



# Proposed 3G Sports Pitch St Iltyd's Catholic High School

## Sports Pitch Noise Impact Assessment

For Mace Group

---

Date *8 February 2023*

Doc ref *CSSS-HYD-S2-XX-RP-Y-0001*



# Document control sheet

Issued by	Hydrock Consultants Limited Wharton Place 13 Wharton Street Cardiff CF10 1GS United Kingdom	T +44 (0)2920 023 665 E cardiff@hydrock.com hydrock.com
Client	Mace Group	
Project name	Proposed 3G Sports Pitch St Illtyd's Catholic High School	
Title	Sports Pitch Noise Impact Assessment	
Doc ref	CSSS-HYD-S2-XX-RP-Y-0001	
Project number	20700	
Status	S2	
Date	08/02/2023	

Document production record		
Issue number	P01	Name
Prepared by	Rhodri Owen MIOA BSc Hons, PGDipIOA	
Checked by	Tom Quaife-Jones	
Approved by	Tom Quaife-Jones	

Document revision record			
Issue number	Status	Date	Revision details
P01	S2	08/02/2023	For information and to accompany planning applications.

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

# Contents

<b>1.</b>	<b>Introduction</b> .....	<b>3</b>
<b>2.</b>	<b>Outline Description of Proposed Development</b> .....	<b>3</b>
<b>3.</b>	<b>Guidance Criteria</b> .....	<b>5</b>
3.1	<i>World Health Organisation: Guidelines on Community Noise (1999)</i> .....	5
3.2	<i>BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings</i> .....	5
3.3	<i>Sport England AGP Design Guidance</i> .....	5
3.4	<i>Proposed Assessment Methodology - Noise Modelling</i> .....	6
<b>4.</b>	<b>Environmental Noise Survey</b> .....	<b>7</b>
4.1	<i>Procedure</i> .....	7
4.2	<i>Weather Conditions</i> .....	7
4.3	<i>Equipment</i> .....	8
4.4	<i>Results</i> .....	8
<b>5.</b>	<b>Noise Impact Assessment</b> .....	<b>9</b>
5.1	<i>Noise Modelling</i> .....	9
5.2	<i>Assessment Results - Discussion</i> .....	9
<b>6.</b>	<b>Summary</b> .....	<b>11</b>

## Tables

Table 1: Survey Equipment.....	8
Table 2: Continuous Monitoring Survey Results.....	8

## Figures

Figure 1: Proposed 3G Pitch Layout (Option 1) - St Illtyd School .....	3
Figure 2: Proposed 3G Pitch Layout (Option 2) - St Illtyd School.....	4
Figure 3: Site Plan Showing Measurement Location.....	7

## Appendices

Appendix A	Acoustic Terminology
Appendix B	Weather Time History
Appendix C	Measurement Time History
Appendix D	Noise Map Predictions

## 1. Introduction

It is proposed to develop a 3G sports pitch on land within the existing St Illtyd's Catholic High School, Cardiff site. It is understood the sports pitch is to have flood-lighting and could therefore operate outside of school hours, into the early evening period. For this assessment, it is assumed that the sports pitch could operate between the hours 07:00-21:00.

The aim of this assessment report is to identify the likely noise impact of sports pitch activity to nearby noise-sensitive receivers; and, if necessary, outline possible noise mitigation measures to reduce the noise impact.

Possible noise mitigation measures are specified with the aim of limiting overall noise impact and reducing sports pitch activity noise levels, inside a dwelling and private gardens, to within proposed guidance criteria.

