Noise Impact Assessment for Proposed Office And Leisure Facility, Bridge Farm, Holbeach Road, Peterborough, Cambridgeshire, PE12 6JP



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1.0 Introduction

1.0.1 E2 Consultants have been appointed to undertake an environmental noise assessment for the construction of four internally located Padel courts at Bridge Farm, Holbeach Road, Peterborough, Cambridgeshire, PE12 6JP. The assessment considers the impact of environmental noise on the nearby noise-sensitive residential properties.

1.0.2 The assessment includes the prediction of noise emission from the padel courts at the nearby noise-sensitive properties, based on noise level data from activities measured at existing courts and existing noise levels measured on site.

1.0.3 The author of this report is an Associate Member of the Institute of Acoustics (AMIOA) with over fifteen years' experience in the industry.

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2.0 The Site

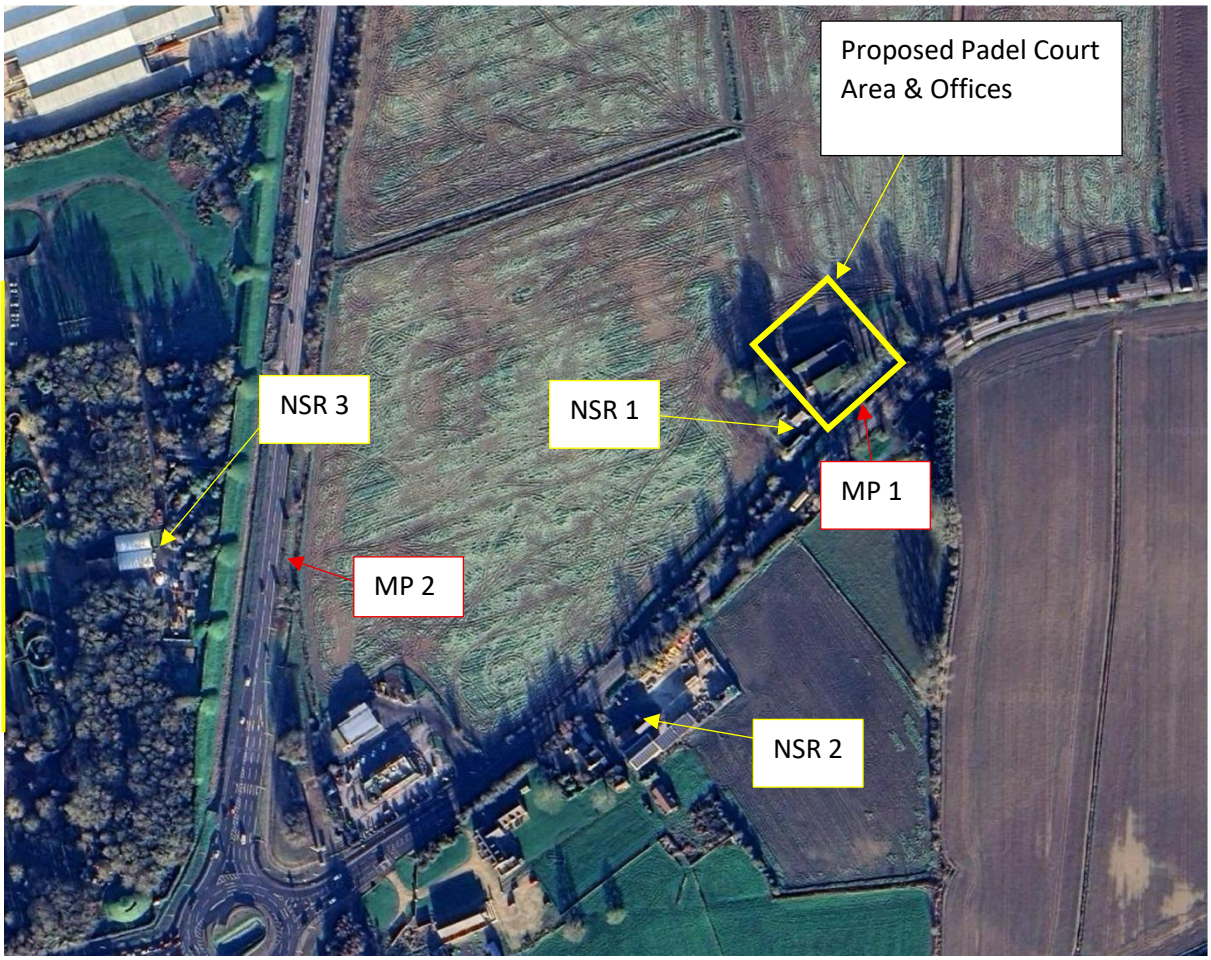
2.0.1 The development site is currently vacant field areas with existing farm buildings on site. These are due to be demolished and replaced by the proposed buildings but the main road-side dwelling is to remain. Offices will also be constructed on the proposed site. This will also act as a natural sound barrier to the padel courts' location

2.0.2 It is proposed to construct three Padel courts, 2 x double courts and 1 x single court, to the North of the A16 road and North-East of the existing dwelling

2.0.3 The proposed hours of use are to be 07:00-22:00 Monday to Sunday and therefore the assessment conducted within this report will be within 'daytime' hours.

2.0.4 The proposed site plan and site location are provided on the figures below:

Figure 1 – Main site plan



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Figure 2 – Proposed Site Plan Area



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3.0 Planning and Noise

3.1 National Planning Policy Framework

3.1.1 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. "

3.1.2 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

3.2.1 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.

3.2.2 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."

3.2.3 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

3.2.4 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

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

SOAEL – Significant Observed Adverse Effect Level

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

3.2.7 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.

3.2.8 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."

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

3.2.10 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."

3.2.11 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

3.3.1 The Planning Practice Guidance (PPG) on noise referred to here is based on the current version (July 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."

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

3.3.3 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.

3.3.4 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			

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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

3.3.5 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.

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4.0 Relevant Noise Guidance for Padel Assessment

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

4.0.2 This includes advice contained within the Sport England Design Guidance Note 'Artificial Grass Pitch (AGP) Acoustics – Planning Implications' which refers to the following documents. Whilst the Sport England guidance does not consider noise from Padel courts the methodology and referenced guidance documents are useful in considering potential noise impact.

