



Halewood Leisure Centre AGP and Spectator Stands

Noise impact assessment

12212.1

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Revision E



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1 Summary

- 1.1 This report is prepared in support of a Planning Application for improvements to the existing infrastructure associated with the existing AGP at Halewood Leisure Centre.
- 1.2 It is understood that the improvements will include the installation of 2 no. 50 person covered spectator stands, the replacement and lengthening of the existing acoustic screening, installation of a WC Block, dugouts and the relocation of the storage container and turnstile entrance.
- 1.3 Assessment criteria have been proposed based on Sport England and other guidance considered appropriate.
- 1.4 Existing noise levels at the nearest noise sensitive receptors have been measured over a 46-hour period, including periods when the existing AGP was in use.
- 1.5 Source noise levels associated with the pitch have been taken from measured noise levels on site whilst the AGP was in use and compared against published measurements of all-weather Artificial Grass Pitches.
- 1.6 Source noise levels for the spectator stands have been determined using guidance from BS EN ISO 3382-3 and BS EN 9921
- 1.7 Noise propagation to the nearest residential noise sensitive receptors is calculated using environmental noise modelling software, CadnaA. Assumptions are made on a potential worst-case operation of the AGP when the spectator stands are at full capacity to ensure prudence in the assessment. In practice, noise levels are likely to be lower than predicted for most of the time when the pitch is in use.
- 1.8 The outcome of the assessment indicates that the criteria published by Sport England, WHO and IEMA are achieved at the nearby noise sensitive receptors.
- 1.9 The modelled specific noise level is also assessed against the existing acoustic environment. The change is anticipated to result in no impact upon the receptors when considering the long-term impacts in accordance with IEMA guidance.
- 1.10 On the basis of the details contained in this report, the development is considered acceptable from a noise impact perspective.

2 Introduction

- 2.1 Improvements to the existing AGP infrastructure have been proposed at Halewood Leisure Centre, including the installation of 2 no. 50 person covered spectator stands and the replacement and lengthening of the existing acoustic screening.
- 2.2 A layout showing the locations of the AGP and existing acoustic screen is shown in Figure 1. A layout showing the AGP, proposed spectator stands and location of the enhanced acoustic screen is shown in Figure 2.
- 2.3 The operating hours of the AGP and spectator stands are understood to be as follows:
- Monday – Friday, 09:00 – 22:00 hours; and
 - Saturdays, Sundays, and Bank Holidays, 09:00 – 20:00 hours.
- 2.4 The scope of our instruction includes:
- Review guidance documentation to propose appropriate assessment criteria;
 - Measurement of the existing noise environment, including periods when the existing AGP is in use, at a location representative of the nearest noise-sensitive receptors;
 - Determine source noise levels representative of the AGP using Sport England guidance and measured levels;
 - Determine source noise emissions from the proposed spectator stands;
 - Calculate noise propagation using proprietary noise modelling software to the noise-sensitive receptors and assess the impact; and
 - Propose noise mitigation measures where necessary to reduce impact at the noise sensitive receptors.
- 2.5 The noise-sensitive receptors are identified as the residential properties around the perimeter of the field.
- 2.6 This assessment is based on the layout proposed by the client, and acoustic modelling described in this report.



Figure 1: Existing AGP (yellow), with measurement position in purple and existing acoustic barrier



Figure 2: Existing AGP (yellow) and spectator stands (red) with enhanced acoustic barrier

3 Planning policy and noise criteria

3.1 National Planning Policy Framework (NPPF)

3.2 The National Planning Policy Framework (NPPF) Reference 1, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. In respect of noise, Paragraph 180, 191 and 193 of the NPPF states the following:

3.3 Paragraph 180:

"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..."

3.4 Paragraph 191:

"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 life⁶⁵ [See Explanatory Note to the Noise Policy Statement for England];

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;

3.5 Paragraph 193:

3.6 "Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed. "

Noise Policy Statement for England (NPSE)

3.7 The Noise Policy Statement for England, Reference 2, states three 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."*

3.8 The NPSE defines adverse noise impact as follows:

- No Observed Effect Level (NOEL)
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.
- Lowest Observed Adverse Effect Level (LOAEL)
This is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL)
This is the level above which significant adverse effects on health and quality of life occur

3.9 The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

3.10 Available guidance

3.11 There is not currently a standardised method for assessing noise from field-based sporting activities.

3.12 The most relevant guidelines have been reviewed and reasonable criteria proposed for the assessment of potential noise associated with the AGP.

