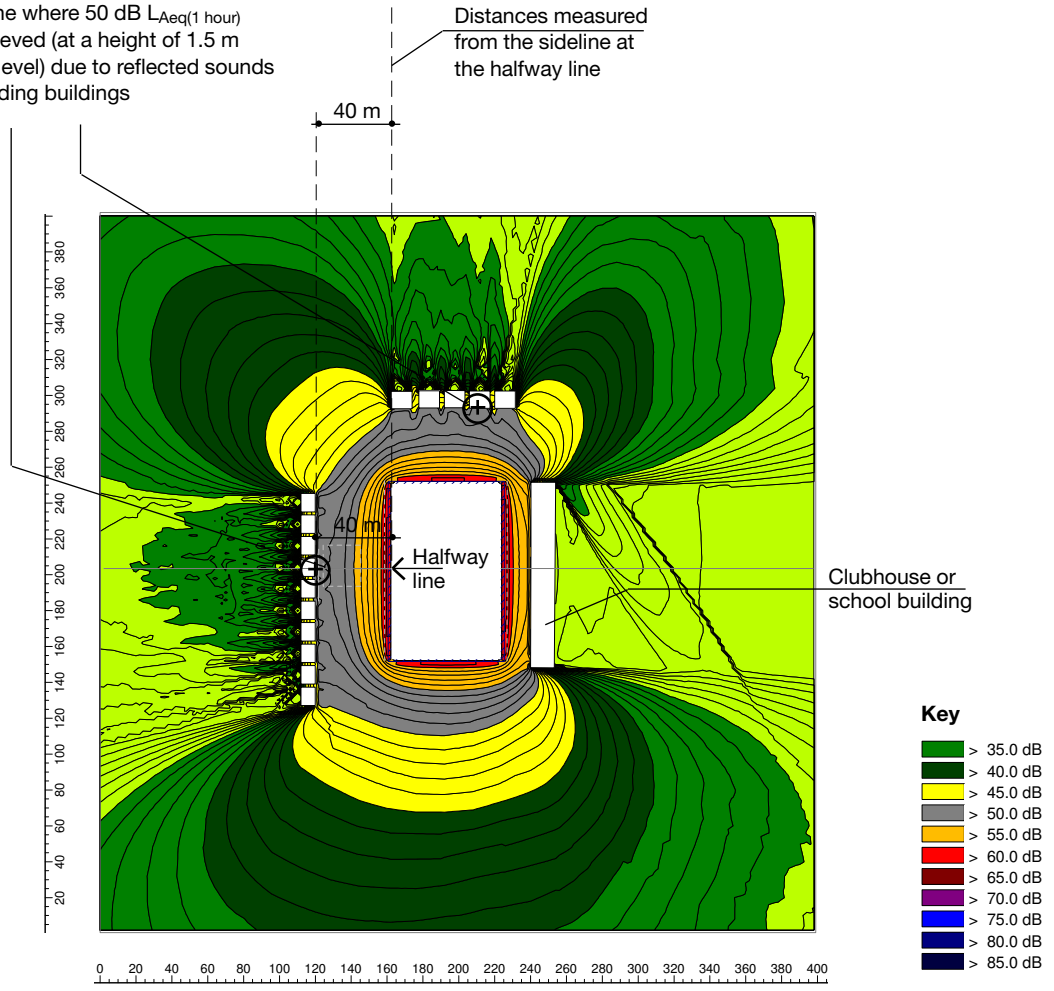
Reflections from adjacent buildings can increase the noise levels. As such, it is not possible to accurately determine the noise propagation of an AGP on a 'one case fits all' basis. The noise model below illustrates what could be considered as a fairly common layout with a club house or school building to one side and residential properties to the other.

In comparison to an open site (as illustrated on page 8), the distance from the pitch where 50 dB $L_{Aeq(1\ hour)}$ is achieved is greater due to building reflections. This impacts on the distance residential buildings would require to be set back from the AGP.

The determining noise criteria for AGPs proximity to residential properties, to avoid moderate annoyance in the daytime and evenings, as set by The World Health Organisation's 'Guidelines for Community Noise':

= 50 dB $L_{Aeq(1\ hour)}$ upper noise limit external to residential properties and within external living areas

Example residential property locations c. 40 m from the sideline where 50 dB $L_{Aeq(1\ hour)}$ cannot be achieved (at a height of 1.5 m above ground level) due to reflected sounds off the surrounding buildings



Plan of noise contours for an AGP with a clubhouse or school building to one side and residential properties on the other side

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Ball impact sound mitigation

It was observed that the impact noise of hockey balls hitting the strike boards, goal boards and fencing has the potential to generate higher noise levels than from users. In addition, there was a difference in the character of the noise.

These impact noises were found to be significantly reduced by the use of padding and the careful design and selection of perimeter fencing.