4.1 LTA Padel Guidance Note

4.1.1. The Lawn Tennis Association has provided a guidance note on the construction of Padel Courts. With regard to planning and noise it states:

"The construction of a Padel court will require formal planning consent to be issued by the relevant Local Authority (For further information on how to obtain planning please refer to LTA guidance note on planning). The site developer will be responsible for obtaining planning consent and this will be excluded from most contractors' quotations. Careful consideration of the location of proposed padel courts should be given in relation to the impact of noise and light on adjacent residential properties. If a residential property is within 30m of the padel court then it is likely that sound attenuation mitigation will be required as well as noise and light surveys being required as part of the planning application."

4.2 World Health Organisation 'Guidelines for Community Noise'

4.2.1 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 Padel 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 L_{Aeq} 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 L_{Aeq}, 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 L_{Aeq}. The maximum sound pressure level should be measured with the sound pressure meter set at "fast"."

4.2.2 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_{Aeq}.

4.2.3 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

4.2.4 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.

4.2.5 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 Padel courts may be noticeable but not intrusive and is considered acceptable in planning terms.

4.2.6 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.

4.2.7 In our opinion, 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 stringent but appropriate assessment time

period of one hour, $L_{Aeq\ (1\ hour)}$, as this is the typical rental period for a sports facility. 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.

4.2.8 An alternative time period T which is reflective of a session on a Padel court may also be considered appropriate.

4.2.9 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."

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

4.3 Comparative Assessment

4.3.1 The criteria set out in section 4.1 is an absolute level in a dwelling or external amenity area. As such, it does not consider existing noise levels on or around the site. However, for certain applications it may be more suitable to consider a comparative assessment as part of the overall impact assessment.

4.3.2 For example, this would be a site where the existing noise levels already exceed the WHO guideline values. This existing noise for example, could be due to transportation noise or other sporting facilities.

4.3.3 In terms of noise level changes, withdrawn Planning Policy Guidance 24 states in the Glossary under dB (A) the following:

"Measurements in dB (A) broadly agree with people's assessment of loudness. A change of 3 dB (A) is the minimum perceptible under normal conditions, and a change of 10 dB (A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB (A); normal conversation about 60 dB (A) at 1 metre; heavy road traffic about 80 dB (A) at 10 metres; the level near a pneumatic drill about 100 dB (A)."

4.3.4 The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, Version 1.2 published in November 2014 categorises the significance of a change in noise level, this is summarised as follows and taken from Table 7-14 of the guidance.

Table 3: IEMA Impact from the Change in Sound Levels (Table 7-14)

Sound Level Change LpT	Long-term impact classification	Short-term impact classification
≥ 0 dB and < 1 dB	Negligible	Negligible
≥ 1 dB and < 3 dB		Minor
≥ 3 dB and < 5 dB	Minor	Moderate
≥ 5 dB and < 10 dB	Moderate	Major
≥ 10 dB	Major	

4.3.5 Where noise from the proposed development does not exceed the existing noise climate, the increase in noise will be no more than 3 decibels. It is expected there will be no observed effect on nearby residential properties. This would be applicable where noise levels currently exceed the WHO guidelines which would be used as a lower limit. The noise levels are both measured in the $L_{Aeq(T)}$ parameter over the same time period, T.

4.3.6 Where noise levels do not exceed the WHO guidelines, a higher change could be considered acceptable without having an observed adverse effect as the noise levels are suitably low.

4.4 Characteristics of Sound from Padel Courts

4.4.1 It is widely stated that noise from Padel courts is of a specific character which differs from many other sports including Tennis.

4.4.2 The main characteristics are stated to be that of the Padel hitting the ball and the specific action of deliberately and powerfully hitting the ball at the rear glass panel of the court to rebound it over the net.

4.4.3 From observations made of a number of Padel courts at different locations and being used by different groups we have observed that the most significant consistent source of noise is often that from voice during and in between rallies.

4.4.4 Noise from ball on Padel is also typical and frequent during use of a Padel Court.

4.4.5 Additional sounds are caused when the ball is hit powerfully against the rear glass panel of the court to rebound it over the net. This is a style of play within the game although was observed to take place relatively infrequently relative to other sounds.

4.4.6 Other loud sounds occur if a player runs into the glazed screes or hits the Padel off the screens. However, this is not a deliberate action and occurs infrequently.

4.4.7 Where impulsive sounds are frequent, they will determine the equivalent noise level and therefore the WHO guideline values would be applicable. This is likely to be the case in Padel where ball impacts are inherent to the sport

4.4.8 However, given the impulsive nature of the game play it is proposed that this should be assessed in addition to the equivalent noise parameter.

4.4.9 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.

4.4.10 During the daytime, a higher maximum noise level is likely to be permissible but is not stated in any relevant guidance documents.

4.4.11 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.

4.4.12 Alternatively, the impulsive character of the game play could be considered in the form of a correction to the equivalent noise level. The WHO guideline value would form the criteria for the predicted noise level plus character correction.

4.4.13 Impulsivity is considered in BS4142:2014+A1:2019, which states:

"A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible."

4.4.14 Alternatively, the impulsivity can be objectively assessed using the Nordtest Method Proposal "Objective method for the measurement of prominence of impulsive sounds and for adjustment of L_{Aeq}". This method determines a correction to the L_{Aeq} based on the onset rate and change in noise level.

4.4.15 It should be noted that none of the above are specific to Padel and their relevance is somewhat limited. However, in the absence of any specific guidance on Padel noise or on the effect of maximum noise levels on residential amenity during the day, the above is considered the most useful in determining the effect level of the proposals.

4.5 Proposed Assessment Methodology

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

4.5.2 It is proposed to assess the development against the WHO guidelines with corrections applied as appropriate. Where the predicted noise level of the Padel courts 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'.

4.5.3 The PPG states that the perception of 'No Observed Adverse Effect' is 'noticeable 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."

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

4.5.5 The predicted equivalent noise level is also to be compared against the existing noise climate and consideration of maximum noise levels will also be undertaken.