3.13 Sport England guidance on Artificial Grass Pitches (AGP)

3.14 Sport England issued the guidance Artificial Grass Pitch (AGP) Acoustics - Planning Implications, Reference 3, in 2015.

3.15 The guidance suggests the consideration of the criteria set out by The National Planning Policy Framework and Local Planning Authority planning policies.

3.16 This guidance also refers to the WHO guidelines to achieve ambient outdoor noise levels and states the following:

“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 $L_{Aeq(1\text{ hour})}$ upper noise limit external to residential properties and within external living areas”

3.17 This guidance is considered most relevant for artificial grass pitches, or sports pitches, that may be used on a commercial basis.

3.18 The noise levels are consistent with the WHO Guidelines for Community Noise, Reference 4, and BS 8233, Reference 5, guideline levels but assessed over a shorter time period.

3.19 WHO guidelines

3.20 WHO Guidelines for Community Noise provides guideline values for community noise in specific environments.

3.21 For dwellings, the guidance states the following:

“To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .”

3.22 BS 8233 guidance is consistent with that of the WHO.

3.23 IEMA

3.24 IEMA guidance, Reference 6, addresses the key principles of a noise impact assessment and can be used to assess all development proposals where noise impacts are likely to occur. This guidance is also referenced within the Sports England document for use where there are changes to existing natural grass pitches or existing noise residual noise levels are high.

3.25 It provides guidance on assessing the long-term noise impact based on the change in noise levels, as shown in Table 1.

Long-term impact classification	Change in noise level at a sensitive noise receptor
None / not significant	Less than 2.9 dB L_{Aeq} change in sound level
Minor	A 3 to 4.9 dB L_{Aeq} change in sound level
Moderate	A 4.9 to 9.9 dB L_{Aeq} change in sound level
Major	Greater than 10 dB L_{Aeq} change in sound level

Table 1: Effect due to change of noise level

3.26 It is proposed to assess the change in $L_{Aeq,T}$ noise levels due to the proposed crowd noise from the spectator stands following this guidance.

3.27 Assessment criteria

3.28 Following the review of available guidance, a summary of the assessment criteria adopted for this assessment is shown in Table 2.

Noise source	Guidance	Parameter	Criteria
AGP	Sports England & WHO	$L_{Aeq,1hr}$	≤ 50 dB
	IEMA	$L_{Aeq, 1\text{ hr}}$ increase	≤ 5 dB
Crowd noise	IEMA	$L_{Aeq, 1\text{ hr}}$ increase	≤ 5 dB

Table 2: Assessment criteria

4 Existing acoustic environment

- 4.1 The existing acoustic environment was measured from 12:15 hours on 23rd October 2024.
- 4.2 Measurements were undertaken over a 46-hour period to determine existing noise levels at the nearest residential receptors during the proposed operational hours.
- 4.3 The measurement positions are shown in Figure 1.
- 4.4 The microphone was located 2.5 metres above ground level and away from other reflecting surfaces such that the measurements are considered free-field.
- 4.5 At the time of the measurements, works were being undertaken to repair the existing acoustic barrier, therefore it was not possible to leave the long term measurement at the same position as the previous noise surveys in 2018.
- 4.6 The chosen measurement location is considered to be representative of the existing background noise levels at the nearest receptors.
- 4.7 Data was recorded in single-octave band frequencies at one-second intervals throughout the measurement period.
- 4.8 The most significant noise sources during the measurement period were noted to be road traffic noise on the surrounding road networks and noise from users of the AGP.
- 4.9 The equipment used is listed in Table 3.