## 2. Outline Description of Proposed Development

It is understood there are 2no options for 3G sports pitch layout being considered. A site plan of each option proposal is shown in Figure 1 and Figure 2 below;

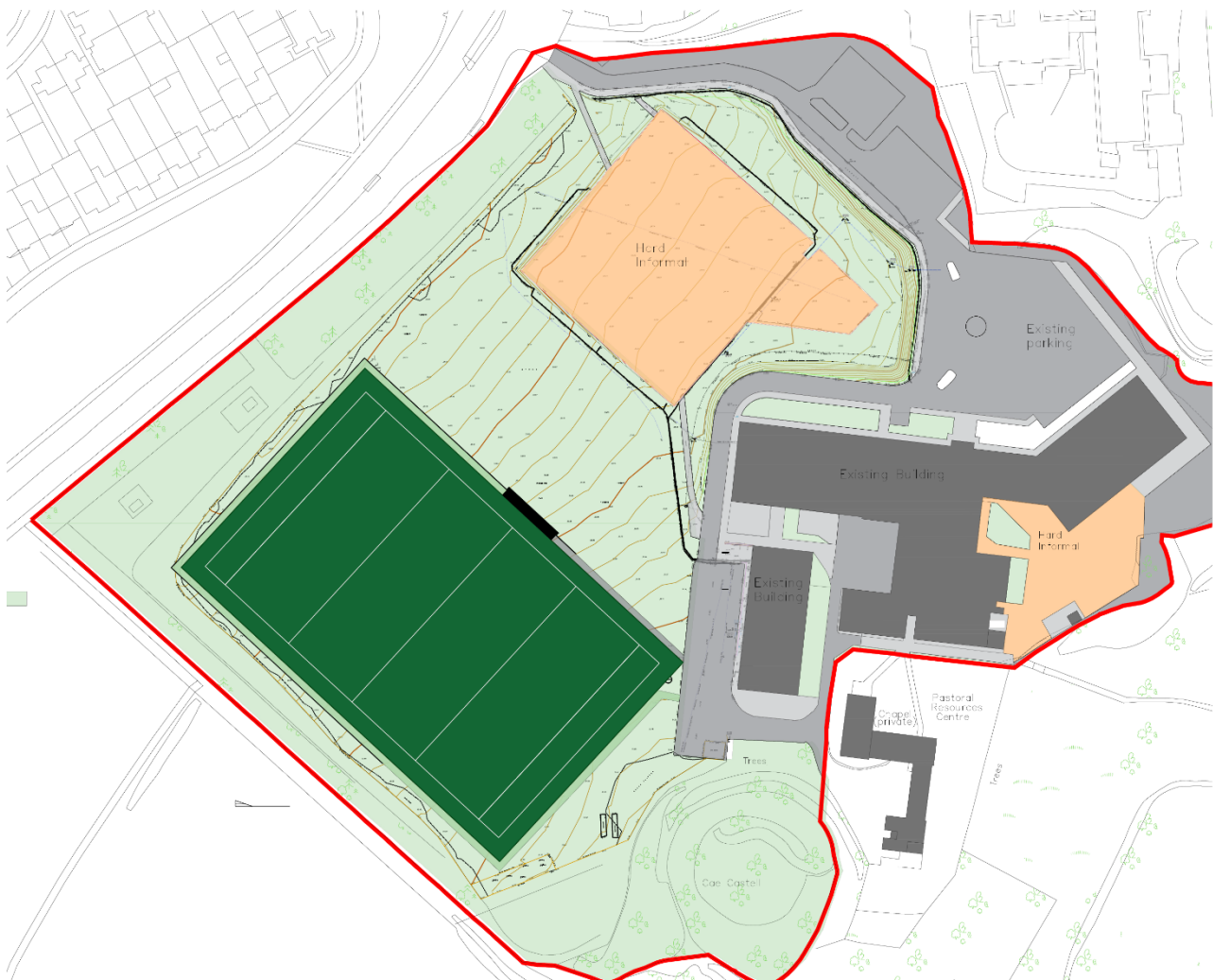


Figure 1: Proposed 3G Pitch Layout (Option 1) - St Illtyd School



Figure 2: Proposed 3G Pitch Layout (Option 2) - St Illtyd School

The nearest noise-sensitive receivers include:

- » Residential dwellings on Ilfracombe Crescent, to the north
- » New residential dwellings currently being built on the 'Aspen Grove' site located immediately adjacent to the school, to the southwest.
- » Quarry Hill Lodge Apartments & Care Home, to the northeast.
- » Residential dwellings off Greenway Road

### 3. Guidance Criteria

There is no recognised assessment methodology for determining the impact of noise from sports pitch activity. However, there is guidance on defining appropriate criteria for sports pitch noise levels at noise-sensitive receivers, based on existing guidance which is applicable to anonymous noise without a distinct character (i.e. road traffic noise).