5.0 Site Noise Monitoring

5.5.1 A unattended site noise survey was undertaken between the 31th and 16th of March 2025. The purpose of the noise survey was to determine the existing ambient noise climate at representative locations of the nearest noise sensitive residential properties during the proposed hours of use.

5.1 Monitoring Equipment

5.1.1 Sound Pressure Levels were measured using Class 1 sound level meters with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

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5.2 Weather Conditions

5.2.1 During the survey, the weather was dry with no rain and the temperature ranged between 6 and 14 degrees Celsius. Wind speeds during the noise monitoring exercise was less than 4 metres per second, with a predominantly southerly direction. The weather conditions are not expected to have adversely affected the measured noise data. One small patch of rain was detected by audio but this was during the night-time period and therefore does not impact on this assessment.

5.3 Monitoring Procedure

5.3.1 Noise monitoring was undertaken in two representative locations of the nearest noise sensitive receivers to the proposed courts. Noise measurements were undertaken from 10.40am on 13/03/26 through until 15.49pm on 16/03/26.

5.3.2 During the measurements the noise climate was primarily determined by road traffic. The microphone was in a free-field position, approximately 2.5 metres above ground fixed to a lamp post at the A16 and Holbeach Road locations. The monitoring locations are shown on the figure below:

Figure 4: Monitoring locations for unattended assessment (MP 1 & MP 2)

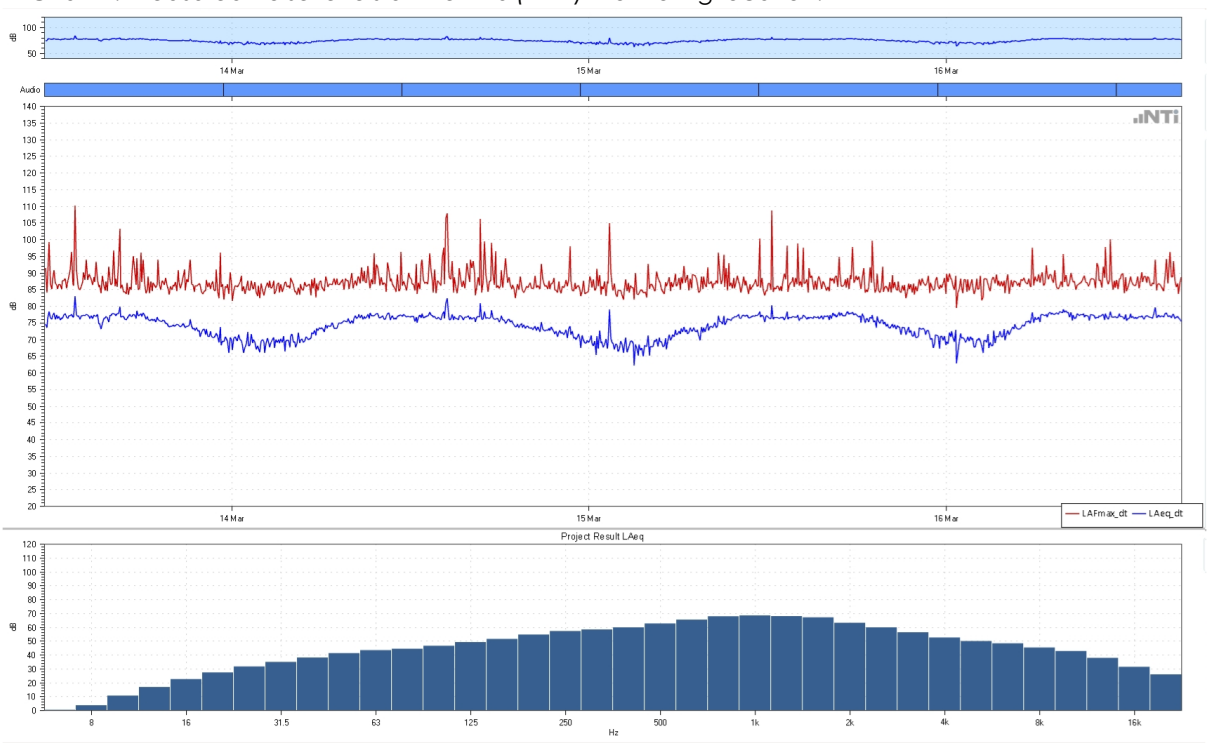


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5.4 Measured Noise Levels – South/Field/NSR Location

5.4.1 The following chart provides the measured equivalent (dB $L_{Aeq,15minute}$) and L_{AMax} noise levels for the duration of the measurement period.

Chart 1: Measured noise levels at the A16 (MP2) monitoring location.



5.4.2 The following table provides the equivalent residual noise levels over each hour during the operating hours of the padel courts:

Table 5: Measured noise levels at the West MP2 monitoring location

Time (hh:mm)	$L_{Aeq,1\ hour}$ (dBA)	L_{A90_1hr} (dBA)
11.00	77	69
12:00	77	70
13:00	77	69
14:00	77	69
15:00	76	69
16:00	76	68
17:00	77	68
18:00	77	66
19:00	75	62
20:00	75	60
21:00	73	58