Equipment	Model	Serial no.
Sound Level Meter	XL2	A2A-12269-E0
Calibrator	Larson Davis CAL 200	13404

Table 3: Equipment used

- 4.10 Both meter and calibrator have current calibration certificates traceable to national standards. The sound level meter has been calibrated within the last two years and calibrator has been calibrated within the last year in accordance with the guidance of BS 4142; calibration certificates are available on request.
- 4.11 The equipment was field-calibrated before and after the measurements with no significant drift in sensitivity noted.
- 4.12 The measured existing residual $L_{Aeq,T}$ levels are shown in Table 4.

Measurement period	$L_{Aeq,T}$ (dB)
Daytime (08:00 – 19:00 hours)	56
Evening (19:00 – 23:00 hours)	57
Night-time (23:00 – 07:00 hours)	48

Table 4: Measured existing sound levels based on proposed opening hours

- 4.13 During the measurement periods, activities associated with the existing AGP were taking place and have been included in the calculation of existing noise levels.

5 Source noise levels

5.1 Artificial grass pitch (AGP)

- 5.2 The most significant noise sources associated with use of AGP are from players shouting and whistles during matches.
- 5.3 Based on a study of AGPs by an Environmental Health Officer published by the Institute of Acoustics, Reference 8, the $L_{Aeq,T}$ values at 10 m from the pitch boundary for the majority of sites studied are within the range of 56 dB to 58 dB.
- 5.4 Sports England guidance also states that “A typical free-field noise level from an AGP at 10 m from side line halfway marking is 58 dB $L_{Aeq,1hr}$ ”. These noise levels include noise from the voices of the players and the spectators.
- 5.5 The existing AGP was in use whilst the long-term measurements were carried out. The noise source was calibrated to achieve the same noise level as was measured whilst the AGP was in use at the measurement location, which was calculated to be marginally higher than the levels stated in the Sports England guidance. This is considered to be representative of typical noise levels whilst the AGP is in use.
- 5.6 A comparison of the measured noise levels and Sports England noise levels is presented in Table 5.

Source	Noise level at 10 m from the side line, dB(A)
Sports England guidance	58
Measured noise levels at Halewood Leisure Centre	61

Table 5: Comparison of source noise levels

5.7 Crowd noise

- 5.8 Based on reviews of previous measurements within sports stands at football and rugby matches it is noted that the noise levels from spectators varies with events on the pitch.
- 5.9 During more exciting passages of play, or where a goal is scored, the spectators will cheer much more loudly than during less exciting passages of play. It is anticipated that noise from crowds clapping will be no louder than the predicted noise from crowds cheering, and therefore the assessment does not include noise from crowds clapping.
- 5.10 It is understood that crowds create banging noises during more exciting passages of play. This has not been included as part of the assessment and should be controlled as part of a noise management plan.
- 5.11 The sound power levels for spectators within the proposed stand are calculated using speech spectra data from BS EN ISO 3382-3 and sound pressure levels of speech with different vocal effort from BS EN 9921, Reference 10.
- 5.12 Table 6 shows Table 1 from BS EN ISO 3382-3 which gives speech spectra for normal speech.

Band No. <i>i</i>	Frequency Hz	Sound power level $L_{W,S}$ dB re 1 pW	Sound pressure level $L_{p,S,1\text{ m}}$		A-weighting <i>A</i> dB
			Directional source dB re 20 μ Pa	Omnidirectional source dB re 20 μ Pa	
1	125	60,9	51,2	49,9	-16,1
2	250	65,3	57,2	54,3	-8,6
3	500	69,0	59,8	58,0	-3,2
4	1 000	63,0	53,5	52,0	0,0
5	2 000	55,8	48,8	44,8	1,2
6	4 000	49,8	43,8	38,8	1,0
7	8 000	44,5	38,6	33,5	-1,1
	A-weighted	68,4	59,5	57,4	

Table 6: Speech spectra for ‘normal speech’ from BS EN ISO 3382-3

- 5.13 The varying sound pressure levels for different vocal effort at 1 m in front of a speaker from BS EN 9921 are shown in Table 7.