A summary of the most relevant criteria is provided below.

#### 3.1 World Health Organisation: Guidelines on Community Noise (1999)

The World Health Organisation (WHO) document 'Guidelines for Community Noise', provides guidance on noise levels that may impact on the local community.

The WHO guidelines state 'During daytime, few people are highly annoyed at  $L_{Aeq}$  levels below 55 dB(A), and few are moderately annoyed at  $L_{Aeq}$  levels below 50 dB(A).'

The above recommendations relate to external noise levels at residential properties. They are usually considered to apply to anonymous noise without a distinct character. However, they are often also applied to noise from sports facilities and other normal community noise which does not provoke a strong negative reaction.

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.

#### 3.2 BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

BS8233:2014 'Guidance on sound insulation and noise reduction for buildings', provides guidance for acceptable internal noise levels within and external to residential dwellings which are derived from the WHO Guideline Level.

Table 4 within BS8233:2014 states that to achieve desirable living conditions, ambient noise levels should be 35 dB  $L_{Aeq,16hour}$  or less within Living rooms, and 40 dB  $L_{Aeq,16hour}$  within dining rooms during the day (07:00 to 23:00). Table 4 Note 7 from Bs8233:2014, states that where noise levels are 5dB higher, reasonable living conditions can still be achieved.

A partially open window typically provides 15 dB of attenuation (as assumed by the WHO Guidelines) therefore applying this to the indoor targets for living rooms provides external noise limits at the façade of:

BS8233:2014 - Desirable internal conditions: Façade noise levels <50dB  $L_{Aeq,16hour}$

BS8233:2014 - Reasonable internal conditions: Façade noise levels <55dB  $L_{Aeq,16hour}$

#### 3.3 Sport England AGP Design Guidance

The document "Sport England Design Guidance Note - Artificial Grass Pitches (AGP's) - Planning Applications - New Guidance 2015" sets out a methodology for assessing noise impact from sports pitches, and provides target noise limits for residential dwellings in proximity to sports pitches.

The Sport England document is not endorsed by either the Institute of Acoustics (IOA) nor the Association of Noise Consultants (ANC) and is therefore the opinions of the select authors.

The Sport England document states that a typical free-field noise level of 58 dB  $L_{Aeq,1hour}$  at a distance of 10 metres from the side line halfway marking has been determined as representative of noise from an Artificial Grass Pitch. The Sport England guidance is based on adult sports, and noise levels from school pitches may be lower.

The Sport England document suggests that noise levels of 50 dB  $L_{Aeq,1\text{hour}}$  should not be exceeded at the façade of residential dwellings, but goes on to state that ‘it is not necessarily the case that where these levels are exceeded, the noise will adversely affect residential properties.’

### 3.4 Proposed Assessment Methodology - Noise Modelling

The Sport England document states that the typical free-field noise level of 58 dB  $L_{Aeq,1\text{hour}}$  at a distance of 10 metres from the side line halfway marking has been determined as representative for noise from an Artificial Grass Pitch (AGP).

An acoustic noise model has been generated based on noise levels specified within the Sport England document in order to predict an overall AGP noise contribution at the facades of the nearest residential dwellings.



## 4. Environmental Noise Survey

### 4.1 Procedure

A noise survey of the school site was undertaken over the period of 15 to 16 December 2022 to measure ambient sound levels affecting existing dwellings in the vicinity. The noise measurement location is shown in Figure 2 below.

Measurements were undertaken in accordance with guidance outlined in BS 4142:2014+A1 2019 and BS 7445-1:2003. Measurement positions were free-field.