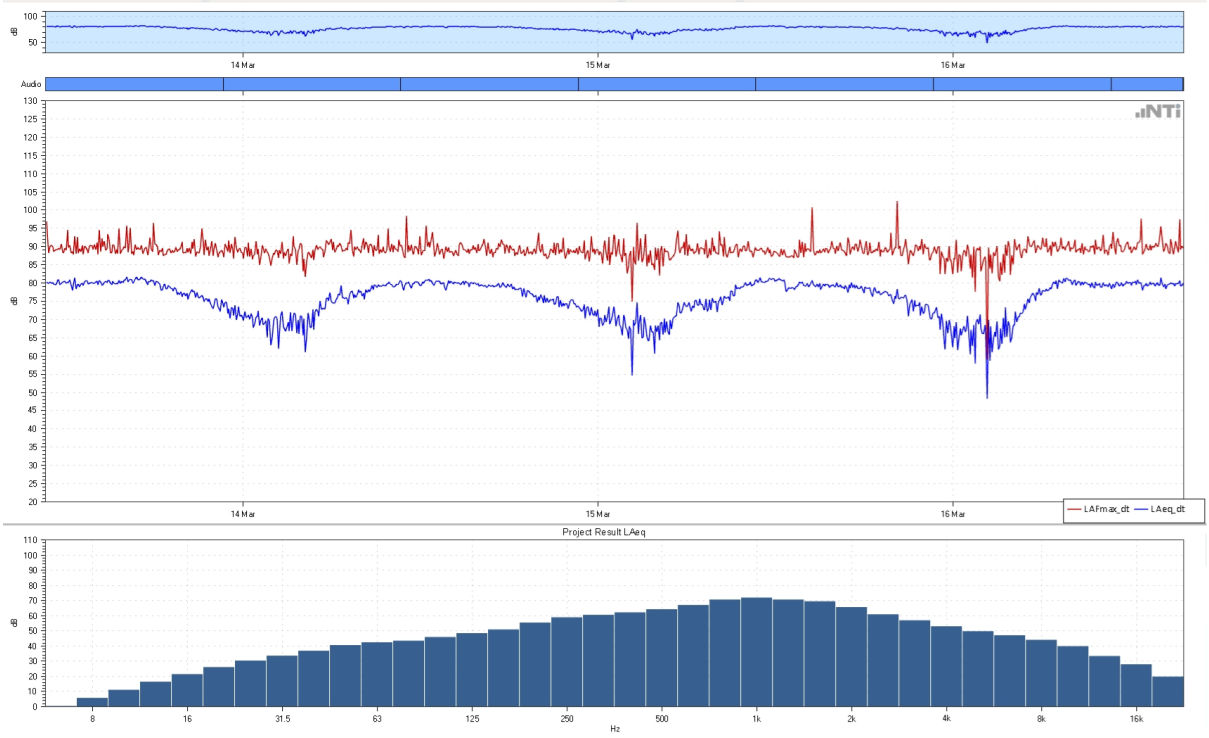
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22:00	73	55
07:00	74	62
08:00	77	64
09:00	77	67
10:00	77	69

5.4.3 The above measured noise levels are considered representative of the noise sensitive receivers closer to the A16 side of the site. This includes office buildings as well as residential/farm buildings. Thes are labelled as Noise Sensitive Receptor 3 (NSR3) in figure 1.

5.44 Chart 2 shows the Holbeach Road side of the site which has been used as a representative figure for traffic flow at the closest NSR; NSR1.

Chart 2: Measured noise levels at the Holbeach Rd (MP1) monitoring location.



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5.4.4 The following table provides the equivalent residual noise levels over each hour during the operating hours of the padel courts:

Table 6: Measured noise levels at the East MP 1 monitoring location

Time (hh:mm)	$L_{Aeq,1\ hour}$ (dBA)	L_{A90_1hr} (dBA)
11.00	80	68
12:00	80	70
13:00	80	70
14:00	80	69
15:00	80	69
16:00	80	68
17:00	80	67
18:00	80	66
19:00	79	64
20:00	77	59
21:00	76	56
22:00	74	53
07:00	77	59
08:00	79	62
09:00	79	66
10:00	80	68

5.4.5 The extreme levels of the Holbeach road are caused by multiple HGVs passing within 2m of the measurement location is it was on a roadside lamppost. The CadnaA noise modelling software will be used to get façade levels at the nearest NSRs; which are a few metres further back from the road.

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6.0 Noise Levels from Padel Courts

6.1 Impact sounds from Padel Court screens

6.1.1 Measurements were undertaken at Rocks Lane Multi Sports Centre club in Chiswick, London. The club is owned and operated by Rocks Lane sports facilities. The facility has four artificial turf padel court pitches.

6.1.2 Noise measurements were undertaken using an NTI sound level meter. The equipment was checked before and after use with the calibrator and no drift was detected. The equipment information and calibration status are as follows:

6.1.3 During the noise monitoring the conditions were calm, dry and overcast with an air temperature of 5 degrees centigrade. The conditions were considered suitable for noise monitoring.

6.1.4 Measurements of both activities were undertaken 20 metres from the padel pitch with a full view of the courts and behind the rebound wall. The monitoring location and pitches are shown below.

Figure 5: Monitoring location 'A' with padel court pitches in blue



6.1.5 During the survey there was a coaching session between two players where players took turns to hit balls at their own maximum speed against the nearest rebound panel to the monitoring location. The most significant noise was from this impact.

6.1.6 From the measured data a typical noise level of 59dB $L_{Amax,fast}$ was determined as representative of noise from a ball being directly and powerfully hit against the rear glazed screen of the courts.

6.2 Noise levels from Padel Court Games

6.2.1 Noise Monitoring was undertaken on the 16th of January 2025 at an existing Padel site in Alvechurch, Birmingham by Acoutstic Consulatnts Ltd. The purpose of the survey was to observe and measure noise from Padel games.

6.2.2 Two games by different user groups were measured during the survey

6.2.3 Noise measurements were undertaken using three NTI sound level meters. The equipment was checked before and after use with the calibrator and no drift was detected.

6.2.4 The measurement equipment was checked before and after use with the noted calibrators and no significant drift was detected.

6.2.5 During the noise monitoring the conditions were calm, dry and clear with an air temperature of 4 degrees centigrade. The conditions were considered suitable for noise monitoring.

6.2.6 Sounds from Padel activity included players voices, Padel hitting ball and infrequent forceful impacts on the glazed screens.

6.2.7 Residual noise affecting the measurement locations included road traffic, car park activity and people on a nearby artificial football pitch. These have been excluded from the measured noise levels.

6.3 **Measured Game 1**

6.3.1 For the first game noise levels were measured at two locations to the open side of the court at distances of 3m (location A) and 20m (location B) from the edge of the court. Location A had an almost unobstructed view of the entire playing area whilst, due to the glazed walls of the court, location B would have a partially obstructed view.

6.3.2 Noise levels were measured for an hour whilst the court was in use by the group. The following table provides the measured noise levels which have been corrected for residual noise.

Table 7: Padel noise levels from measured game 1

Measurement location	Equivalent Sound Pressure Level
Location A – 3 metres from the court	61dB $L_{Aeq,T}$
Location B – 20 metres from the court	51dB $L_{Aeq,T}$

6.3.3 The following table shows the octave-band equivalent noise level spectra of the measured padel use at 3 metres from the side of the court. The 63Hz octave band is not included due to the influence of road traffic noise on the measurement.