Table A.1 — Vocal effort of a male speaker and related A-weighted speech level (dB re 20 μ Pa) at 1 m in front of the mouth

Vocal effort	$L_{S,A,1\text{ m}}$ dB
Very loud	78
Loud	72
Raised	66
Normal	60
Relaxed	54

Table 7: Sound pressure levels for different vocal effort

- 5.14 The stands were assumed to be filled to capacity with 50 spectators per stand. The total sound power level for the crowd cheering was calculated assuming 50 spectators (25 per stand) are all cheering simultaneously, this assumes only half of the spectators were cheering at the event.
- 5.15 Where less exciting passages of play occur, resulting in lower spectator excitement, it has been assumed that 1 in 3 spectators are talking with a raised voice level.
- 5.16 The calculated total sound power levels are shown in Table 8.

Vocal effort	dB(A)	Single-octave band centre frequency (Hz)					
		Sound power levels (dB)					
		125	250	500	1k	2k	4k
Crowd cheering	89	66	77	87	84	78	72
Raised voices	83	60	71	81	78	72	66

Table 8: Calculated sound power levels

6 Activities taking place on the AGP during the measurement period

- 6.1 A timetable has been provided by the client detailing the activities which took place at the AGP during the measurement period, including the ages of the users of the site, as presented in Table 9. The corresponding $L_{Aeq, T}$ for each activity is also presented.

Date/Time	Duration	Activity	Age group	$L_{Aeq, T}$ (dB)
23/10/2024 16:00	4 hours	Tom Owens – Private Football Training	-	59
23/10/2024 17:00	2 hours	Football Performance Academy	Under 7 years	58
23/10/2024 17:00	1 hour	FGS Benfica	Under 11 years	58
23/10/2024 18:00	1 hour	Quarry Juniors	-	62
23/10/2024 19:00	1 hour	Old Xavierians FC A and B Team	-	58
23/10/2024 19:00	1 hour	Halewood Town	Under 14 years	58
24/10/2024 10:30	1.5 hours	Tom Owens – Private Football Training	-	54
24/10/2024 12:00	1.5 hours	Tom Owens – Private Football Training	-	54
24/10/2024 17:00	1 hour	Apollo	Age 5 – 13 years	61
24/10/2024 18:00	1 hour	Kingsthorpe Junior	-	58

24/10/2024 18:00	1 hour	Men's Football	Open Age	58
24/10/2024 19:00	1 hour	Apollo	Age 5 – 13	63
24/10/2024 19:00	1 hour	Football Five-a-side	-	63
24/10/2024 19:00	1 hour	Hough Green FC Mens	Adult	63
24/10/2024 19:00	1 hour	Apollo	-	63
24/10/2024 20:00	1 hour	Men's Football	Open Age	60
24/10/2024 20:00	1 hour	Halewood Lions	Under 15 years	60
24/10/2024 20:00	1 hour	Apollo Men's	Adult	60

Table 9: Activities on AGP during measurement period

7 Noise transmission and propagation

- 7.1 Noise transmission and propagation is modelled to the NSRs based on the noise source data detailed, using proprietary software, CadnaA.
- 7.2 This models noise propagation outdoors according to ISO 9613-2, Reference 11.
- 7.3 The model parameters and assumptions are summarised in Table 10.

Parameter	Details
Site location and layout	Architects' drawings, Reference 12
Topography	Modelled with no changes in topography
Building heights	3 m per storey + 2 m roof (residential properties)
Receptor positions	On the façade closest to the source at a height of 1.5 m and 4 m to represent ground and first floor window heights respectively
Building and barrier absorption coefficient	0.21 to represent a reflection loss of 1 dB
G, Ground factor	Soft ground, G=1
Max. order of reflections	Three

Table 10: Modelling parameters and assumptions

- 7.4 $L_{Aeq,T}$ levels due to the AGP and spectator stands are modelled as an area source.
- 7.5 The AGP and spectator stands are assumed to be in use continuously over the one-hour periods to represent its worst-case operation.
- 7.6 It is assumed that cheering will occur for 5 minutes in every hour, and spectators will speak with raised voices for 30 minutes per hour.