Measures to mitigate noise levels from AGPs are listed below:

- Acoustic barriers should be built outside the perimeter fence so they are protected from being hit by balls and generating impact sounds
- Weldmesh fencing is commonly used to enclose the AGP and the panels should be securely clamped with resilient fixings to avoid vibrations
- Sheet metal advertising signs can make a clattering noise when hit by a hockey ball and these should be avoided in proximity to the playing surface or replaced by soft vinyl signs
- Lightweight 'substitutes' shelters also have the potential to clatter when hit by hockey balls and should be located within recesses to reduce the risk of impact
- People tend to congregate around the entrance to the AGP and as such, it is advisable that the entrance and access route should be located away from nearby housing where possible
- Some users may act in an unreasonable manner resulting in higher noise levels and a management/monitoring plan could be developed to effectively respond to specific incidents
- Similarly, the restriction of use to authorised groups could be appropriate in many situations.



Fence panels should be securely clamped together and to supporting posts with resilient fixings to minimise rattling noises from ball impacts

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Using barriers and bunds

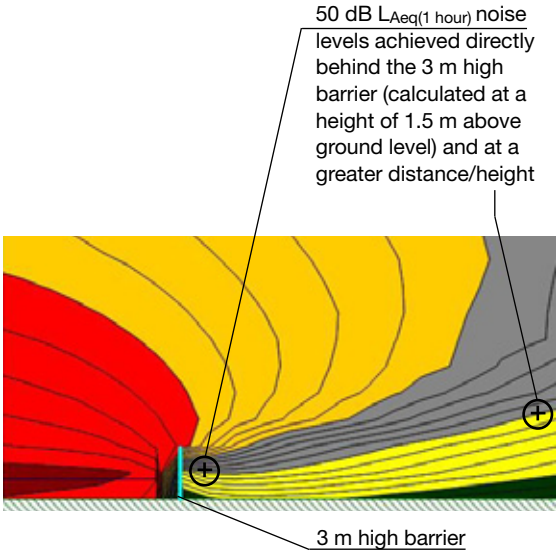
Barriers and bunds provide sound reduction by breaking the line of sight between the noise source and the receiver location. In the most basic terms, the sound attenuation increases the more the line of sight is broken.

This can provide a real benefit when trying to protect houses and gardens from noise where the receiver location is relatively low. As the receiver location increases in height (for example in a block of flats) the sound attenuation is greatly reduced and where the noise source can clearly be seen at the receiver location the barrier effect is negligible.

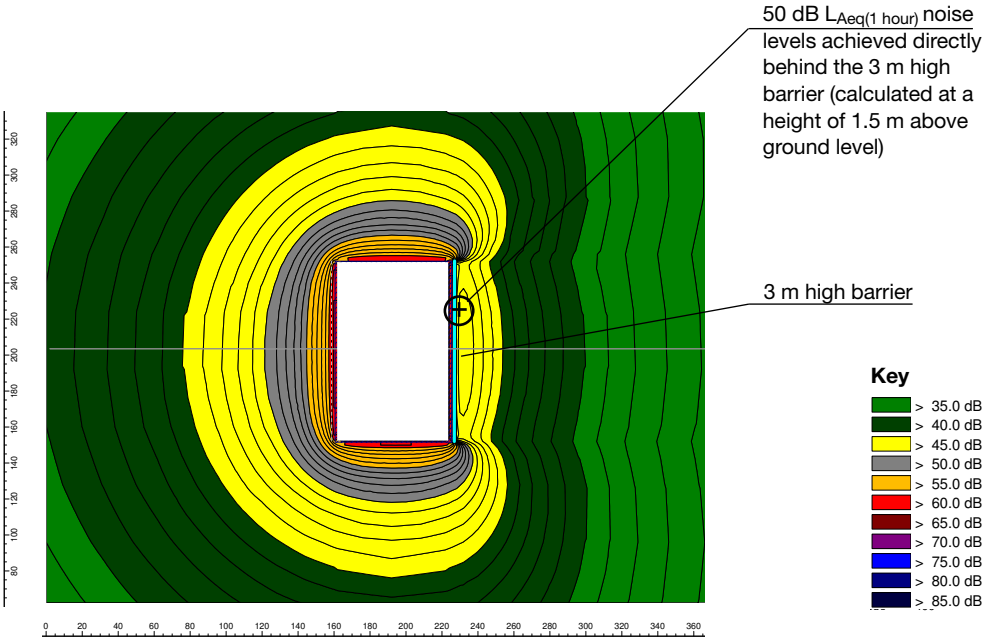
The noise map on the plan below shows the noise reduction provided by a 3 m high barrier (shown in light blue) calculated at a height of 1.5 m above the ground. At this level, a significant sound reduction can be achieved to areas behind the barrier, reducing AGP noise levels to below 50 dB $L_{Aeq(1\ hour)}$.

It should be noted that reflections from buildings can reduce the sound reduction provided by the barrier.