Measurement position LT1 was 1.5m above local ground level and 175m from Newport Road to the north. The ambient and background sound climate at position LT1 is deemed representative of the most critical residential receivers in proximity of the proposed sports pitch.



Figure 3: Site Plan Showing Measurement Location

### 4.2 Weather Conditions

Approximate weather conditions for the area during the survey period can be viewed in Appendix B.

To summarise, conditions were generally dry, calm and cold.



### 4.3 Equipment

The following equipment was used for the monitoring survey:

Table 1: Survey Equipment

Monitoring ID	Equipment	Manufacturer	Instrument	Serial No.	Date of Last Laboratory Calibration
LT1	Sound Level Meter	NTi Audio	XL2-TA	A2A-20607-E0	27/05/2022
	Pre-amp		MA220	10684	27/05/2022
	Microphone		MC230A	A23089	27/05/2022
	Calibrator	Cirrus	CR:515	95714	14/06/2022

Sound level meters were calibrated immediately before and after the monitoring survey period - no drift in calibration level was observed. Wind shields were fitted to measurement microphones at all times.

Copies of calibration certificates for all equipment are available upon request.

### 4.4 Results

Three main acoustic parameters were measured using a time interval as stated in Table 1:

- »  $L_{Aeq,T}$  dB, defined as the 'A' weighted equivalent continuous sound pressure level. Over a defined time period 'T', it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. It is often referred to as the 'ambient noise level'.
- »  $L_{Amax,F,T}$  dB, defined as the 'A' weighted maximum sound pressure level that occurred during the time period 'T' acquired using a 'fast' time weighting (i.e. a sample every 125ms). It is commonly used to describe the highest noise level that occurred during an event such as a vehicle pass-by.
- »  $L_{A90,T}$  dB, defined as the 'A' weighted sound pressure level exceeded for 90% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe the prevailing background noise level.

The noise level time history over the full measurement period at LT1 Position is presented in Appendix C.

Observations made on site and of audio recorded during the survey, the ambient sound climate across the site was controlled by distant road traffic noise. There were instances where monitoring was affected by construction activity on the neighbouring Aspen Grove residential site - this has been excluded from the assessment.

Table 2 below shows the range of measured 1-hour sound pressure level values for the daytime and evening periods, when sports pitch activity is deemed likely to occur:

Table 2: Continuous Monitoring Survey Results

Monitoring Position	Range of $L_{Aeq,1hr}$ (dB) (07:00 - 21:00)	Range of $L_{AFmax,1hr}$ (dB) (07:00 - 21:00)	Range of $L_{A90,1hr}$ (dB) (07:00 - 21:00)
LT1	50 - 55	58 - 75	47 - 51

The values above are used as a basis for carrying out the noise impact assessment.

## 5. Noise Impact Assessment

### 5.1 Noise Modelling

A noise model has been created using SoundPLAN v.8.2 environmental noise prediction and mapping software.

The modelling was carried out on the basis of:

- » Ground absorption set to 0.5
- » Order of reflection set to 2
- » Temperature 10C and 70% humidity
- » Reflection loss from buildings set to 2 dB

The area source within the model, used to represent the proposed sports pitch, has been calibrated to a source noise emission level of 58dB  $L_{Aeq}$  @ 10m from the edge of the halfway line, as per Sport England guidance.

Noise Maps in Appendix D show predicted noise contribution from the proposed 3G sports pitch at ground floor and first floor levels, respectively. Noise maps have been generated for all sports pitch layout options (Options 1A, 1B & 2).

### 5.2 Assessment Results - Discussion

The following assessments are made for each sports pitch layout option.

#### 5.2.1 Options 1A & 1B

Noise map results indicate a maximum predicted sports pitch noise level of 54dB  $L_{Aeq,1hr}$  at the most critical residential façade (residential dwelling within the Aspen Grove site). However, a majority of dwellings surrounding the proposed sports pitch have predicted façade levels at around 42-52dB  $L_{Aeq,1hr}$ .