8 Existing noise impact

- 8.1 The noise impact from the AGP with the existing barrier has been modelled. The $L_{Aeq, 1-hr}$ noise contours at 1.5 m height, representative of ground floor window height, are presented in Figure 3.
- 8.2 The modelled contours do not include any noise from spectators cheering, and are therefore representative of a training session held on the AGP, such as the sessions measured during the noise survey. Since the AGP currently does not have any spectator stands, it is assumed that spectators are permitted to watch activities from any location along the southern side of the AGP.

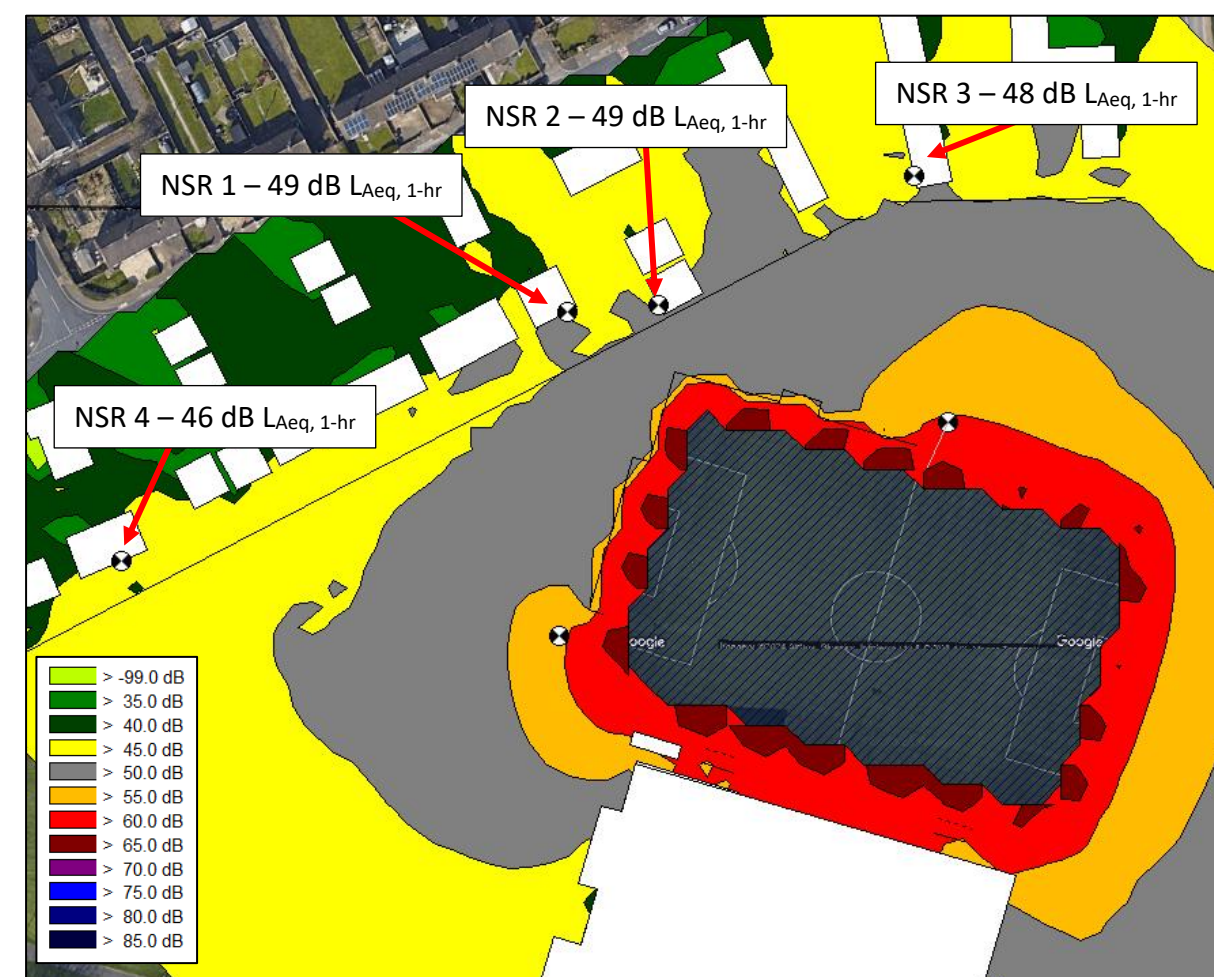


Figure 3: Noise impact from AGP with existing barrier

9 Noise impact assessment