Table 8: Padel octave-band equivalent noise levels

Noise Source	Sound Pressure Level (dB $L_{eq,1hour}$) per Octave Band Centre Frequency (Hz)							dB $L_{Aeq,1hour}$
	125	250	500	1k	2k	4k	8k	
Padel court use at 3m distance	58	58	59	58	52	45	39	61

6.3.4 Maximum noise levels due to ball impacts at location B (20 metres from the court) typically range from 58 dB $L_{Af,max}$ to 68 dB $L_{Af,max}$ with the highest level being 70dB $L_{Af,max}$.

6.4 Measured Game 2

6.4.1 For the second game noise levels were measured at location C which was 5 metres from the side of the court. Subjectively the players were louder with more talking and shouting although noise from the play itself was similar to game 1.

6.4.2 Noise levels were measured whilst the court was in use by the group. The following table provides the measured noise levels which have been corrected for residual noise.

Table 9: Padel noise levels from measured game 2

Measurement location	Equivalent Sound Pressure Level
Location C – 5 metres from the court	60dB $L_{Aeq,T}$

6.4.3 Maximum noise levels due to ball impacts at location C (5 metres from the court) typically range from 65dB $L_{Af,max}$ to 70dB $L_{Af,max}$ with the highest level being 77dB $L_{Af,max}$.

6.5 Comparison with data by others

6.5.1 To ensure the data collected is accurate we have reviewed data by other professionals which is publicly available. This additional data ranges from 58dB $L_{Aeq,T}$ at 5 metres to 63dB $L_{Aeq,T}$ at 2 metres. The data collected by E2 is comparable to that by others and is therefore considered representative and suitable for use in the assessment.

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7.0 Noise Modelling Methodology

7.0.1 The measured noise 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. This has been done both for the existing noise levels and then for the predicted impact from the proposed site.

7.0.2 The modelling has been undertaken using noise mapping software CadnaA by DataKustik. This uses the calculation method of ISO 9613:2024 to predict noise levels.

7.0.3 The prediction of equivalent noise levels is based on the noise modelling methodology using an area source covering the playing surface 1 metre from the edge as the noise source. The area source is at a height of 1.5 metres representative of head height.

7.0.4 To validate the modelling methodology, we created a number of noise models using different shape area sources and multiple point sources at different locations on the court.

7.0.5 No significant variation in noise propagation was found between the different models and therefore we propose using an area source. This is similar to the Sport England guidance and allows for the fact that over the course a game the sound sources (voices and ball hits) will occur as numerous discrete points over the court and not a number of fixed locations.

7.0.6 For predicting maximum noise levels a point source has been used as an individual event will occur at a specific location.

8.0 Noise Emission Prediction

8.1 External Noise Levels

8.1.1 The external noise levels have been calculated by using calibrated sound power levels of each noise source stated in Section 6.

8.1.2 E2 have assumed an overall absorption coefficient of 0.1 to all internal surfaces. This is considered a reasonable assumption for reflective internal surfaces and the inclusion of the courts, furnishing, and people within the space.

8.2 Noise Modelling Parameters

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

8.2.2 The surrounding area has been determined from Google Maps imagery.

8.2.3 Nearby residential dwellings in the vicinity of the playing fields have been built within the model. The height of these buildings has been determined via Google Maps imagery.

8.2.4 The noise sources have been included as a noise generating area source for each of the four courts.

8.2.5 Third-order reflections are calculated.

8.2.6 The topography of the site and surrounding area is predominantly flat between itself and the nearest NSRs.

8.2.7 The sound reduction provided 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 9613:2024.

8.2.8 The noise map in Figures 9, 10, 11 and 12 below show noise emission from the courts predicted 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. Figures 6, 7 and 8 shows the existing soundscape across the area at the specified Noise Sensititve Receptor (NSR) points.

9.0 Predicted Noise Levels

9.0.1 The following figure shows the existing equivalent noise level prior to the installation of the proposed courts.

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Figure 6: Existing noise levels– NSR 1