Predicted noise levels from sports pitch activity are indicated to exceed the suggested  $\leq 50$ dB  $L_{Aeq,1hr}$  Sport England criteria at critical facades to dwellings within the Aspen Grove site. However, predicted sports pitch noise levels are shown to be within the measured range ambient noise levels for the site; therefore, the likely impact of the pitch to residences is unlikely to be major.

In order to achieve a  $\geq 5$ dB reduction in sports pitch noise to the most critical residences, a minimum 3m high noise barrier (i.e. an imperforate fence or wall) could be constructed along the southwestern long edge of the pitch. Any noise barrier solution should be constructed as close to the sports pitch (noise source) as practicable, in order to achieve maximum screening to surrounding residences.

In addition to the above mitigation, in line with good practice, any proposed weld-mesh sports fencing around the sports pitch should be sufficiently stiff/robust to avoid high levels of metal impact noise and resonating fence sections. Any low-level boundary retention system could be 'padded' to avoid high impact noise.



### 1.1.1 Option 2

Noise map results indicate a maximum predicted sports pitch noise level of 52dB  $L_{Aeq,1hr}$  at the most critical residential façade (Quarry Hill Lodge Apartments).

Considering the likely higher ambient noise levels at Quarry Hill Lodge Apartments (due to closer proximity to Newport Road traffic), the noise impact of a sports pitch is likely to be less significant than compared with the ambient sound climate measured at position LT1. Therefore, additional noise mitigation measures by form of a noise barrier are not deemed necessary at this stage.

Predicted noise levels from sports pitch activity are indicated to marginally exceed the suggested  $\leq 50$ dB  $L_{Aeq,1hr}$  Sport England criteria at critical Quarry Hill Lodge Apartment facades, by 2dB - this is not considered significant.

### 5.2.2 WHO / BS 8233:2014

It can be assumed that the proposed sports pitch is to be used occasionally (i.e. not continuously between the hours of 0700-2100hrs, every day of the week). Therefore, daytime external  $L_{Aeq,16hr}$  ambient noise levels, inclusive of sports pitch activity, are deemed likely to fall to  $\leq 55$ dB  $L_{Aeq,16hr}$  at the most critical residential dwelling façades. At  $\leq 55$ dB  $L_{Aeq,16hr}$ , 'desirable' internal ambient noise level criteria for living rooms can be achieved based on a 15dB sound reduction through a partially-open window (as assumed by the WHO Guidelines), in line with BS 8233:2014 guidance criteria.

Daytime external ambient noise levels in private gardens are also likely to satisfy the BS 8233/WHO upper guideline limit of  $\leq 55$ dB  $L_{Aeq,16hr}$ .

## 6. Summary

It is proposed to develop a 3G sports Pitch on land within the St Illtyd's Catholic High School grounds. There two differing pitch layouts being considered for development. It is understood the sports pitch is to have flood-lighting and operate outside of school hours, into the early evening period (assumed up to 21:00).

An environmental noise survey was conducted to establish existing ambient and background sound levels across the site, at the nearest residential dwellings to the proposed sports pitch.

A noise model has been generated based on proposed site plans and sports pitch source noise levels, as defined in Sports England Guidance.

Option 1A & 1B noise model predictions indicate sports pitch noise impinging the most critical residential dwelling façade will exceed Sport England guidance criteria. A 3m-high noise barrier solution has been outlined in order to mitigate sports pitch noise to the most critical Aspen Grove residences, located south-west of the site.

For Option 2, noise model predictions indicate sports pitch noise impinging the most critical residential dwelling façade will likely have a less significant noise impact, based on likely higher prevailing ambient noise levels at the residences. Therefore, no additional noise mitigation measures are deemed necessary.

Predicted sports pitch noise emissions from all option layouts are deemed to satisfy daytime 16hour WHO/BS 8233:2014 internal & external (garden) noise criteria.