- 9.1 The modelled $L_{Aeq,1hr}$ noise contours at 1.5 m height, representative of ground floor window height, are presented in Figure 4 to represent the crowd cheering and in Figure 5 to represent the crowd speaking with raised voices. The impact is modelled with the addition of the proposed acoustic barrier, which runs along the western and part of the northern side of the AGP, as shown in blue.
- 9.2 The barrier included in the model is 3.5 m high, should have no cracks or gaps, be continuous to the ground, and have a surface density of at least 10 kg/m^2 , such as a timber fence with overlapping boards or a brick wall.

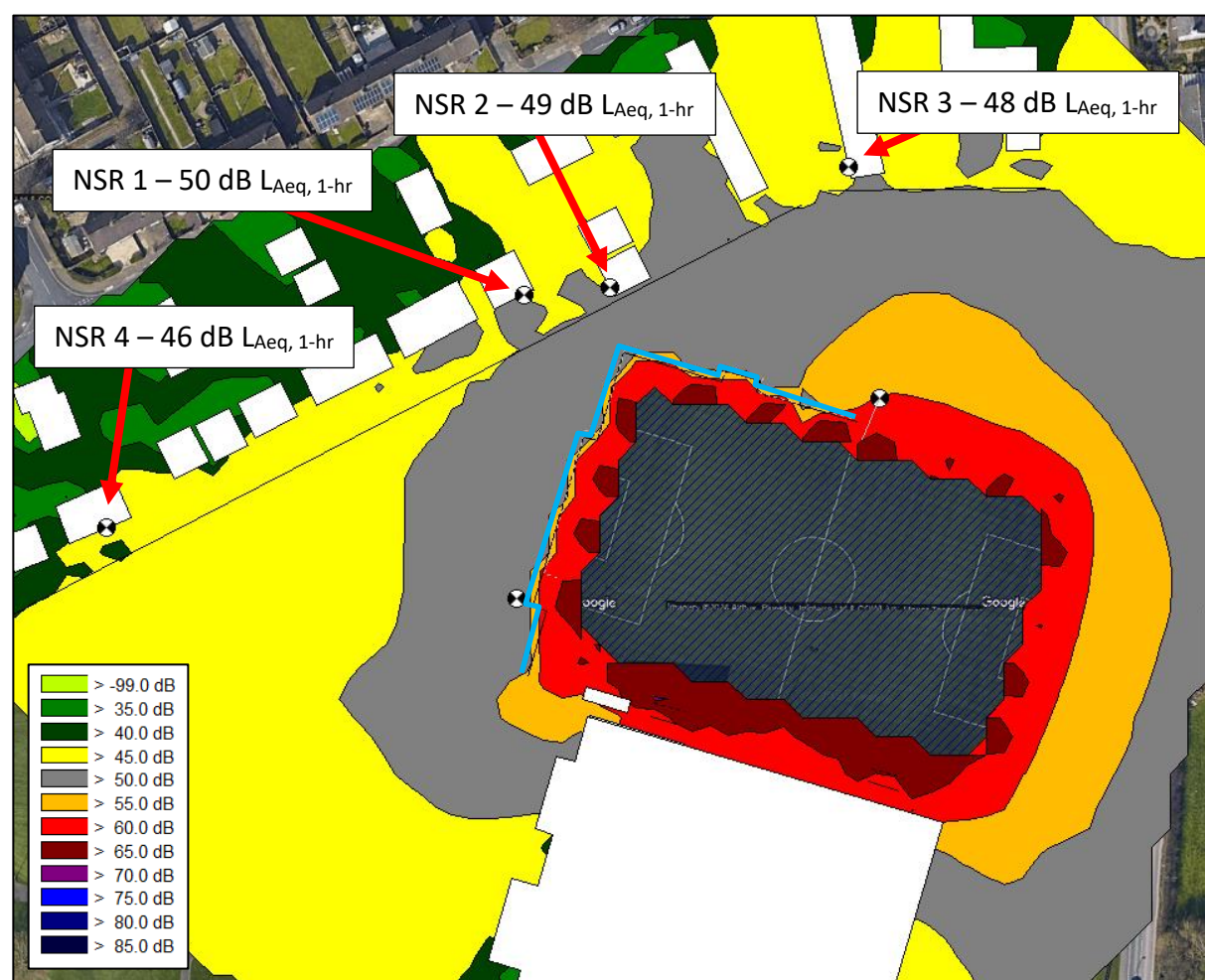


Figure 4: AGP and crowd cheering calculated $L_{Aeq,1hr}$ noise contours at 1.5 m height