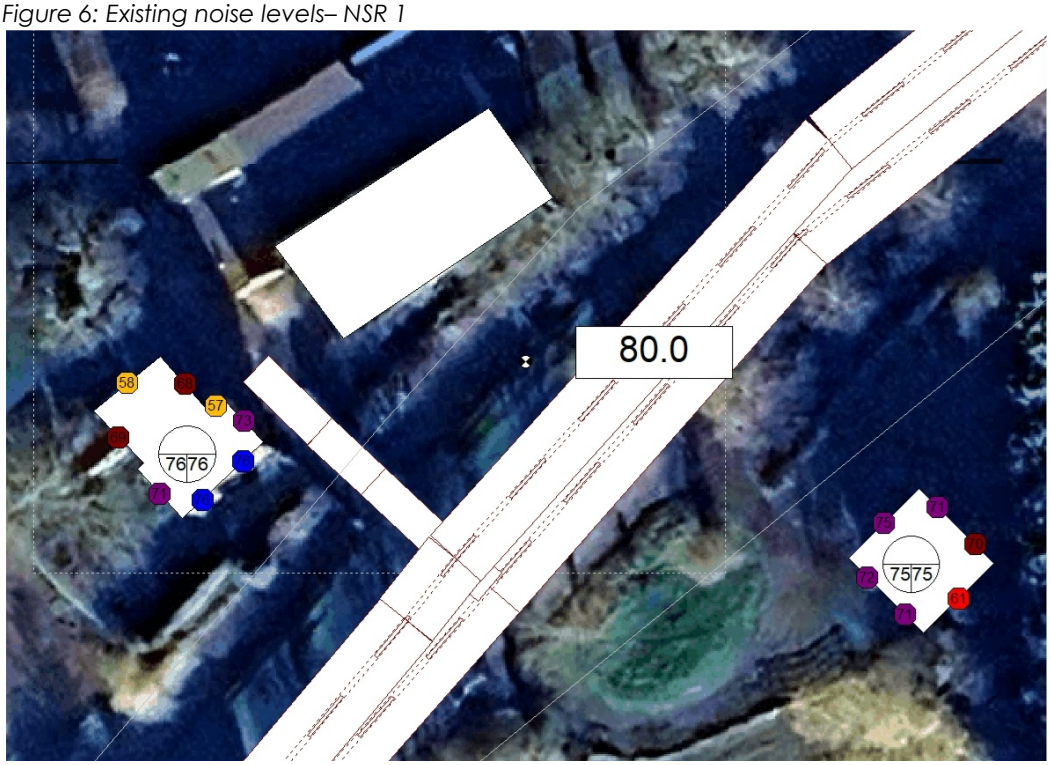


Figure 7: Existing noise levels– NSR 2

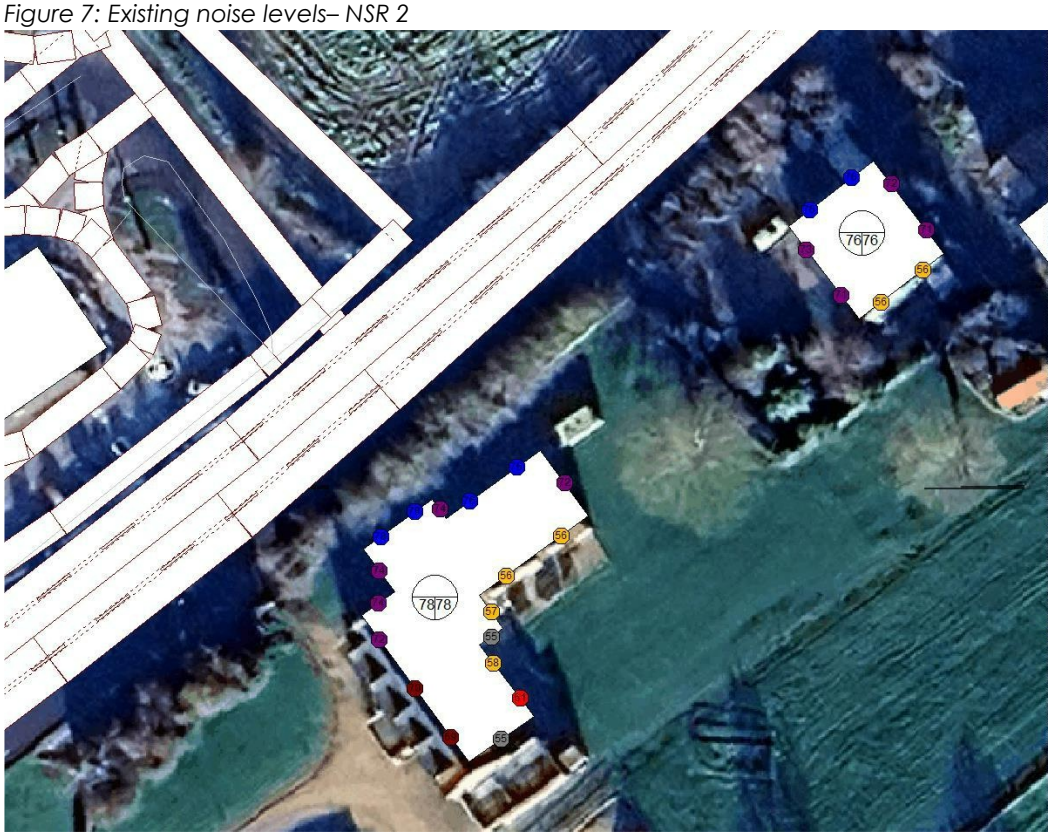


Figure 8: Existing noise levels– NSR 3

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9.0.2 Figures 9, 10, 11 and 12 show the same NSR receptor points with the impact from the proposed courts. There are currently no proposals for external AC units so all predictions are made based on the padel courts (with all 3 active at the same time) and traffic to and around the site.

Figure 9: Predicted noise levels from Padel courts and traffic movement on site– NSR 1

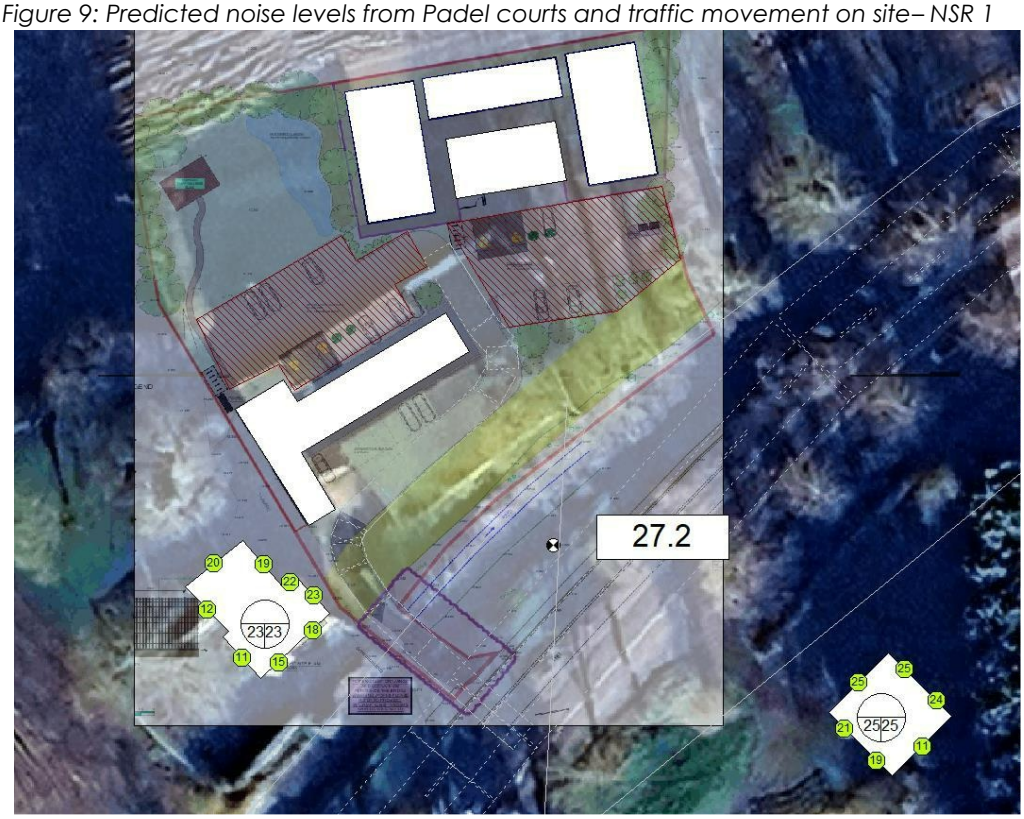


Figure 10: Predicted noise levels from Padel courts and traffic movement on site – NSR 1, 3D view