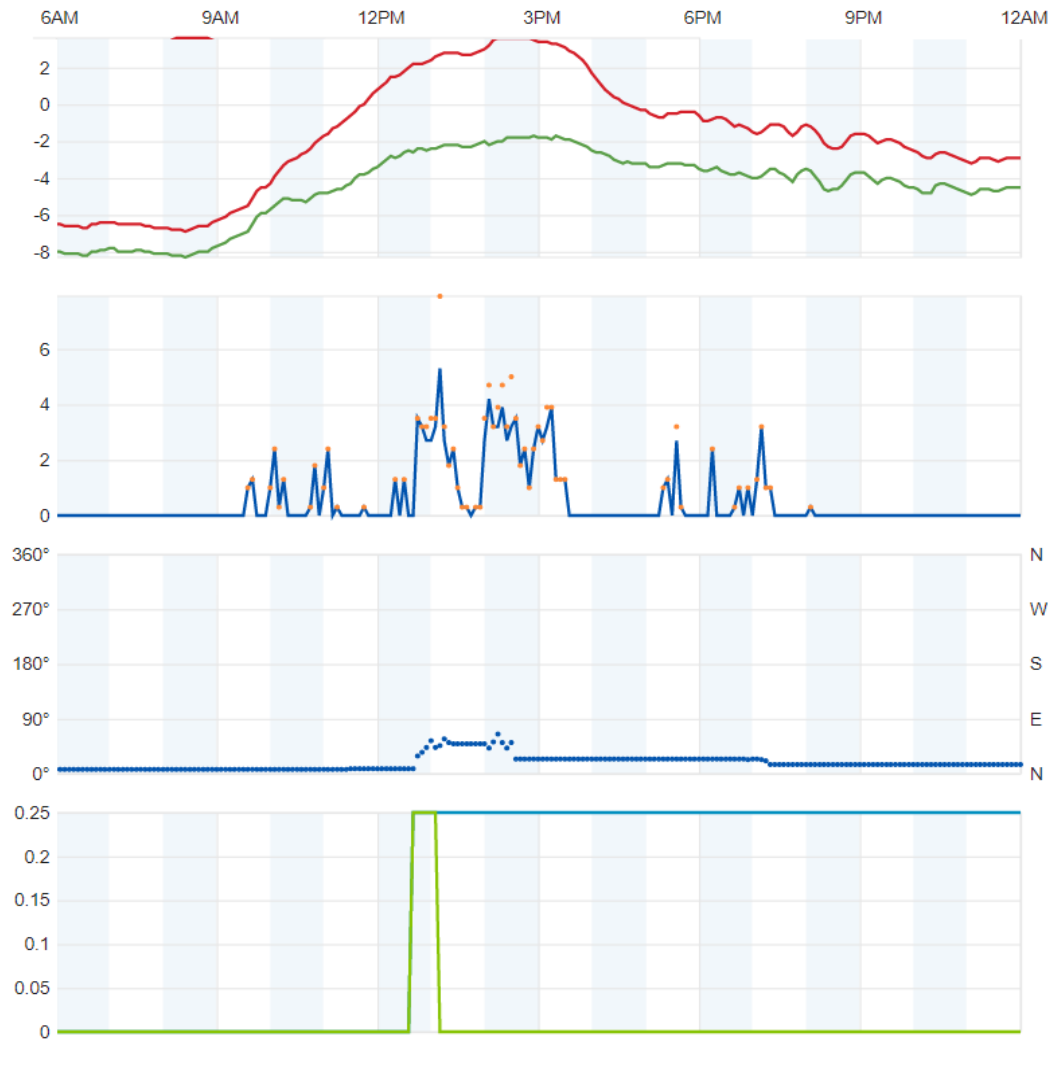


# Appendix A Acoustic Terminology

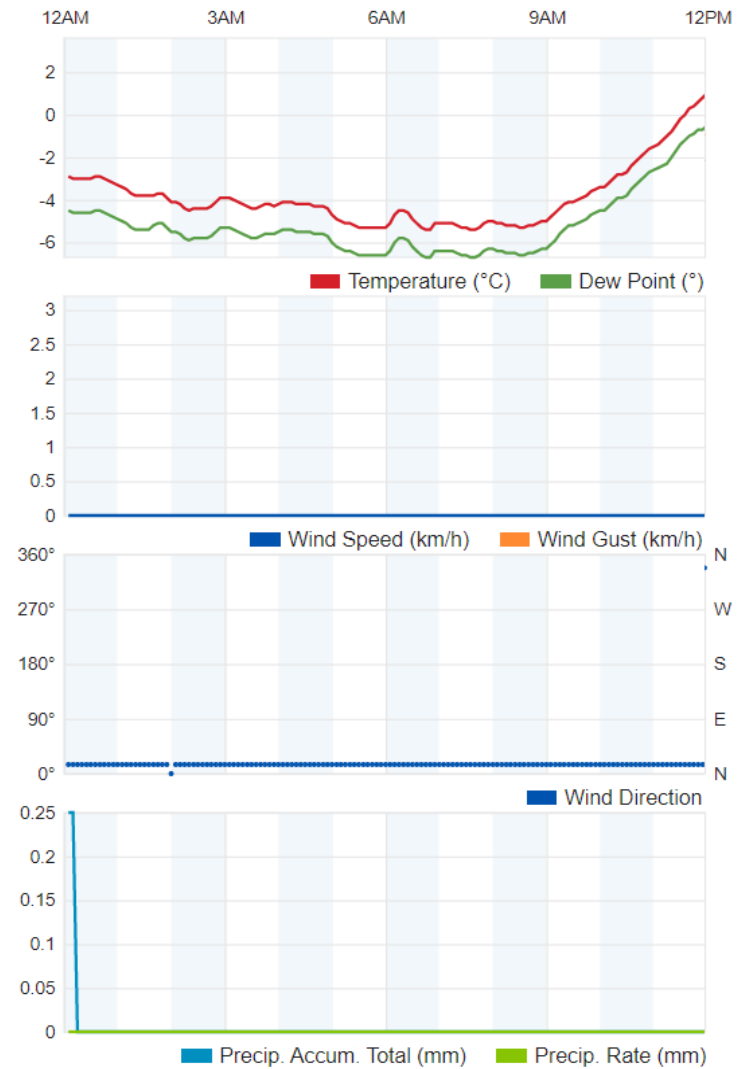
Term	Description
<b>dB (decibel)</b>	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 <sup>-5</sup> Pa).
<b>dB(A)</b>	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
<b>L<sub>Aeq,T</sub></b>	L <sub>Aeq</sub> is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
<b>L<sub>Amax</sub></b>	L <sub>Amax</sub> is the maximum A - weighted sound pressure level recorded over the period stated. L <sub>Amax</sub> is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L <sub>eq</sub> noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
<b>L<sub>10</sub> and L<sub>90</sub></b>	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L <sub>n</sub> indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L <sub>10</sub> is the level exceeded for 10% of the time, and the L <sub>90</sub> is the level exceeded for 90% of the time.
<b>R<sub>w</sub></b>	R <sub>w</sub> is the single-number quantity which characterizes the sound insulating properties of a given material over a range of frequencies. This is typically measured in a laboratory in accordance with BS EN ISO 717-1.
<b>D<sub>n,e,w</sub></b>	D <sub>n,e,w</sub> is the single number quantity which characterizes the airborne sound insulation performance across a given 'element' and is typically used to describe the acoustic performance of trickle ventilators etc.
<b>C<sub>tr</sub></b>	C <sub>tr</sub> is a correction term applied to single-number sound insulation values (R <sub>w</sub> , D <sub>n,e,w</sub> etc.) to afford additional weighting against low frequency performance.
<b>Free-field Level</b>	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and at least 3m from buildings.