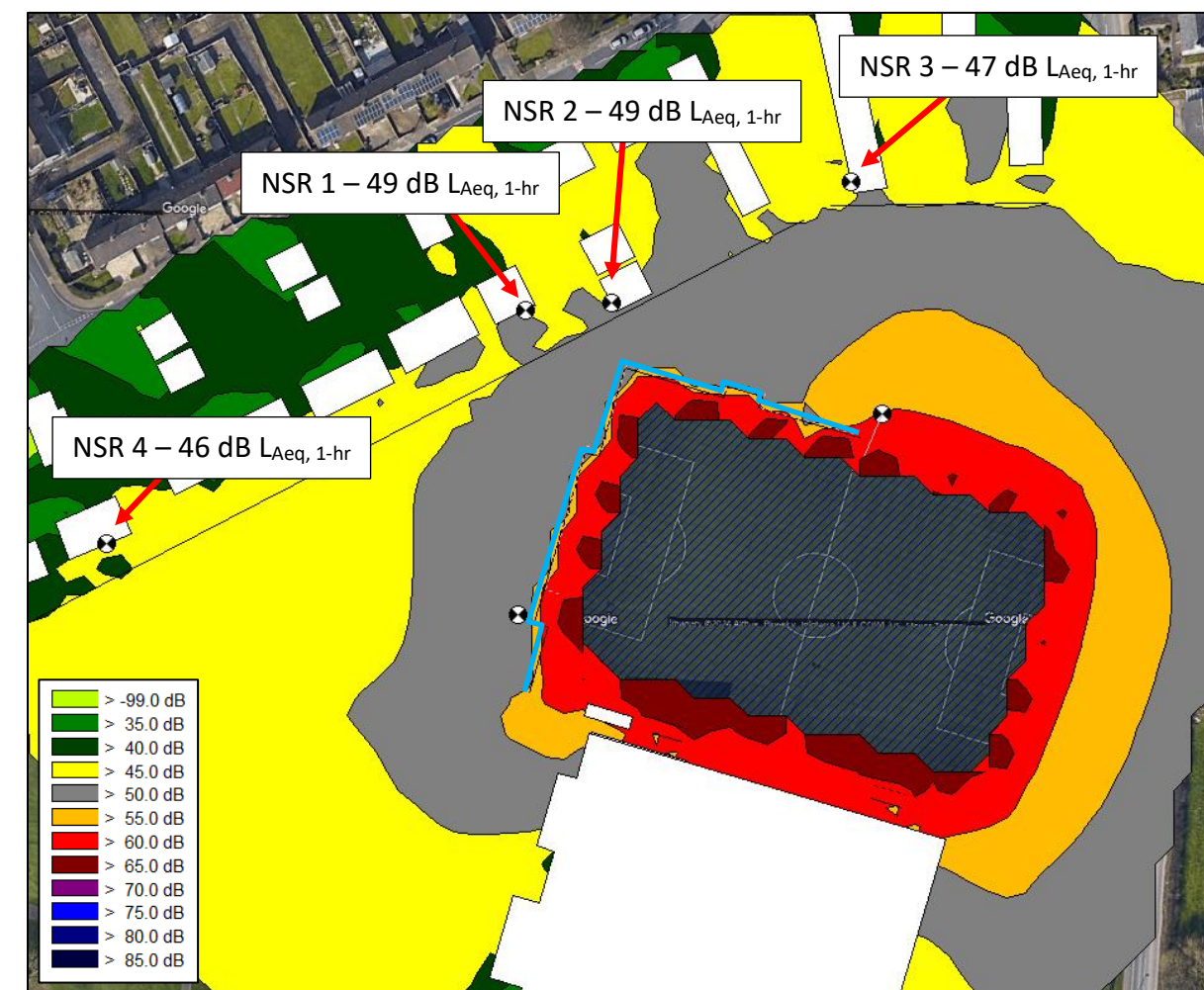


Figure 5: AGP and crowd speaking with raised voices calculated $L_{Aeq,1hr}$ noise contours at 1.5 m height