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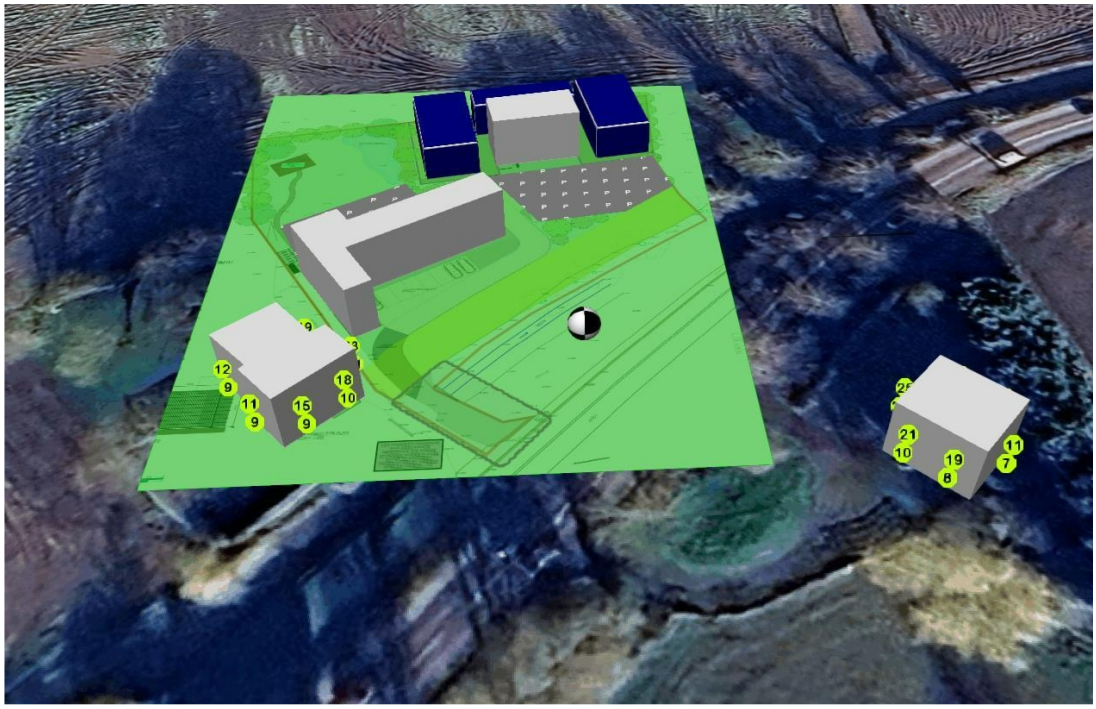


Figure 11: Predicted noise levels from Padel courts and traffic movement on site – NSR 2



Figure 12: Predicted noise levels from Padel courts and traffic movement on site – NSR 3

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9.0.2 Table 10 shows the summary of the predicted noise impact at the 3 locations. This is taken as an averaged daytime level versus the lowest background noise level. This provides the greatest chance of an adverse nosie impact taking place. Predictions for the buildings have been based on single brick skin or equivalent level of sound attenuation. This more than likely underestimates the noise attenuation provided by the building and therefore represents a worst-case scenario for the noise impact on the surrounding area. All buildings have been assumed to be the same compostion for the purposes of this report.

Table 10 – Noise impact comparision for predicted vs existing noise levels at the identified NSRs

Location	Existing L_{Aeq_t}	Lowest Existing Background Noise L_{A90}	Predicted Noise Level L_{Aeq_t}	Difference to Background
NSR 1 (Front)	76dBA	53 dBA	18 dBA	-35 dBA
NSR 1 (Rear)	58dBA	53 dBA	23 dBA	-30 dBA
NSR 2 (Front)	78 dBA	53 dBA	12 dBA	-41 dBA
NSR 2 (Rear)	56 dBA	53 dBA	3 dBA	-50 dBA
NSR 3 (Front)	70 dBA	56 dBA	9 dBA	-47 dBA

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10. Assessment of noise impact

10.1 Comparison with WHO 1999 threshold for community annoyance

10.1.1 The highest predicted noise level from the simultaneous use of the proposed courts is 23 dBA L_{Aeq_1hr} at the facades of the nearest noise sensitive dwellings. This is at first-floor level. The ground floor level is predicted to be a maximum of 21dBA $L_{Aeq_1hr.}$

10.1.2 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.

10.1.3 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 8-10 dB $L_{Aeq_1\ hour}$ at the closest NSR (NSR 1).

10.1.4 The highest predicted noise level in the gardens is 26 dB $L_{Aeq\ (1\ hour)}$, which is below the proposed criterion of 50 dB $L_{Aeq\ (1\ hour)}$.

10.2 Comparison with existing noise climate

10.2.1 The lowest measured existing ambient noise level is 57dB $L_{Aeq,T}$ at NSR1, 55dBA L_{Aeq_t} at NSR 2 and 52dBA L_{Aeq_t} at NSR 3 for use between 07:00 and until 22:00 hours. These values were measured as an average hourly figure from 7-10pm.

10.2.2 The highest predicted equivalent noise level from the use of the proposed courts and offices is 23 dB L_{Aeq_1hr} at the nearest noise sensitive dwellings and 26dBA L_{Aeq_t} at the residential gardens.

10.2.3 The additional noise from the Padel courts will not result in an increase in the existing ambient noise climate. Therefore, according to the IEMA guidelines, the padel courts are not expected to provide any long-term impact and is therefore considered acceptable.