# Appendix B Weather Time History

December 15, 2022



December 16, 2022

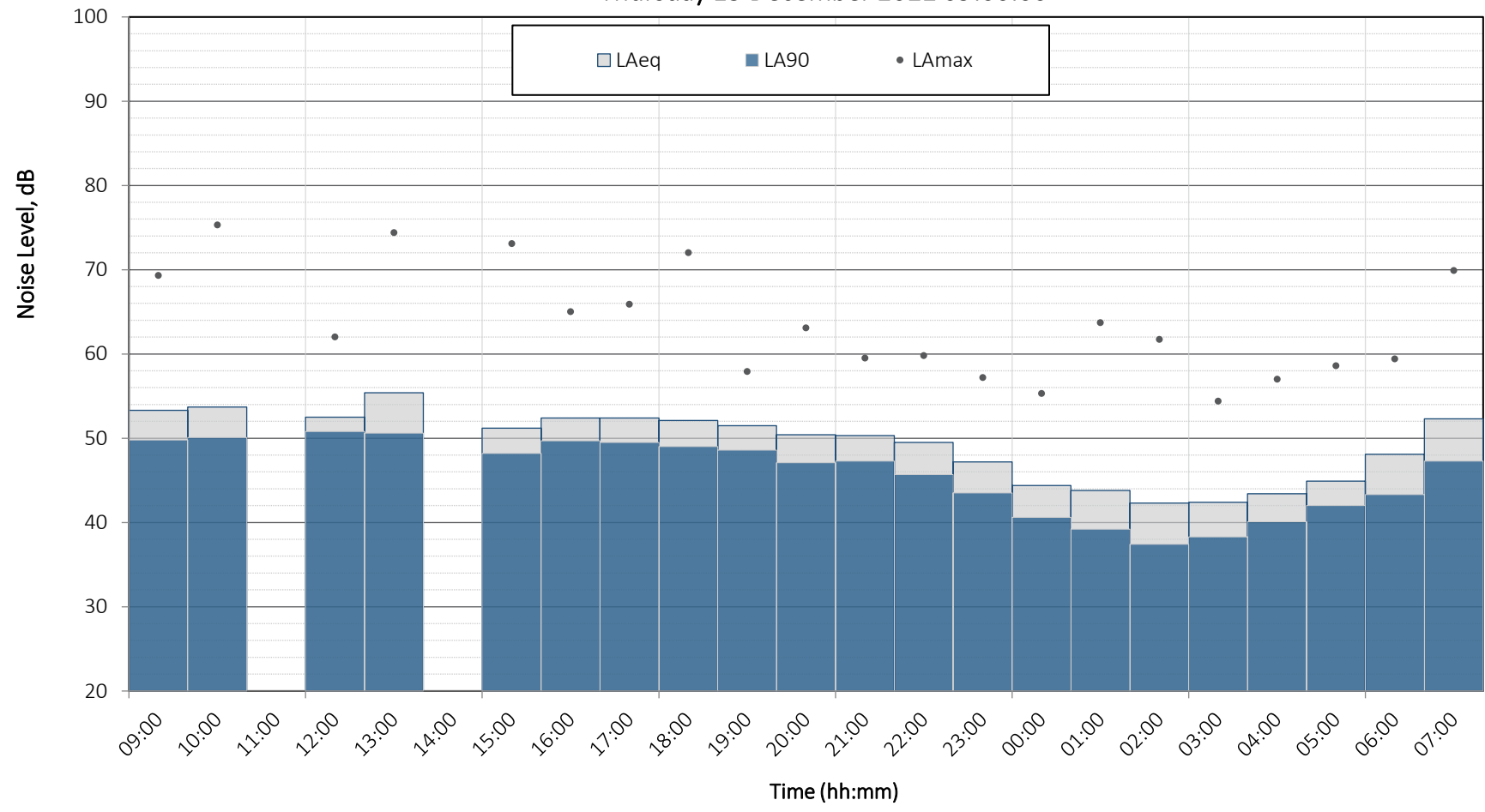


Taken from [www.wunderground.com](http://www.wunderground.com) - weather station ICARDI23 located in Llanedeyrn, Cardiff



# Appendix C Measurement Time History

Proposed 3G Sports Pitch - St Illtyd School  
 Noise Time History Plot  
 Thursday 15 December 2022 09:00:00



Note: Monitoring results affected by near-by construction activity have been excluded from the assessment

# Appendix D Noise Map Predictions