However, the partial cross section below for the same layout shows how the barrier attenuation is relatively ineffective when calculated at increased heights because there is a clear view of the AGP.



Cross section of noise contours for an AGP with a 3 m high barrier showing the barrier effect is reduced at increased height



Plan of noise contours for an AGP with a 3 m high barrier showing noise reduction achieved at a height of 1.5 m above ground level

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4.0 Making a Planning Application

The key consultee with regard to planning and noise is the Environmental Health Officer. It is advisable to liaise at an early stage to discuss the site history and the scope of evidence that will be required.

As explained in this document, it is not possible to predict the noise emission of an AGP on a 'one case fits all' basis and it may be necessary to undertake a site specific assessment to determine the predicted noise levels at the nearby residential properties.

5.0 Appointing an Acoustic Consultant

In many situations it will be necessary to appoint an Acoustic Consultant to undertake a site specific noise assessment in order to provide advice on suitable noise mitigation measures.

Where site noise measurements are required these should be undertaken at a location representative of the nearby noise sensitive residential properties and at the most sensitive time the AGP is proposed to operate. Noise measurements should be undertaken in accordance with British Standard 7445-1:2003.

Acoustic consultancy companies can be found on the Association of Noise Consultants website (www.association-of-noise-consultants.co.uk)

6.0 Conclusion

With suitable noise mitigation measures, it is considered that acceptable noise levels can be achieved for the majority of AGP sites and will operate without adversely affecting neighbouring residential properties.

Noise management is an ongoing process and includes maintenance of the noise control measures as well as managing the use and operation of the pitch. Good practice should be applied to the operation of AGPs and maintaining long-term relationships with neighbours. Reacting to problems effectively is often as important as the actual noise levels in play and helpful in avoiding disputes that could threaten the continued operation of the facility.

With suitable noise mitigation measures, it is considered that acceptable noise levels can be achieved for the majority of AGP sites and will operate without adversely affecting neighbouring residential properties



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7.0 Check List

Below is a check list of key issues to be considered:

Question/task	Answer	Action
Has there been a previous planning application for an AGP on the site or nearby that has been refused planning permission?	Yes/No	If yes, contact the Local Authority planning department to find out the reasons for refusal. If acoustics was one of the reasons, seek advice from an acoustic consultant
Are there residential dwellings nearby?	Yes/No	
What is the distance to the nearest dwelling?		
Are there any flats or maisonettes adjacent to the site?	Yes/No	A topographical survey and site sections are likely requirements
Is a topographical survey available?	Yes/No	If there are dwellings in the proximity of the AGP, it may be appropriate to commission one
Are drawings available showing sections through the site including the nearest buildings beyond the site boundary	Yes/No	These will be needed if there are dwellings within the proximity of the AGP
Is the AGP to be used in the evening, weekends and bank holidays?	Yes/No	
Has contact been made with the local Environmental Health Officer (EHO)?	Yes/No	
Have acoustic issues been raised by the EHO?	Yes/No	If yes, seek advice from an acoustic consultant
Is the site in the green belt or Area of Outstanding Natural Beauty, in a Conservation Area, adjacent to a Listed Building or other special designated area?	Yes/No/ Don't know	If yes, early consultation with the local planning department is advised If don't know, check with the planning department ASAP
Are acoustic barriers required?	Yes/No	Early discussions along with proposed sample materials are vital
Is the Local Authority intending to restrict use of the AGP via planning conditions?	Yes/No	If yes, seek advice from an acoustic consultant and look at a mitigation package Also check the business plan to see if the scheme is still viable

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8.0 Further Information

Sport England (SE) guidance

The following documents can be downloaded from the 'Design and Cost Guidance' section of the SE website available at https://www.sportengland.org/facilities-planning/tools-guidance/design-and-cost-guidance/

- *Selecting the Right Artificial Surface*
- *Artificial Surfaces for Outdoor Sport* Design Guidance Note
- *Artificial Sports Lighting* Design Guidance Note

Planning models and tools can be downloaded from the *'Planning for Sport'* section of the website available at https://www.sportengland.org/facilities-planning/planning-for-sport/



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Alternative Languages and Formats:

This document can be provided in alternative languages, or alternative formats such as large print, Braille, tape and on disk upon request. Call the Sport England switchboard on 08458 508 508 for more details.

Prepared by:

Sport England and Abacus Cost Management Ltd (Design Services)

Acknowledgements:

Contributors:

Acoustic Consultants Limited
MEA Consulting
MSc – Consultants
Robin Wilson Consulting
The Football Association

User Guide:

Before using this design guidance note for any specific projects all users should refer to the *User Guide* to understand when and how to use the guidance as well as understanding the limitations of use.

Click here for **'User Guide'**

Click here for current **'Design and Cost Guidance'**

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Sport England
1st Floor
21 Bloomsbury Street
London
WC1B 3HF

Tel : +44 (0)8458 508 508

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