10.2.4 The background noise level, L_{A90}, ranged from 53-70dBA $L_{A90_1hr.}$ The predicted highest noise impact value (with all sources within the court and the office area acting simultaneously) would provide a -35 to -50dB noise impact on the nearest NSR location. This meets the criteria set by the local council for there to be no more than background noise levels at any point during the day. Again, this is based on the worst-case scenario for noise output from the proposed development. This is not expected to be constant for the site.

10.3 Assessment of maximum noise levels

10.3.1 The predicted maximum noise level from ball strikes is 23 dB $L_{Af,max}$ at the facades of the worst case dwellings, and 26 dB $L_{Af,max}$ in the nearest residential gardens.

10.3.2 As noted above 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. However, the courts are not expected to be in use during the night-time periods (2300 – 0700).

10.3.3 During the daytime, a higher maximum noise level is likely to be permissible but is not stated in any relevant guidance documents.

10.3.4 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 giving an external criterion of 65 dB $L_{Af,max}$.

10.3.5 The predicted maximum noise levels are well below the noted criteria.

10.4 Consideration of Noise Characteristics

10.4.1 The predicted maximum noise level from ball strikes is 26 dB $L_{Af,max}$ at the worst case. This is equal to the lowest measured existing equivalent ambient noise level (36dBA L_{Aeq_1hr}). Given this equivalence, this would be unlikely to be noticeably audible at the nearest NSR garden area.

10.4.2 Using the subjective corrections of BS4142:2014+A1:2019, even a clearly perceptible interpretation of the sound would provide a penalty with a maximum value of +9 dB correction. This would provide a value of 35dBA L_{Amax} at the nearest NSR rear façade. This value would still be 18dBA below the background noise level. Even if there is significant shielding (such as acoustic fencing protection from the road noise) the value is unlikely to be low enough for there to be any audibility or adverse impact from the proposed padel courts.

10.4.3 This corrected level also falls below the WHO1999 guideline value for the onset of moderate community annoyance even when the noise characteristics are considered.

10.5 Determination of noise impact

10.5.1 Based on the different assessments above it is concluded that with regards to planning policy, noise from the development would potentially be noticeable but not intrusive and would result in 'no observed adverse effect'.

10.5.2 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.' It is expected that the actual outcome of the construction of the padel courts will not even reach this level.

10.5.3 This would fall below the Lowest Observed Effect Level and is considered acceptable in planning terms.

11.0 Summary and Conclusions

11.0.1 E2 Consultants were appointed to undertake an environmental noise assessment for the construction of three internally located Padel courts at Bridge Farm, Holbeach Road, Peterborough, Cambridgeshire, PE12 6JP. The assessment considers the impact of environmental noise on the nearby noise-sensitive residential properties.

11.0.2 The assessment includes the prediction of noise emission from the courts at the nearby noise-sensitive properties, based on noise level data from activities measured at existing courts and existing noise levels measured on site.

11.0.3 It is proposed to construct three Padel courts within the existing development area as well as office building and clubhouse area to the South of the courts. The clubhouse is not expected to be a noise-emitting location. If this changes an update to the assessment may be required but the difference between the predicted noise impact of the padel courts and the background noise at the nearest NSRs mean that levels would need to be significant for there to be any likelihood of noise impact from the development as a whole post construction.

11.0.4 For the assessment, noise breakout from both the courts and traffic for the office areas has been assessed in depth to determine the noise impact on the surrounding NSRs.

11.0.5 The assessed hours of use are between 07:00 and 22:00, Monday to Sunday.

11.0.6 Based on the different assessments above it is concluded that, with regards to planning policy, noise from the development would be

potentially noticeable but not intrusive and would result in 'no observed adverse effect'.

11.0.7 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.'

11.0.8 This would fall below the Lowest Observed Effect Level and is considered acceptable in planning terms.

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Appendix A – Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LAeq,T).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

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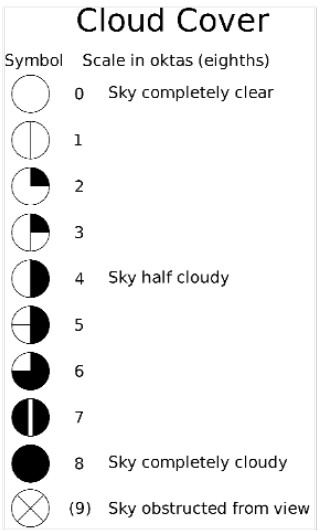
Appendix B - Noise Survey Instrumentation

Type	Manufacturer	Model	Serial Number	Last Cal	Cal Due
SLM	NTi	XL2-TA	A2A-18475-E0	12/11/2024	12/11/2026
Pre-amp	NTi	MA220	9378	12/11/2024	12/11/2026
Microphone	NTi	MC230A	A19093	12/11/2024	12/11/2026
Calibrator	NTi	CAL200	19829	12/11/2024	12/11/2026
SLM	NTi	XL2-TA	A2A-18928-E0	06/11/2025	06/11/2027
Pre-amp	NTi	MA220	9785	06/11/2025	06/11/2027
Microphone	NTi	MC230A	A20919	06/11/2025	06/11/2027

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Appendix C – Weather Conditions Chart Used

(Blank version)

<table>
<tr><th colspan="5">Weather Conditions</th></tr>
<tr><th>Measurement Location</th><th>Date/Time</th><th>Description</th><th>Beginning of Survey</th><th>End of Survey</th></tr>
<tr><td></td><td></td><td>Temperature:</td><td></td><td></td></tr>
<tr><td colspan="2" rowspan="8">
</td><td>Precipitation:</td><td></td><td></td></tr>
<tr><td>Cloud cover (oktas - see guide)</td><td></td><td></td></tr>
<tr><td>Presence of fog/snow/ice</td><td></td><td></td></tr>
<tr><td>Presence of damp roads/wet ground</td><td></td><td></td></tr>
<tr><td>Wind Speed (m/s)</td><td></td><td></td></tr>
<tr><td>Wind Direction</td><td></td><td></td></tr>
<tr><td>Conditions that may cause temperature inversion (i.e. calm nights with no cloud)</td><td></td><td></td></tr>
</table>

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Appendix D – CadnaA Noise Calculations

Available upon request (76 pages)