9.3 Results

9.4 The calculated specific noise levels from the AGP at the noise sensitive receptors are shown in Table 11. The table compares the existing noise levels at the site with the current acoustic barrier against the calculated noise levels on the site, which includes the addition of the enhanced acoustic barrier and the spectator stands.

Crowd activity level	Calculated noise level at NSR 1, dB		
	Existing measured noise levels $L_{Aeq,T}$	Calculated noise levels $L_{Aeq,1hr}$	Increase in $L_{Aeq,T}$ noise level
AGP + Cheering	56	50	08:00 – 19:00 hours: + 1.0 dB
	57	50	19:00 – 23:00 hours: + 0.8 dB
AGP + Raised voices	56	49	08:00 – 19:00 hours: + 0.8 dB
	57	49	19:00 – 23:00 hours: + 0.6 dB

Table 11: Calculated pitch noise levels without proposed upgraded acoustic barrier

- 9.5 The specific $L_{Aeq,1hr}$ noise level at the identified NSR is calculated to be below the Sports England and WHO criterion of 50 dB $L_{Aeq,1hr}$ without requiring further mitigation.
- 9.6 The calculated increase in the residual noise level from the spectator stands indicates that no significant long-term effects upon the nearest noise sensitive receptors would result from introducing noise associated with the use of the spectator stands.
- 9.7 The assessment does not include noise from crowds clapping, however it is anticipated that noise from clapping will be no louder than the predicted noise from crowds cheering in the spectator stands.
- 9.8 It is considered that the proposals will not increase the maximum noise levels based on the following:
- The measurements were carried out with the existing acoustic screen providing the only noise mitigation. This acoustic screen is dilapidated, cracked and does not contain noise contours as it should.
 - The installation of a new, extended, properly installed acoustic screen will enhance the noise mitigation from activities taking place on the AGP and from the formalisation of spectator assembly in the locations of the proposed stands.
- 9.9 It is also noted that the AGP is already in use regularly for fixtures and training sessions, therefore it is likely that the existing noise climate may already include noise from spectators standing on the sidelines.

10 Conclusion

- 10.1 Noise levels affecting the residential NSRs due to the proposed spectator stands and installation of the enhanced acoustic barrier have been calculated.
- 10.2 The outcome of the assessment indicates that criteria published by Sports England and WHO are achieved on the basis of implementing the proposed mitigation measures and controlling internal noise levels during the night-time. A comparison of the specific noise impact against the existing residual level, using the guidance of IEMA, indicates that no significant long-term effects would be expected.
- 10.3 Therefore, on the basis of the details and proposed replacement and extension to the acoustic barrier contained in this report, the development is considered acceptable from a noise impact perspective.

11 References

- 1 National Planning Policy Framework, Department for Communities and Local Government, December 2023.
- 2 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 3 Design Guidance Note: Artificial Grass Pitch (AGP) Acoustics – Planning Implications, New Guidance for 2015, Sports England.
- 4 Guidelines for community noise, WHO, 1999.
- 5 BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.
- 6 Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment (IEMA), 2014.
- 7 The development and evaluation of an assessment methodology for the prediction and identification of noise impact from Multi Use Games Areas, Masters Derby: University of Derby, Fallon, R., 2012.
- 8 The assessment of noise from all weather sports pitches, Charley Vaughan, IOA Acoustics Bulletin Vol 43 No 1 January/February 2018.
- 9 CadnaA environmental noise modelling software, version 2024, Datakustik GmbH.
- 10 BS EN ISO 9921:2003 Ergonomics – Assessment of speech communication
- 11 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors, 2024.
- 12 Steve Wells Associates, Drawing no 205-104-1003 Proposed Site Plan